Report No.

Weathering the Storm: Options for Disaster Risk Financing in Vietnam

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THE WORLD BANK

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Abbreviations and Acronyms

ADB	Asian Development Bank
CAR	Construction All Risk
CAT DDO	Catastrophe Risk Deferred Drawdown Option
CCFSC	Central Committee for Flood and Storm Control
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CRMG	Commodity Risk Management Group of the World Bank
DANA	Damage Assessment and Needs Assessment (national system for natural disasters' damage and loss assessment developed in 2006)
DDMFSC	Department of Dyke Management, Flood and Storm Control
DMC	Disaster Management Center
DPL	Development Policy Loan
EACVF	World Bank Office – Hanoi
EAR	Erection All Risk
EASVS	Vietnam Sustainable Development
ECLAC	Economic Commission for Latin America and the Caribbean
FFSP	Fund for Flood and Storm Protection
FONDEN	*Fondo de Desastres Naturales* (Mexico National Disaster Fund)
GCMNB	Global Capital Markets, Non-Bank Financial Institutions
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery Division of the World Bank
GIS	Geographic Information System
GoV	Socialist Republic of Vietnam (Government of Vietnam)
GSO	General Statistical Office
HMDC	Hydro-Meteorological Data Centre of the NHMS
INS	*Instituto Nacional de Seguro* (Costa Rica public insurance and reinsurance company)
MARD	Ministry of Agriculture and Rural Development
MoF	Ministry of Finance
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
NCHMF	National Centre for Hydro-Meteorological Forecasting
NGO	Non-Government Organization
NHMS	National Hydro-Meteorological Services
NSNDPRM	National Strategy for Natural Disaster Prevention, Response and Mitigation
OECD	Organization for Economic Co-operation and Development
P&C	Property and Casualty
PML	Probable Maximum Loss
SOCCSFC	Standing Office of the Central Committee for Storm and Flood Control
SRF	State Reserve Fund
TCIP	Turkish Catastrophe Insurance Pool
TT Hue	Thua Thien Hue province
UNDP	United Nation Development Project
VIBARD	Vietnam Bank for Agriculture and Rural Development
VND	Value of National Disaster

Acknowledgments

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Executive Summary

1. ***In the context of the National Strategy for Natural Disaster Prevention, Response and Mitigation approved by the Government of Vietnam, in 2009 the Ministry of Finance requested the World Bank to conduct a study on the financial protection of the state against natural disasters***. This study aims to build institutional capacity on catastrophe risk financing and to identify financial options which are affordable and effective to the Government of Vietnam, including both sovereign risk financing and private insurance instruments. The study relies on the following four components: (i) financial risk assessment; (ii) review of Government budgetary process for financing natural disasters; (iii) dynamic fiscal funding gap analysis; and (iv) options for the financial protection of the state against natural disasters.

Key Findings and Challenges

2. ***The annual average value of natural disaster losses, as reported by the public authorities, are estimated at one percent of GDP over the last 20 years, or US$ 900 million in 2008 GDP, and could exceed US$3.8 billion for a major disaster.*** Excessive and extended inundation flooding and tropical storms represent about 95 percent of the reported value of losses. The analysis of selected events shows under a catastrophic typhoon event, approximately one third of all the value of damage is incurred by agriculture, a quarter by private housing and the rest by public-sector property. Preliminary catastrophe risk analysis indicates that a major disaster year in Vietnam, like one occurring every century, could cause losses in excess of US$3.8 billion at 2008 GDP values.

3. ***The official loss values may be under-estimated because the current post-disaster damage assessment and reporting system tends to under-report the financial value of the damages.*** The current damage assessment and needs assessment (DANA) system is mainly intended to record the direct costs of recovery and reconstruction of damaged property and infrastructure and does not report the value of secondary or business interruption losses: as such these estimates probably significantly under-estimate the true value of losses to the Vietnamese economy. The report highlights the need for more standardized damage data, especially estimated financial values for each category of damage, to be collected through a comprehensive damage and needs assessment system. In addition, the current disaster damage assessment system may under-estimate the damage to private sector property and commercial business and industry.

4. ***The Contingency Budgets are currently the main source of post-disaster financing of emergency relief and recovery expenditures by the Government of Vietnam***. Under the State Budget Law of 2002, Central and Local governments are required to allocate between 2 percent and 5 percent from their total planned budget for capital and recurrent expenditures to contingency budgets. This represented US$650 million in 2008. In practice it is understood that a high proportion of the Central and Local Contingency Budgets are actually spent on natural disaster risk prevention / mitigation prior to the onset of the main typhoon and flood seasons and therefore that the proportion of funds available to pay for natural disaster recovery operations is much lower than the 2% figure. These funds can be complemented by other sources, such as the Financial Reserve Funds or the Surplus Revenue, although these additional resources have been very scarce in recent years.

5. ***The current Contingency Budgets have been able fund the post-disaster recovery needs in the period 2000-08, but they may be insufficient for more severe disasters.*** The dynamic funding gap analysis suggests that the Government of Vietnam has been able to finance the post-

disaster recovery needs out of its short term fiscal resources, and mainly from the central and local contingency budgets. Based on the data available, the analysis shows that even in the very severe loss years of 2006 to 2008, government finances have been adequate to cover the short-term recovery expenditures. Once every ten years, the government contingency budget allocated to natural disasters may not be enough to cover the recovery costs estimated at US$500 million.

6. ***Major reconstruction funding gaps have been identified between 2006 and 2008***. The financing of the reconstruction activities cannot be secured through short-term fiscal resources: the contingency budgets cannot be used for post-disaster reconstruction activities and the planned capital expenditures cannot be easily reallocated. As a consequence, the Government of Vietnam faces major reconstruction funding gaps in the aftermath of a disaster. Based on the data available, this funding gap was estimated at US$275 million in 2006, which is probably an underestimate due to the fact that the current damage assessment procedures may underestimate the full costs of reconstruction. Such gaps are expected to be even bigger for major disasters: based on the preliminary catastrophe risk analysis, a one-in-50 year event would create a reconstruction funding gap estimated between US$850 million and US$900 million.

7. ***Disaster risk financing can provide financial incentives to prevention and preparedness activities and allow for rapid response once a disaster occurs.*** Disaster risk financing should complement disaster risk mitigation and focus on major events that cannot be efficiently mitigated through risk reduction activities. Disaster risk financing can also sensitize about the financial impact of natural disasters and create financial incentives to further invest in disaster risk reduction.

8. ***A cost-effective disaster risk financing strategy should rely on an optimal combination of financial instruments including, but not only limited to, contingency budgets***. Contingency budgets give the Government of Vietnam some flexibility to finance post-disaster recovery needs, but this source of financing is likely to be insufficient for major natural disasters. Major disaster losses should be layered and financed through a combination of financial instruments including, contingency budget, national disaster reserves, contingent credit, and risk transfer instruments (including insurance).

Options for Consideration

9. ***Government of Vietnam could formally allocate a portion of its contingency budget for natural disasters***. In order to avoid a situation where contingency funds are almost exhausted when a disaster occurs, Government of Vietnam could allocate in its contingency budget a fixed percentage for the financing of the post-disaster recovery expenditures. Over the period 2001-08, the government-funded recovery expenditure has represented on average almost half of the Contingency budget.

10. ***Government of Vietnam could also build up reserves dedicated to natural disasters from an annual budget allocation into the existing Financial Reserve Fund***. Government of Vietnam could complement the contingency budget with a reserve mechanism for natural disasters, for example to be built up over time from an annual budget allocation to the Financial Reserve Fund. These reserves could be used once the contingency budget is exhausted to finance post-disaster recovery expenditures and/or to start reconstruction operations.

11. ***Contingency budgets and/or reserves could be complemented with a contingent credit***. Should the contingency budgets and/or the national reserves be insufficient to cover the recovery needs in the aftermath of a disaster, the Government of Vietnam could access additional financial resources through a contingent credit. For example, the World Bank offers a Development Policy

Loan (DPL) with a Catastrophe Risk Deferred Drawdown Option (CAT DDO) to IBRD-eligible countries as an immediate budget support to governments hit by a natural disaster. Government of Vietnam could also build a Contingent Emergency Response component in its standard investment operations with the World Bank. Preliminary analysis in this report shows that a US$250 million contingent credit, on the top of the contingency budget and reserves, would allow the Government of Vietnam to finance the recovery and/or reconstruction activities caused by a major disaster.

12. ***Sovereign parametric disaster insurance could be further explored to protect against the fiscal impact of major events occurring every ten years or less frequently.*** Parametric insurance is an innovative form of insurance triggered by pre-defined parameters such as the wind speed or the excess rainfall level for tropical storms and typhoons. It provides immediate liquidity to the policyholder in the aftermath of a disaster. Sovereign parametric insurance against natural disasters has been purchased by many of the Caribbean islands and by Mexico.

13. ***The Government of Vietnam could set up a dedicated reserve fund for natural disasters for the post-disaster reconstruction of public assets.*** This fund would aim at securing financing for the post-disaster reconstruction of public assets both from an annual budget allocation and from external financing, including insurance. The national disaster fund FONDEN in Mexico is an interesting case the Government of Vietnam may want to further explore. Such a fund could build upon the ongoing rapid disbursement facility set up under the Natural Disaster Risk Management Project co-financed by the World Bank.

14. ***In the medium term, the Government of Vietnam could promote the development of the local property catastrophe insurance market, especially for private urban dwellings of middle- and high-income households***. The private residential property insurance market in Vietnam is still under-developed. As this market develops in the future, the Government could promote a private residential catastrophe insurance program through the establishment of a catastrophe insurance pool, like in Turkey.

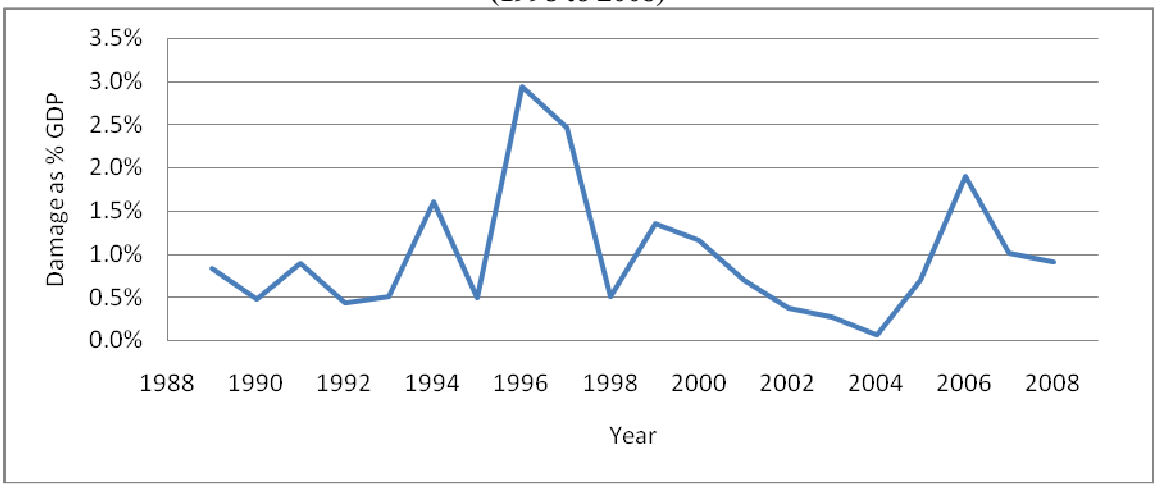
15. ***In the medium term, agricultural insurance could also be promoted through public-private partnerships***. The agricultural sector in Vietnam is highly exposed to natural hazards and approximately one third of the reported value of damage is incurred by this sector. Currently Government support to affected farmers is restricted to small payments in kind (inputs of seeds and fertilizers) The provision of agricultural insurance in 2009 is extremely restricted and the past attempts have not been very successful. Further work could build on the ongoing initiatives to design and pilot-implement an agricultural insurance program based on public-private partnerships. Currently the Government is investigating options to introduce a national agricultural insurance program.

Chapter 1: Introduction

Various measures have recently been undertaken to help strengthen Vietnam's resilience to natural disasters, including the Government's approval of the *National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020* in November 2007 and increasing emphasis on community-based initiatives. However, the country remains extremely vulnerable to natural hazards. Vietnam is one of the most exposed countries in the world to multiple natural hazards including floods and tropical cyclones (typhoon), tornados, landslide and droughts. A very high proportion of the population lives in the coastal areas of the country and they are adversely affected by seasonal floods and storms. (World Bank 2005a; GoV 2004).

Over the past 20 years, natural disasters have resulted in a total loss of life of 13,035 persons (average of 652 lives per year), with major damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) valued at VND 91 trillion (US$ 6.4 billion) or an average of VND 4,547 billion (US$ 322 million per year) in current prices. Over this period the annual costs of natural disasters have been equivalent to an average of about 1% of GDP with a peak loss of nearly 3% of GDP in 2006 (Figure1.1.). Moreover, there are rising concerns about the impact of climate change on the frequency and intensity of climatic hazards in Vietnam. The country has been identified as one of the five worst affected countries by climate change owing to the fact that a large proportion of the population, industry, infrastructure and agriculture are concentrated in the narrow coastal strip and low-lying Red River Basin and Mekong Delta (World Bank 2007).

Figure 1.1. Value of Natural Disasters as % of Gross Domestic Product (1998 to 2008)



Source: World Bank analysis of CCFSC damage data in VND.
Note: The analysis is based on the actual VND value of losses and actual GDP value in each year

In the aftermath of a disaster, Government of Vietnam, GoV, uses a combination of financial resources to respond to the financial needs. Despite the fact that the Government, the private sector and donors absorb some of these losses, there is still an estimated large resource gap between available financial resources and post-disaster expenditure requirements. An earlier study identified an overall funding gap for all natural disaster relief and reconstruction requirements and the available financial resources from central and local government, local voluntary donations and international aid donor funding of between US$130 million in 2000

which was a severe year for typhoon and flood losses and US$ 46 million in 2001 which was a low loss year. (World Bank 2005b).

According to Article 9(1) of the GoV's Law on State Budget, 2 to 5 percent of the central and local budgets should be allocated to a contingency fund to *"meet contingent spending on preventing, combating and overcoming the consequences of the act of God and fires, important tasks of national defense and security."* Vietnam has a very efficient natural disaster management system which operates from commune level to national level and which is capable of mobilizing major human, financial and emergency relief resources in the aftermath of a major catastrophe. Previous studies have shown that government can normally fully finance short-term emergency relief and early recovery operations out of the central and local contingency funds, but that there is a major funding gap for reconstruction expenditure. However, despite the substantial economic losses caused by natural disasters in the country and Government of Vietnam's recognition of the adverse fiscal, economic, and social consequences of natural disasters, there are no formal *ex ante* disaster risk financing mechanisms in place and instead there is an over-reliance on post-disaster funding.

The identification and planning of a catastrophe risk financing strategy (ies) could help the GoV to address efficiently the potential resource gaps in the aftermath of a natural disaster. To begin with a formal risk assessment designed to quantify the natural hazard exposure and associated financial costs of damage to public and private assets could assist GoV to understand better the magnitude of its fiscal liability to natural disasters and to plan more effectively for catastrophe events. In addition, a review of GoV's existing budgetary resources (and possible post-disaster budget reallocation) and information on existing public risk financing and private risk transfer mechanisms could serve as a basis for the GoV to identify its own risk financing needs and to identify options for the development a catastrophe risk financing strategy involving both the public and private sectors.

Objectives of the Study

The purpose of this study is (i) to analyze how the Government of Vietnam manages the fiscal impact of natural disasters and (ii) to identify financial options to improve the ability of Government of Vietnam to access immediate liquidity in case of natural disasters while maintaining its fiscal balance. This study aims to build institutional capacity on catastrophe risk financing and to identify catastrophe risk financing options which are affordable and effective to the Government of Vietnam, including both sovereign risk financing and private insurance instruments. It relies on a thorough understanding of the current risk transfer tools currently available in the country. To achieve these objectives, there is a need to assess what existing government-funded relief, livelihood restoration instruments and reconstruction efforts are available and how the private insurance industry can cope with the adverse financial impacts of disasters caused by the impact of natural hazards on the national economy. Based on an in-depth knowledge of financial risk management options available globally, and the outcomes of this assessment, the study aims to present sovereign disaster risk financing options available to Vietnam as well as policy options on further enhancing the existing disaster risk financing framework. The study relies on the following four components:

- *Financial Risk Assessment* of the frequency and severity of natural hazards with an emphasis on flood and storm hazards and an analysis of the costs of natural disaster damages to private and public assets in Vietnam in order to quantify more clearly GoV's fiscal liability. This assessment also includes some preliminary modeling of catastrophe losses which might be expected to occur in future;

- *Review of Government Budgetary process for financing natural disasters,* including the sources of funding and changes in funding levels over the past decade;
- *Dynamic Government Funding Gap Analysis* which aims to assess the impact of natural disasters on the GoV's fiscal balance and to identify potential funding gaps during the main post-disaster phases of (i) emergency and early relief, (ii) short-term recovery and (iii) medium-term reconstruction.
- *Options for the sovereign financial protection against natural disasters* are reviewed drawing on relevant international experience. Options for sovereign risk financing are presented for GoV to consider including a combination of post-disaster (unplanned) and ex-ante (planned) financial and insurance instruments. In addition, options are presented for GoV to consider including the promotion of private residential catastrophe property insurance and agricultural insurance.

This report consists of four Chapters including this Introduction. Chapter 2 presents a natural disasters financial risk assessment aimed at quantifying the costs to government of natural disasters in Vietnam including a detailed analysis of 20 years of individual flood and tropical cyclone data. Chapter 3 provides an overview of the GoV budget process for the financing of natural disaster losses and then develops a dynamic model to analyze the potential post-disaster funding gap divided into short-term recovery gap and medium term reconstruction funding gap. Chapter 4 is devoted to a review of options for GoV to consider for the future financing of natural disaster recovery and reconstruction expenditures including options for sovereign risk financing and for promoting commercial catastrophe insurance for the private property and agricultural sectors in Vietnam. The report is complemented by 10 technical annexes which provide further analyses and results.

Chapter 1: **Financial Disaster Risk Assessment in Vietnam**

Vietnam is ranked as the seventh most exposed country in the world to multiple natural hazards including floods, tropical cyclones (typhoon), tornados, landslide and drought and 59% of the total area of the country and 71% of the population are exposed to cyclones and floods. (World Bank 2005a, 2009).

To date, in Vietnam, most of the studies into the risks associated with flood and tropical cyclones have been conducted for physical risk mitigation and flood control purposes as opposed to from a financial risk assessment perspective. As such much flood risk mapping and engineering risk assessment is being conducted in Vietnam both by government and with the support of aid donors. There is, however, limited work currently into hazard and loss modeling from a catastrophe risk financing perspective.

This Chapter presents a financial risk assessment of the costs of natural disasters in Vietnam. The chapter begins with an analysis of natural hazards in terms of frequency and severity of occurrence of natural disasters with a focus on flood and tropical cyclones. It then presents an analysis of the physical and financial damage to mainly public-sector property and infrastructure but also to rural and agricultural households, associated with these natural hazards, drawing on available published data in Vietnam. A preliminary analysis of the catastrophe risk exposures is then presented. In the absence of underlying exposure data (namely, the value of public and private assets), financial losses are compared to Gross Domestic Product, GDP.

It is recognized that this is a preliminary risk assessment with limited objectives. It is intended to stimulate debate among government and the private insurance and reinsurance industry about their requirements for financial risk assessment and to identify potential areas for future research into hazard and loss modeling for Vietnam.

Natural Hazard Risk Exposures in Vietnam

Vietnam has more than 50 years of earthquake, flood and tropical cyclone data. The National Hydro-Meteorological Services (NHMS) of the Ministry of Natural Resources is responsible for managing the national network of meteorological stations, for providing weather forecasting services and for maintaining weather data bases. Other agencies in Vietnam involved in natural peril risk monitoring and risk assessment include the agencies under the Vietnamese Academy of Science and Technology including the Institute of Geophysics and other institutes under the Ministry of Science and Technologies (MOST) and the universities.

A summary of the main peril hazard exposures is presented below and further details are provided in Annex 1.

Tropical Cyclones

Vietnam is highly exposed to tropical cyclones. Over the 48-year period 1961 to 2008, the country experienced an average of nearly 5 tropical cyclones per year of which an average of 1.5 events per year were classified as Severe Tropical Storm or Typhoon (hurricane)[1].

The tropical cyclone season lasts from May to December with storms hitting the northern regions of the country in May and the cyclone belt gradually moves south to affect southern Vietnam in November. In the north peak cyclone activity occurs in June/July while the central regions are typically affected later in August and September and finally in the south cyclonic activity peaks in the months of October and November. See Annex 1.2.

The northern and central regions of Vietnam are more exposed to tropical cyclones than the south of the country. Table 2.1 and Figure 2.1 show that during the reference period Quang Ninh – Thanh Hoa, the most northerly region of Vietnam, has experienced an average of 1.7 tropical cyclones per year while Binh Thuan – Ca Mau in the far south has only experienced one tropical cyclone landfall every three years. There are also marked differences from north to south in the exposure to severe wind storm events of Beaufort Scale 10 and above (Severe Tropical Storm and Typhoon). Quang Ning has experienced 32 category 10 and greater storm events over the past 48 years or an average of 0.7 events per year, while Binh Thuan in the south has experienced only 3 major events over this period or a return period of 1 in 16 years. See Annex 1.2.

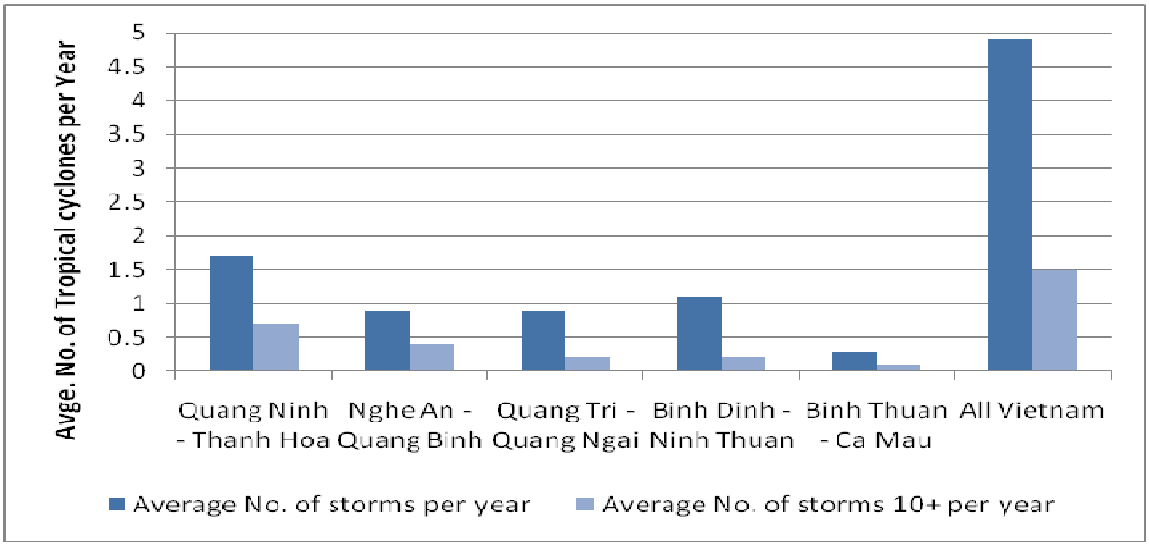
Table 2.1. Average Number of Tropical Cyclones* by Region (1961 to 2008)

Region (North to South)	No. of storm events	Average No. of storms per year	No. Storms Scale 10 & above	Average No. of storms 10+ per year
Quang Ninh - Thanh Hoa	82	1.7	32	0.7
Nghe An - Quang Binh	41	0.9	17	0.4
Quang Tri - Quang Ngai	44	0.9	10	0.2
Binh Dinh - Ninh Thuan	51	1.1	8	0.2
Binh Thuan - Ca Mau	15	0.3	3	0.1
Grand Total	**233**	**4.9**	**70**	**1.5**

Source: World Bank analysis of NHMS tropical cyclone data
Note: * NHMS reports Tropical Cyclone events associated with Beaufort scale category 6 tropical depressions (>39 km/Hr) up to category 13 typhoons (wind speeds > 133 km/hr)

[1] See Annex 1.2. for a full description of Tropical Cyclone naming conventions and Beaufort Scale which is used by NHMS Vietnam to classify Tropical Cyclones of different wind speeds.

Figure 2.1. Average Number of Tropical Cyclones by Year and by Region (1961 to 2008)



Source: World Bank analysis of NHMS tropical cyclone data

Although the frequency of tropical cyclones appears to be fairly stable over time, the pattern of typhoon events (Beaufort Categories 12 and 13) shows two distinct cycles of peak typhoon activity followed by approximately a decade of zero typhoons. Between 1995 and 2004 Vietnam did not experience any direct typhoon hits on the mainland. Since 2005 there have been 6 typhoons (an average of 1.5 events per year) and 2006 was the worst year on record with 4 category 13 typhoons, including Typhoon Xangsane which caused major damage to 15 provinces in central Vietnam. See Annex 1.2. for full details.

Flood

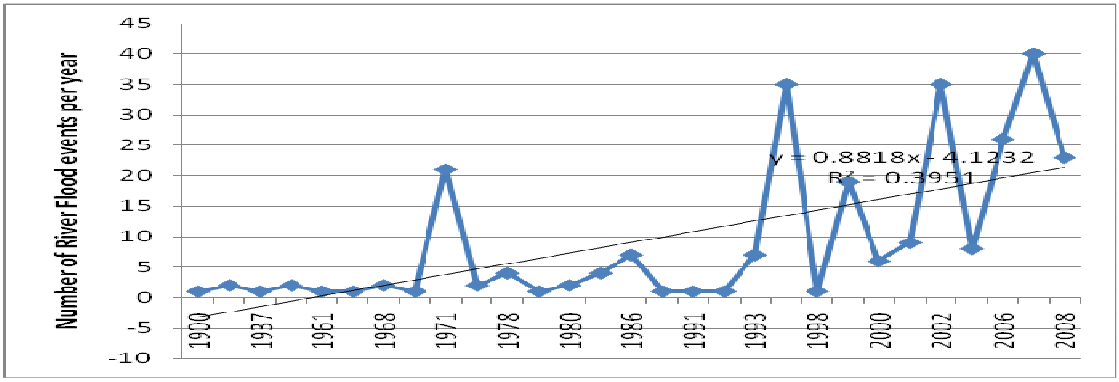
Vietnam is highly exposed in the monsoon rainy season to a combination of river plain flooding and flash floods and associated land-slides. River plain flooding is a major problem in the low-lying southern Mekong Delta region of Ho Chi Minh City and in the northern Red River basin surrounding Hanoi. These regions have major concentrations of population, housing, industry, commercial business and infrastructure, as well as these being important agricultural crop and livestock producing areas[2]. Flash flooding is a major problem in the Central Highlands and Central Coastal regions of Binh Thuan to Than Hoa Provinces: the rivers are mainly short and steep and heavy rainfall usually related to tropical cyclones results in flash flooding and landslides.

NHMS maintains a historical database for the number of flood events by year from 1900 to 2008: the reported data includes the province, named river, recording station, start and end date of flooding and highest river flow level. These data are reviewed in Annex 1.3 and a simple summary of the number of flood events by year is reported in Figure 2.2. Great caution must be exercised in interpreting these data because (i) prior to 1961 data were not systematically recorded and (ii) since the early 1990s the density of river-flow-gauge stations on the major rivers has been significantly increased and upgraded. Therefore although the data suggest a significant

[2] It is important to distinguish between "normal" seasonal river flood which is beneficial to agriculture and irrigation in the Mekong River Delta region and "excessive or prolonged" inundation flooding which can cause severe damage to both agriculture and the irrigation infrastructure.

increase in the incidence of flooding over the period 1993 to 2008, part of this increase is due to improved recording and reporting of river flow and flood data.

Figure 2.2. Number of Reported River Flood events per year (1961 to 2008)*



Source: Data taken from National Hydro-Meteorological Service at:
http://www.thoitietnguyhiem.net/BaoCao/BaoCaoLuLichSu.aspx

NHMS also maintains a database on the incidence of flash floods per year from 1958 to 2008 during which time a total of 405 flash floods were reported in 36 provinces with an average of 8 events per year. The frequency of reported flash floods has also increased significantly since 1990, which may be partly explained by improved recording and reporting systems for flash floods. The flash flood data are reviewed further in Annex 1.3.

Earthquake & Tsunami

Vietnam is generally considered to have a low earthquake exposure which is confined to the north western region with low population density and infrastructure and therefore low exposed values (GoV 2004; Axco 2009)[34]. An earthquake in the Red River Valley area could, however, lead to very high economic losses because of the high population concentration, infrastructure, industry and residential housing in the vicinity of Hanoi. The lack of enforcement of earthquake provisions in building standards codes, however, means that many buildings lack resistance to earthquakes (Axco 2009). The need to introduce and enforce adoption of international building code standards is identified as a priority by GoV (2007)[5]. National Strategy for Natural Disaster Prevention, Response and Mitigation (NSNDPRM) to 2020.

Although Vietnam is considered to face a low risk exposure to locally-sourced tsunamis, the 2004 catastrophe tsunami triggered by an under-sea earthquake off the coast of Sumatra has demonstrated the potential for undersea earthquakes in the vicinity of the Philippines to cause major damage to the low-lying southern coastline of Vietnam (World Bank 2005).[6] Further information on the earthquake and tsunami exposures in Vietnam is contained in Annex 1.4.

[3] GoV (2004): National Report on Disaster Reduction in Vietnam (prepared for the World Conference on Disaster Reduction, Kobe-Hyogo, Japan, 18-22 January 2005, Hanoi, September 2004.
[4] AXCO (2009): Insurance market Report Vietnam: Non-Life (P&C).
[5] GoV (2007) National Strategy for Natural Disaster Prevention, Response and Mitigation (NSNDPRM) to 2020, Hanoi, November 2007
[6] World Bank (2005) Project Appraisal Document on a Proposed Credit in the amount of SDR 59 Million (US$ 86 million equivalent) to the Socialist Republic of Vietnam for a Natural Disaster Risk Management Project in support of the First Phase of the Natural Disaster risk Management Programs, Rural

Other Natural Perils

According to GoV's classification of the relative frequency of natural perils, drought and tornado are high frequency disaster hazards in Vietnam, hail, forest fires and salt water intrusion are medium frequency hazards and frost is considered a low frequency risk along with earthquake. Agriculture is particularly exposed to seasonal drought, hail and salt water intrusion. (GoV, 2004). See Annex 1.5 for further details.

Climatic Change and Impact on Natural Hazard Exposure in Vietnam

Vietnam is identified as one of the five worst affected countries by climate change as a large proportion of the population, industry and infrastructure and agriculture are concentrated in the narrow coastal strip and in the low-lying Red River Basin and Mekong Delta (World Bank 2007). According to the World Bank (2007) study, a rise in the sea-level of up to one meter would affect 39 out of the 64 provinces and in 6 of the 8 economic regions of Vietnam. About 20% of the communes could be totally or partially flooded with the Mekong River Delta being the most seriously affected area. A one-meter rise in sea-level would affect approximately 5% of Vietnam's land area, 11% of the population and 7% of agriculture.

Currently it is understood that the property insurers in Vietnam are not formally conducting any studies into the impact of climatic change on their flood risk exposure and this may be an important topic for any future research.

Damage Assessment in Vietnam

The Central Committee for Flood and Storm Control (CCFSC) is the government agency responsible for disaster risk management in Vietnam. CCFSC's Secretariat is hosted by the Department of Dyke Management and Flood and Storm Control (DDMFSC) of the Ministry of Agriculture and Rural Development (MARD). CCFSC was formed in 1990 to coordinate flood and storm disaster risk management, mitigation and post-disaster emergency relief and rehabilitation/reconstruction operations at national, provincial, district and commune levels throughout the 64 provinces of Vietnam. Further details of CCFSC's organization and functions are contained in Annex 2.

Damage Assessment and Needs Assessment (DANA) System

Vietnam has formally conducted post-disaster damage assessment to measure the physical and financial losses to human life, property, infrastructure, production and industry for more than 25 years. Published data is available on the DDMFSC website for each event by province and for the annual total damages.

The natural disaster damage assessment procedure was upgraded in 2006 with the introduction of the DANA system based on a two-stage approach: (i) Damage Assessment, (ii) Needs Assessment. These two stages of post-disaster damage assessment are summarized below and further information is contained in Annex 2. The revised DANA system was developed under a UNDP project but is not yet widely adopted in Vietnam, in part because CCFSC felt insufficient ownership of the new system and also because the system was considered excessively complicated. In addition, limited technical assistance was provided to pilot and implement the

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Development and Natural Resources Sector Unit, East Asia and Pacific Region, Report No 30935-VN, August 16 ,2005

proposed system. In 2009 MARD has recruited an international consultant to conduct an independent review of ways to further strengthen and improve the damage assessment system in Vietnam[7].

Damage Assessment

Under the DANA system, physical and financial damage under 13 major headings or categories are recorded in a standardized form. The major sections include: 1. Human, 2. Housing, 3. Education, 4. Health Care, 5. Other Constructions, 6. Agro-forestry, 7. Irrigation, 8. Transportation, 9. Fisheries, 10. Communications, 11. Industry, 12. Construction, 13. Clean Water and Environment. Currently the new system and proforma is in use in three provinces only: Lao Cai, Dong Thap and Quang Tri. The other provinces continue to use earlier versions of the damage assessment form. See copy in Annex 2.

Physical Damage Assessment is mainly conducted by the commune-level committees and the results are then forwarded to the District-level where they are consolidated before being passed on to the Provincial authorities. The Damage Assessment reports are regularly updated during the initial days and weeks post-disaster as the commune and district-level committees update their initial damage assessments and transmit these to the provincial Committees[8].

The estimation of the financial damages is conducted at a Provincial level. It is understood that the estimation of the value of damages is conducted at the Provincial level by the local People's Committees, in collaboration with the Districts, using their own valuation criteria for each partially damaged or totally destroyed good/asset. Some Provinces publish their standard "unit values" which are used to value the physical losses. These valuations are likely to be based on the estimated replacement cost of the damaged items. It is understood that a second assessment is conducted later on to draw up the detailed list of specific public sector repair/reconstruction needs and then a revised costing is provided.

The Damage Assessment Reports are submitted by each Province to the Prime Minister's office for authorization and approval of release of Central government funds. A copy is also provided to CCFSC Hanoi which prepares for each named event (i) a provincial-level assessment report and (ii) an overall per event damage report. These official damage assessment reports are then uploaded onto DDMFSC's website.

Needs Assessment

The DANA Needs Assessment procedure is broken down into three phases: (1) emergency needs, (2) post-disaster and (3) recovery/rehabilitation. Further details are presented in Scawthorn (2009) and in Annex 2.

[7] Scawthorn, C. (2009) Natural Disaster Risk Management project: Disaster Damage Assessment in Vietnam : Report 01: Current Status, prepared for Central Project Office, MARD, The Socialist Republic of Vietnam, 20 February 2009

[8] In Vietnam, the Standing Office of the Central Committee for Storm and Flood Control (SOCCSFC) started a disaster communications system in 1995. It is an emergency electronic mail network that links provincial dike department offices with the SOCCSFC. The system operates 24 hours per day, 365 days per year, used to transmit disaster damage and needs data to SOCCSFC, issue disaster prevention and mitigation directives to field staff, and in coordinating disaster relief activities between the SOCCSFC and disaster affected province.

Table 2.2. DANA Needs Assessment Reports

Time after a Natural Disaster	DANA Terminology used in Vietnam*	ECLAC Terminology	Terminogogy used in this Report
3-10 days	Emergency Relief	Emergency	Relief
3 month after the event	Recovery	Rehabilitation & Recovery	Recovery
Not specified	Rehabilitation/reconstruction	Reconstruction	Reconstruction

*Source: * Authors based on Scawthorn (2009) classification.*

During the current study, it was not possible to review original copies of the completed Needs Assessment Forms. In practice it appears that few Provinces are using these forms. Rather, it appears the data are consolidated at Provincial level by the Provincial Peoples Committees and a written report is submitted to the Prime Minister's office with a request for release of central contingency funds to support post-disaster food aid, emergency relief and recovery/rehabilitation.

The post-disaster relief and recovery funding request is illustrated is for Storm No. 6, Typhoon Xangsane Damage in Quang Tri Province. (See Box 2.1 below and Annex 2 Table A.2.4). The Provincial Government's request to Central Government for short-term disaster relief and recovery funding amounted to VND 30 billion or 37% of the total estimated cost of damage of VND 81 billion arising from Typhoon Xangsane. It is not possible, however, to report the actual funding contributions made by central and local government by sub-sector towards this disaster event.

Box 2.1. Quang Tri Disaster Relief Payment Request following Typhoon Xangsane

Typhoon Xangsane was a Category 13 Beaufort scale Typhoon when it hit the central region coastline of Vietnam on 1st October 2006. The Quang Tri Disaster Relief Payment Request to the Prime Minister's office dated 3 October 2006 contains the following key information:

A ***completed damage assessment form*** which has been completed for 11 categories of damage with the physical damage in terms of numbers of lives lost or numbers of houses damaged and unit cost of damage with total estimated value of damage of VND 81 billion. The highest damages were incurred to Agriculture (including aquaculture), valued at VND 26.4 billion (32% of total), housing, VND 18.5 billion (23% of total) and Irrigation dams, dykes and canals VND 17.2 billion (21% of total).

Short-term Funding Request to Government amounting to VND 30 billion for:

- Repairs to private housing (VND 1 billion)
- Seeds to rehabilitate agriculture (VND 3 billion)
- Emergency relief, medicines, clean water (VND 1 billion)
- Emergency repairs to infrastructure, roads, irrigation, school, and hospitals (VND 25 million)

Long-term funding request (no budget provided). Government to upgrade small irrigation structures, funding of disaster mitigation equipment for fisheries, dyke construction to protect residential areas, dams and road construction.

Source: Quang Tri Disaster Relief Payment Request 3 October 2009, provided by CCFSC Hanoi

Data Quality Issues

There are several key issues regarding the national DANA system.

The disaster damage assessment system is mainly intended to record direct physical damage to public sector property and infrastructure in order to facilitate post-disaster recovery and reconstruction financing decisions by government. The system does not, however, include an assessment of (i) the financial costs of emergency relief (food aid, drinking water, tents etc) because these do not constitute damage, (ii) the secondary or consequential losses arising out of major storm or flood events including business interruption to agriculture, commercial businesses and industry, and (ii) the wider costs to the economy[9].

The system does not estimate the impact on people lives and livelihoods and appears to under-estimate the damage to private sector property and commercial businesses or industry. Although damage to private rural housing and agriculture (crops, livestock, aquaculture and forestry) is reported, the DANA procedure does not (i) assess the impact of disasters at the community or household level, especially the impact on livelihoods, and (ii) systematically record damage to private commercial businesses or private-urban property.[10] It is likely therefore that the true economic value of damage arising from natural disasters is under-reported, at least for private residential property and for commercial business and industry.

The extent to which the Provincial-level cost estimates of damages may under- or over-estimate the true value of losses is unknown. The Provincial governments are responsible for compiling the commune and district level damage assessment reports and for attaching financial values to the assessed damage. It is understood that the damage valuation is based on a *nominal replacement cost* of the damaged good. In the case of housing, government specifies a maximum disaster relief payment of VND 5 million (about US$ 300) for totally damaged housing which may be adequate to repair or reconstruct simple timber houses in the south of Vietnam, but which does not reflect the reconstruction costs of housing in the north and which may be between VND 25 to 50 million or more.

The Unit Cost tables used by the 64 Provinces to value damage do not seem to be standardized or consistent across provinces. On the basis of this study's limited review of Provincial DANA reports submitted to the Prime Minister's office, it appears that few Provinces systematically submit a detailed and systematic breakdown of their damage assessment valuations by sub-sector. They do not show the unit values which have been used to value each class and sub-class of physical damage. There is therefore no way of checking for consistency in the valuation of damage across provinces.

The financial estimation of damage is often reported as a single event value and no breakdown is given by sub-sector. As such it is not possible to make a comprehensive analysis as to which sub-sector incurs the highest financial damage although from the limited data available this is usually agriculture and fisheries, irrigation infrastructure and residential housing.

The DANA damage assessment procedure does not cover losses to perils such as drought and frost and which mainly affects agricultural production and to this extent under-estimates the value of damage due to these causes.

[9] It is noted that the ECLAC system of damage assessment specifically takes into account these secondary economic costs of natural disasters.

[10] Some provinces, still using the older CCFSC damage assessment system, may report in some cases damage to private commercial businesses or private urban property.

The value of damage is missing for a relatively high percentage of historical natural disasters. For example, Storm No 6 (1989), which registered the highest number of houses damaged from a single event over the past 20 years, is not accompanied by any valuation of the damages. It is understood that where damage was not valued under the original event, this may be included with and reported under a subsequent event.

Financial Analysis of the Costs of Natural Disasters in Vietnam

The CCFSC damage assessment database is the main official source of physical and financial valuation data on the impacts of natural disasters in Vietnam. An analysis of 20 years of data from 1989 to 2008 is presented in this section, both in current VND (dong) and US$ using the official VND: US$ annual average exchange rates[11] and the full results of the analysis are contained in Annex 3. The analysis is conducted on the annual aggregate losses for all provinces and events. To complement this analysis, provincial level analysis of Typhoon Xangsane of 2006, which caused major losses across 15 provinces, is performed. Given the lack of exposure data for the value of public and private assets in Vietnam, this analysis compares the value of historical losses as a percentage of GDP.

A total of 193 events are listed for the 20 year period. However, 31 events have no financial damage estimates and this applies particularly to earlier years. It is thus recognized that these values probably under-estimate the true losses.

Total Assessed Value of Damage

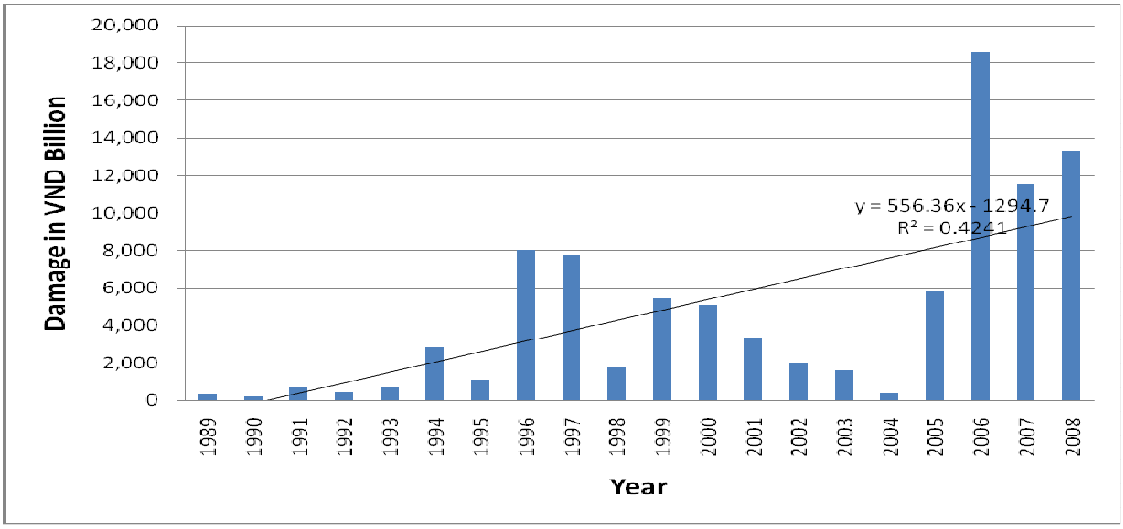
Between 1989 and 2008, the CCFSC reported total value of natural disaster losses in Vietnam for VND 91 trillion (US$ 6.4 billion) or an average of VND 4,547 billion (US$ 332) million per year. Over the 20 year period catastrophe losses due to tornados, tropical cyclones (including tropical storms and typhoon), floods, flash floods and landslides, resulted in a total loss of life of 13,035 persons (average of 652 lives per year), with total damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) valued at US$ 6.4 billion or an average of US$ 322 million per year[12].

The CCFSC reported data show that the estimated value of damage from natural disasters in the past three years has been much higher than the long-term annual average. Over the past 20 years, two distinct periods of below average losses (1989 to 1995 and 2000 to 2005) and two periods of above average losses (1996 to 1999 and 2006 to 2008) can be identified. See Figure 2.3. Over the past three years (2006-08) the total value of natural disaster losses has been between two and three times higher than the long-term average, with peak losses in 2006 valued at VND 18,566 billion (US$ 1.2 billion), when the central regions of Vietnam incurred major wind storm damage under Typhoon Xangsane. Although Figure 2.3 suggests a trend towards increasing natural disaster losses, this is partly explained by the major growth in the Vietnamese economy in recent years, the increasing value of underlying national asset values and the increase in construction costs and rehabilitation costs for property and infrastructure. As such the average cost of damage associated with a natural disaster is much higher today than in the past.

Figure 2.3. Value of Losses due to Natural Disasters from 1989 to 2008

(Current VND Billion)

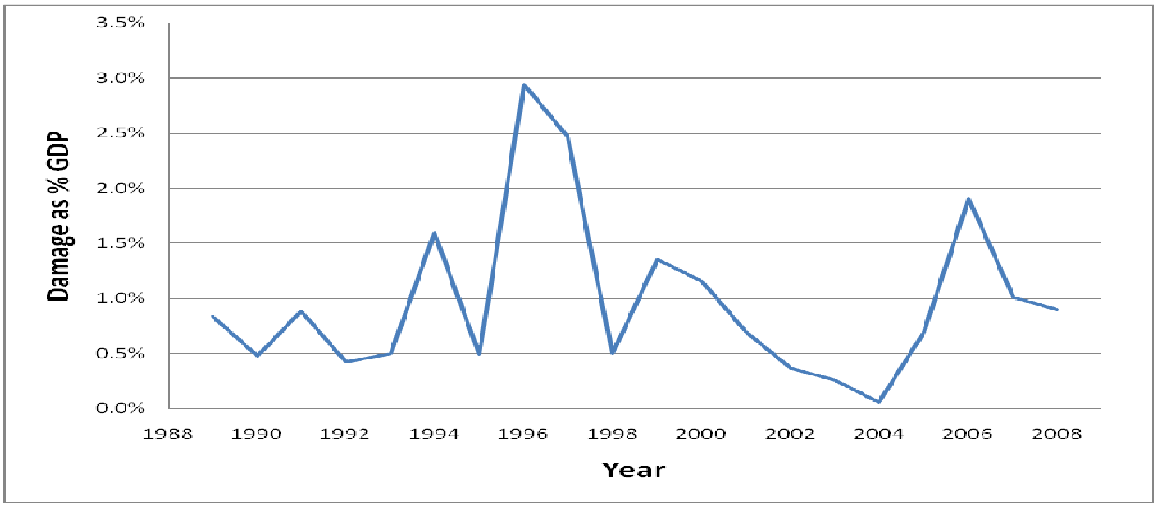
[11] The VND:USD Exchange rates are presented in Annex 6 General Statistics of Vietnam
[12] VND 90.9 billion or an average of VND 4.5 billion per year



Source: World Bank analysis of CCFSC damage data (actual VND Billion)

Over the 1989-2008 period, the average annual value of the direct losses due to natural hazards reported by CCFSC has been equivalent to 1.0% of Gross Domestic Product (GDP) with the worst losses occurring in 1996 equivalent to 2.9% of GDP. (Figure 2.4). The pattern of natural disaster losses expressed as a percentage of GDP shows that there is no trend towards increased losses in recent years. Four catastrophe loss years when natural disaster losses have exceeded 1.5% of GDP are 1994, 1996 1997 and 2006. The losses in 2006 were caused by a large number of mainly flood related events as opposed to major single catastrophe events. At 2008 GDP terms, the annual average value of natural disaster losses to the Vietnamese economy would be equivalent to nearly US$ 900 million per year and as high as US$2.6 billion in 1996. As noted previously these estimates are, however, only based on the direct value of damage and do not take into account the economic costs of business interruption and lost production over the period it takes to get agriculture and commercial businesses and industry back into full production after a severe storm or flood event, and which may exceed the value of direct losses by several fold.

Figure 2.4. Value of Natural Disasters as % of Gross Domestic Product (1998 to 2008)



Source: World Bank analysis of CCFSC damage data in VND.
Note: The analysis is based on the actual VND value of losses and actual GDP value in each year

Causes of Loss

Flood has been the major cause of loss accounting for 49% of the total value of CCFSC reported losses, followed by storm (tropical storms and typhoons) equivalent to 46% of all losses. See Table 2.3 and Figure 2.5. Other perils such as flash floods and landslide, tornado and cold wave account for less than 5% of the total value of damage over this period.

Over the 1989-2008 period an average of nearly ten natural hazard events per year has been reported by CCFSC with an average value of estimated damage of VND 6,437 billion per event (US$ 40 million per event). The average size of loss per event for storm has been US$ 53 million and US$ 49 million for flood. The average value of damage per event associated with flash flooding/landslide and tornado has been much lower.

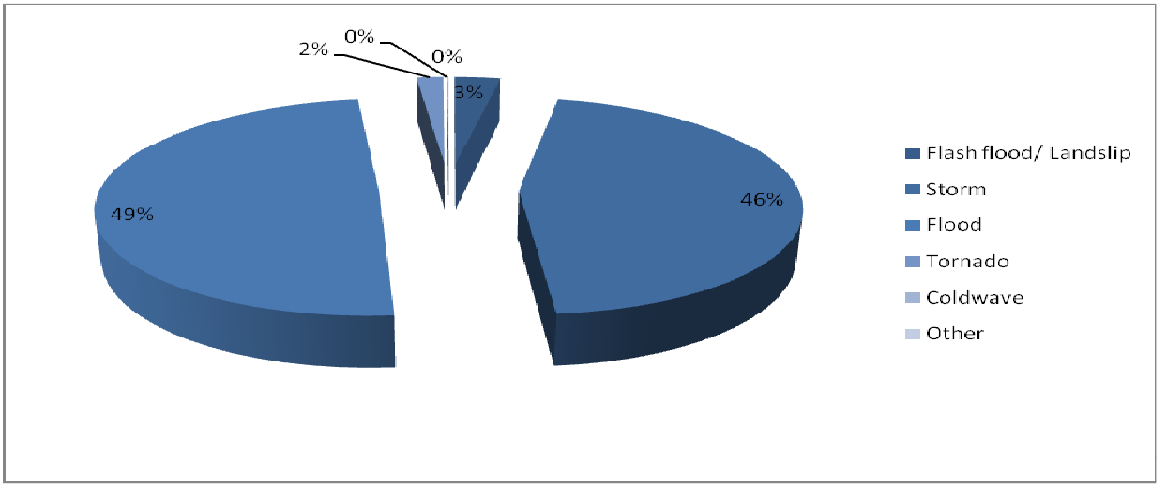
Table 2.3. Vietnam: Estimated Value of Damage by Cause of Loss, 1989 to 2008

Peril (Hazard)	No Events	No. events with recorded Value of Damage*	Total Value of Damage (VND Million)	Total Value of Damage (US$ Million)	% of total value of damage	Avge. Value of damage/ event (VND Mio)*	Avge. Value of damage/ event (US$ Mio)*
Flash flood/ Landslip	23	21	2,789,808	196	3%	132,848	9.3
Storm	70	57	41,505,430	2,996	46%	728,165	52.6
Flood	77	64	44,908,054	3,120	49%	701,688	48.7
Tornado	20	18	1,625,676	118	2%	90,315	6.5
Cold wave	2	1	20,402	2	0%	20,402	2.1
Other	1	1	92,370	6	0%	92,370	6.3
Total	**193**	**162**	**90,941,740**	**6,437**	**100%**	**561,369**	**39.7**

Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

(*) The CCFSC data do not record the total value of damages for 21 events. The average size of loss is calculated only for those events with reported loss values.

Figure 2.5. Percentage Value of Damage by Cause of loss 1989 to 2008

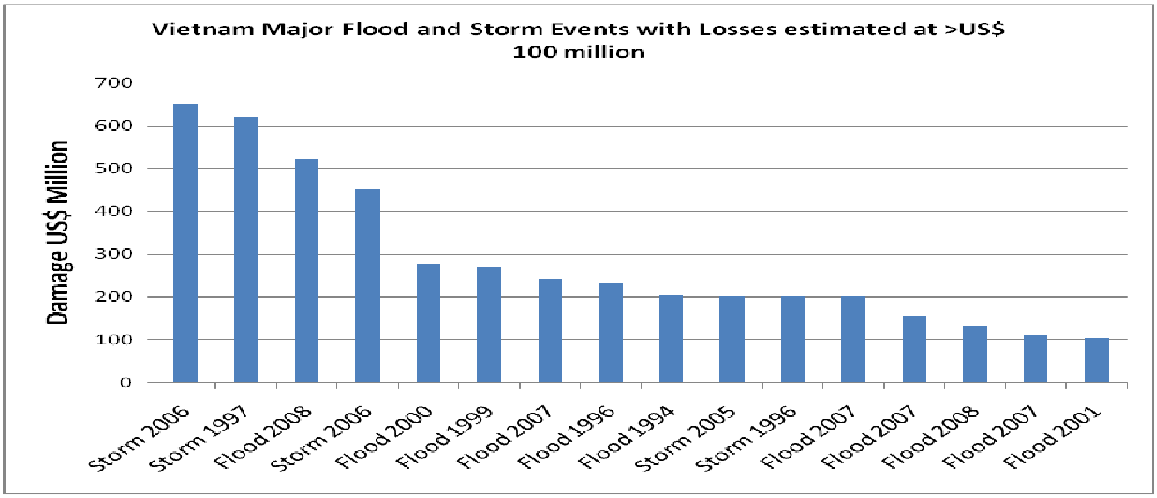


Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

Major Loss Events

Flood and storm have the potential to cause catastrophic losses in Vietnam as evidenced by the losses associated with Typhoon Xangsane 2006 which were estimated at US$ 649 million. Over the past 20 years 16 storm and flood events have had estimated damage of greater than US$ 100 million. See Figure 2.6. The largest recorded single storm was Storm No 6 of October 2006. Typhoon Xangsane was a category 13 Typhoon (sustained wind speeds > 133 Km/Hr) and affected 15 Provinces in central Vietnam with total assessed damage of VND 10,402 billion (US$ 649 million). The second largest recorded storm was Storm no. 5 of 2007 with estimated losses of US$ 619 million. The largest flood loss event occurred in the Red River Basin between 21 October and 3 November 2008 and caused major damages to property, infrastructure and agriculture in the Hanoi region, valued at US$ 522 million.

Figure 2.6. Major Flood and Storm Events with Damage estimated at > US$ 100 million

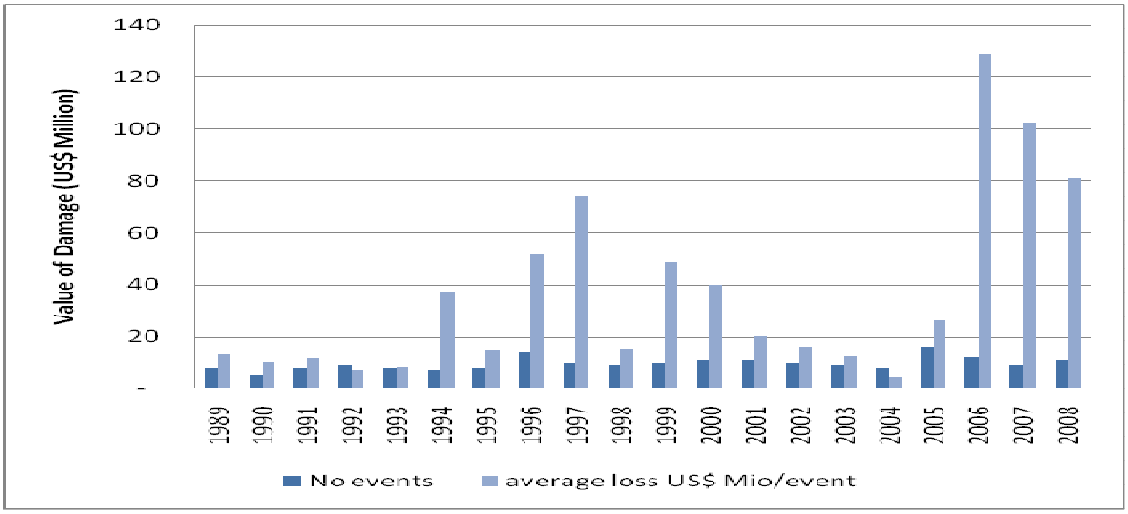


Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

Average size of loss per event

The average value of assessed damage per natural hazard event has increased significantly in recent years. Figure 2.7 shows that the number of declared disaster events is relatively stable with an average of 10 events per year, with a minimum of 5 events in 1990 and a maximum of 16 events in 2005. There has been however a major increase in the average value of assessed damage per event over the past three years. Over the 1989-2008 period, the average value of assessed damage has been US$ 40 million per event, but over 2006-2008 the average size of losses per event was between 2 to 3 times higher than the average, or US$ 129 million, US$ 102 million and US$ 81 million respectively per event.

Figure 2.7. Average size of Natural Disaster losses per Event 1989 -2008 (USD Million)



Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008
Note: Average size of loss is estimated only for those events with a reported value of the damages

More research is required to further explain the major increase in average size of losses in recent years, but this is likely to be a combination of (i) major increases in the values of residential, commercial and industrial properties, public infrastructure and agricultural assets (including perennial crops) exposed to risk and (ii) in the case of storm damage the fact that Vietnam has experienced four severe typhoons of Category 13 wind speeds in the past 3 years, possibly related to climate change. In 2006, US$ 1.1 billion, or 95% of all reported damage in 2006, was associated with typhoons of which 3 typhoons, Durian, Xangsane and Cimaron were Category 13 typhoons[13].

Analysis of Damage by Sub-Sector

A major drawback of the CCFSC 20-year national natural disasters' damage database is that with very few exceptions, the value of the assessed damage is not reported separately for each sub-sector of the economy, but only as a single consolidated total damage value for each event. It appears to have been no standardized reporting by provinces of the estimated values of damage for each of the 15 categories or sub-sectors included in the damage assessment reports. Of the 193 separate events analyzed under this study less than 5% of the reports contain complete valuation data for all categories of damage. This means that it is very difficult to conduct a formal analysis of the relative value of damage to residential property or agriculture or public sector property (schools, hospitals, etc) and to public infrastructure (roads, bridges, etc) caused by flood and by wind storm over the past 20 years. For Typhoon Xangsane, however, it has been possible to obtain a detailed breakdown of the damages by sub-sector.

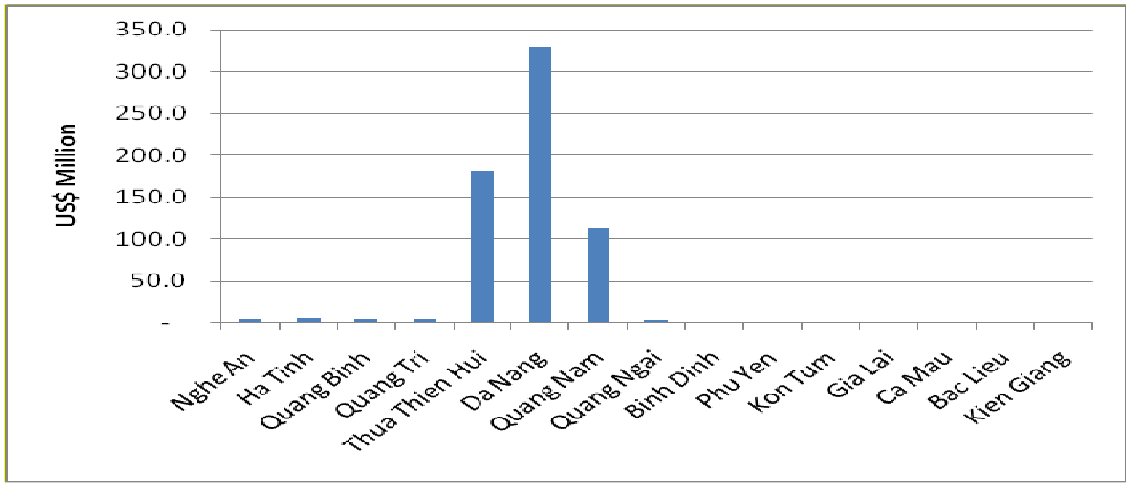
Case Study: Typhoon Xangsane in October 2006

Typhoon Xangsane was a Category 13 Beaufort scale Typhoon when it hit the central region coastline of Vietnam on 1st October 2006 near the city of Hue in Thua Thien Hue Province. It killed 72 people and caused major flooding and storm damage to property and infrastructure in

[13] It is not possible to report whether changes under the improved DANA system for assessing and valuing natural disaster damages may also have contributed towards the increased average value of loss events reported over the past three years.

the three provinces of TT Hue, and Da Nang and Quang Nam immediately to the south. According to CCFSC data, Xangsane affected 15 provinces in Central Vietnam with total estimated damaged of VND 10.4 billion (US$ 649 million) of which nearly 96% of the damages were located in Da Nang, T.T. Hue and in Quang Nam Provinces with the highest losses in Da Nang of US$ 330 million. The reported value of damage in other provinces was very small and in all cases less than US$ 7.5 million (Figure 2.8) and Annex 3.7.

Figure 2.8. Typhoon Xangsane Estimated Damage by Province (US$ Million)



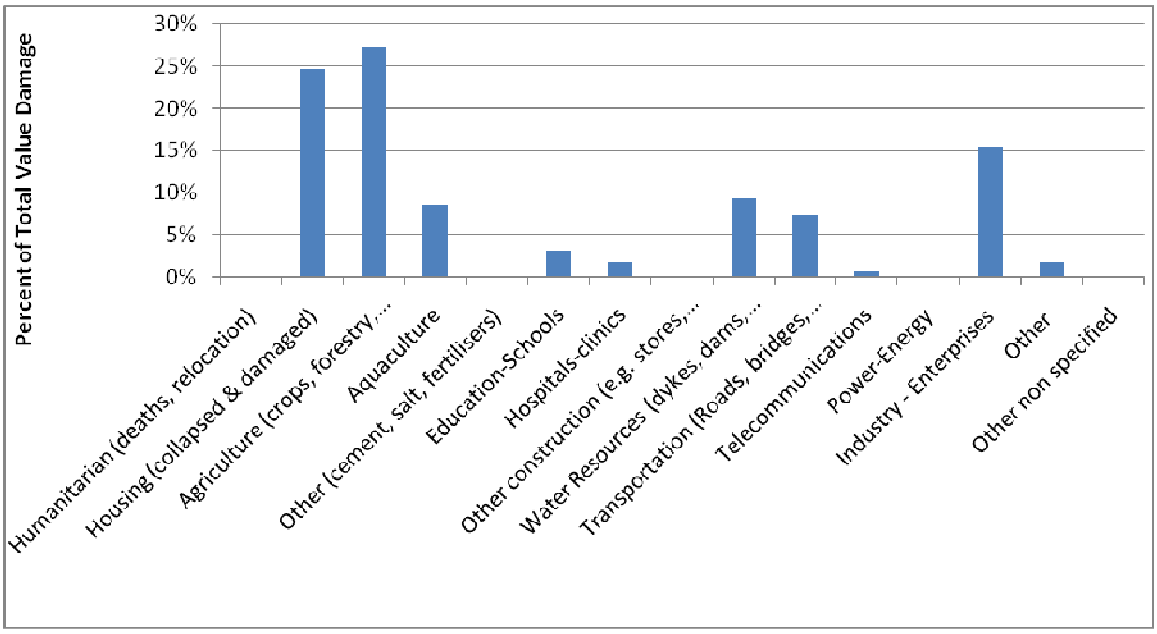
Source: World Bank analysis of CCFSC Typhoon Xangsane Provincial damage estimates

The highest losses were recorded in agriculture (36% of the total value of losses including crops, livestock forestry and aquaculture) and housing (25% of total). For four provinces affected by Xangsane (Quang Binh, Quang Tri, TT Hui and Kon Tum), it has been possible to access a breakdown of the estimated damage value by sub-sector (see Figure 2.9). The total estimated damage in these four provinces was US$ 188 million of which the highest damage was in agriculture (crops, forestry and livestock) equivalent to 27% of total value of losses. If damage to aquaculture is included this rises to 36% of total. This was followed by damage to housing (totally collapsed and damaged) equivalent to 25% of the total estimated value of damage, damage to industry and enterprises[14] (15% of total), damage to water resources including dykes, dams, canals (9%), transportation damage (7%) and minor damage to schools, hospitals and telecommunications. See Annex3.7.

This case study tends to suggest that under a catastrophic typhoon event, approximately one third of all damage is incurred by the agricultural sector, a quarter of the damages occur in private residential property and the remaining forty percent of damages are incurred in public-sector property (schools, hospitals other buildings) and infrastructure (dykes, dams, bridges, roads, power lines, telecommunications etc). However, comparable data for major flood events are not available to be able to provide a breakdown of the damages associated with flooding.

[14] It is not possible to report whether the recorded damage to industry-enterprises applies to private-sector or public sector industry.

Figure 2.9. Typhoon Xangsane 2006: Distribution of Value of Damages by Sub-Sector for Four Provinces



Sources: CCFSC damage database, Provincial Damage Reports

Preliminary Catastrophe Risk Analysis

The analysis of the CCFSC natural hazards damage data based over the 1989-2008 period has shown the single largest loss event by value was Typhoon Xangsane in 2006 with total damages valued at US$ 649 million, and that the worst losses any one year were again in 2006 with total losses valued at US$1.16 billion.

Although 2006 was a severe loss year in Vietnam, even worse natural hazard events could occur in future. During the drafting of this report, central Vietnam was hit by Typhoon Ketsana and the estimated value of damage was in excess of US$750 million. More severe disaster events or disaster years could occur in the future, due to an increase in the concentration of assets at risk, an increase of the frequency of major disaster, or an increase in the severity of these major disasters, possibly linked to climate change.

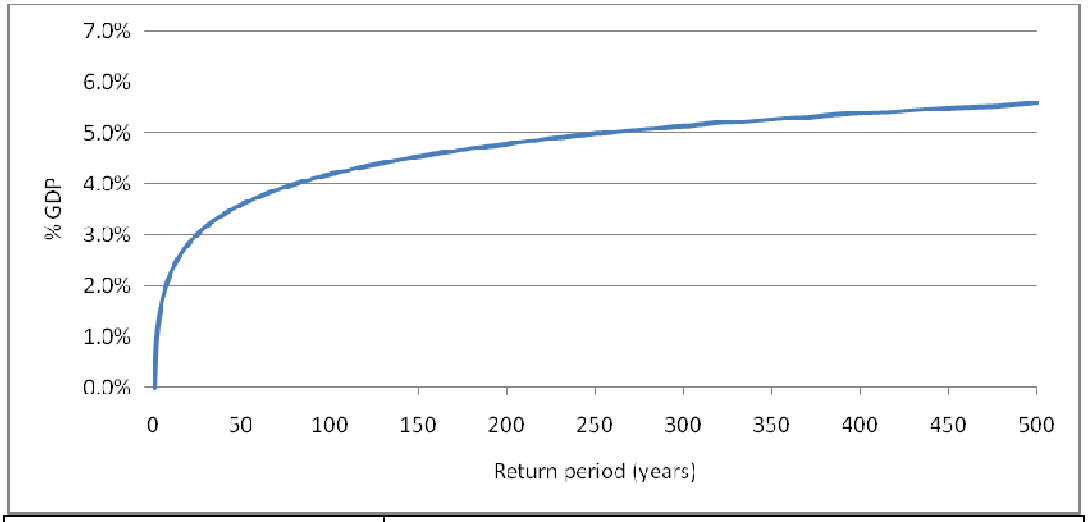
Preliminary catastrophe risk analysis has been conducted, based on a statistical analysis of past events and simulation techniques to assess the possible maximum losses caused by major wind storm and flood events in Vietnam. In particular, the risk metrics such as the probable maximum loss (PML) has been estimated. The PML is defined as an estimate of the maximum loss that is likely to arise on the occurrence of an event or series of events considered to be within the realms of probability, remote coincidences and possible but unlikely catastrophes being ignored. For example, a PML with a 100 year return period is the estimated loss caused by an event occurring once every 100 years on average (or with a 1% chance per year on average).

A preliminary simulation analysis, using historical data, has been conducted to assess the expected losses that might occur 1 in 100 years for wind storm and flood events and then for total expected losses from all events in a single year. Full details of this analysis are presented in

Annex 3.8. and a summary of the Probable Maximum Loss is presented in Figure 3.10.[15] It should be noted that this analysis, based on historical data, do not capture the possible impact of climate change and therefore may underestimate the true impact of future natural disasters in Vietnam.

The preliminary catastrophe risk analysis suggests that once every 100 years on average, Vietnam may expect losses in excess of US$ 3.8 billion, or about three times the worst losses experienced over the past 20 years. This preliminary finding has major financial implications for GoV because it shows that under extremely severe loss years, it would face post-disaster emergency relief, recovery/rehabilitation and reconstruction costs in excess of US$ 3.8 billion or 4.1% of current 2008 GDP. There is a clear need for an adequate strategy to finance extreme natural disaster loss years. See Figure 3.10 and Annex 3.8.

Figure 3.10. Indicative Annual Aggregate Probable Maximum Losses due to Natural Disasters (% of GDP)



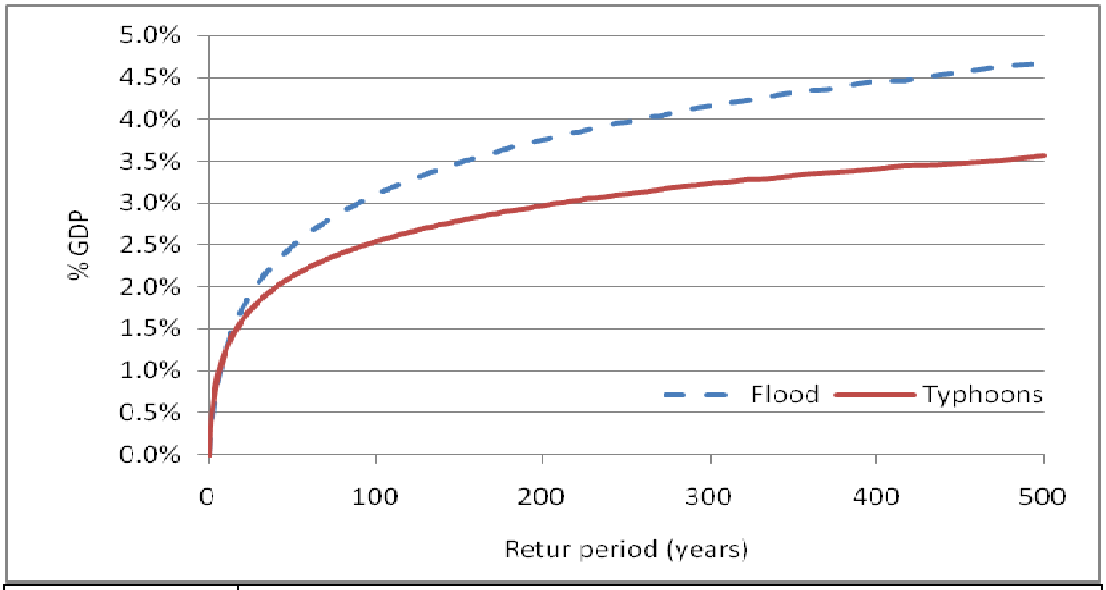
Return period	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)
10 years	2,024
50 years	3,239
100 years	3,770
150 years	4,088

Source: World Bank Simulation analysis of CCFSC annual loss data 1994 to 2008

Major flood events are estimated to generate larger losses than major typhoon events. Preliminary per event catastrophe risk analysis has also been conducted for floods and typhoons. A one in 100 year flood event is expected to generate damage estimated at 3.1% of GDP, while a one-in-100 year typhoon event would generate damage estimated at 2.5%. See Figure 3.11.

[15] Several parametric distributions have been tested to fit the 20 year data series. The Anderson-Darling (A-D) statistics was used as a fit statistic. This test highlights difference between the tails of the fitted distribution and the input data. For both the per year analysis and the per event analysis, the Inverse Gaussian distribution provided the best fit.

Figure 3.11. Indicative Probable Maximum Losses per Storm and Flood Event (% of GDP)



Return period	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)	
	Flood	Typhoon
10 years	1,093	1,095
50 years	2,225	1,913
100 years	2,781	2,290
150 years	3,124	2,513

Source: World Bank Simulation analysis of CCFSC per event loss data 1989 to 2008

Catastrophe risk modeling should be carried out to estimate more precisely the financial impact of major natural disasters in Vietnam and also the potential impact of climate change. The preliminary catastrophe risk analysis and findings presented above should be further developed and refined. Catastrophe risk modeling techniques rely on a combination of hazard models, exposure data and asset vulnerability to natural disasters. These sophisticated techniques were initially developed for the insurance industry and now are more and more used for other applications in disaster risk management such as emergency preparedness or risk mitigation investment. Such probabilistic catastrophe risk models, including the impact of climate change, could be developed in the future. They would allow the Government and the private sector to better assess the financial impact of natural disasters in Vietnam and to design appropriate disaster risk financing strategies and catastrophe insurance products.

Chapter 2: **Financial Management of Natural Disasters**

This chapter reviews the GoV's current budgetary processes for the post-disaster financing of natural disasters. This is followed by an analysis of the GoV's fiscal contingent liability related to natural disasters and the fiscal resources available after a natural disaster. This comparison leads to the concept of a government funding gap, when the fiscal resources are insufficient to cover the post-disaster recovery and/or reconstruction expenditures out of the current fiscal budget.

It should be noted that a funding gap analysis is difficult to conduct because the actual expenditures made by local government (provincial, district and commune governments) and by central government on post-disaster emergency relief and early recovery and then on medium term reconstruction are not systematically recorded at central level by the MoF or by CCFSC.

Review of Budget Process

Sources of Funding for Post-Disaster Response

Several sources of immediate post-disaster financing are available in Vietnam under three main categories: (i) Government Funding (including contingency funding and reserve funds; (ii) In-country voluntary donation post-disaster; and (iii) International aid donor assistance. In addition, it is understood that the Government of Vietnam can reallocate a small proportion of its capital expenditure for post-disaster reconstruction of lifeline infrastructure.

Contingency Funding

The main source of post-disaster funding for emergency relief and recovery is the Central Government's and Local (Provincial District and Commune) Government's Contingency Budgets. Under the State Budget Law of 2002, Central and local governments are required to allocate between 2 percent and 5 percent of their total planned budged for capital and recurrent expenditures to a contingency budget "to meet contingent spending on preventing, combating, and overcoming natural disasters and in important tasks of national defense and security"[16]. Although the law does not specify the actual categories of post-disaster expenditure which the contingency funds may be utilized for, in practice this applies only to immediate emergency relief and early recovery expenditure and specifically excludes reconstruction expenditure which has to be financed out of planned capital expenditure and or other sources.

If the Contingency Budget is inadequate to finance post-disaster emergency and recovery expenditure requirements, Central and Provincial governments may then draw funds from the Financial Reserve Funds, and/or Surplus Revenue. The State Budget Law allows up to 50% of any surplus revenue to be transferred to the Financial Reserve Fund and the remainder is carried over to next years' budget. Government can also defer reconstruction expenditure to the following year's planned capital expenditure budget. Finally government may reallocate part of its planned recurrent budget to the funding of natural disasters.

[16] A copy of Article 9 of the Law on State Budget is attached as Annex 4. Full details in GoV (2002) *Law on State Budget*. National Assembly of the Socialist Republic of Vietnam, Law No. 01/2002/QH11.

Between 2006 and 08, the combined central and local government contingency budgets amounted to between 2.5% (in 2007) and 3.8% (in 2008) of total budgeted expenditure. The contingency budget appears very substantial to fund natural disaster rehabilitation and recovery, but it should be noted that the State Budget Law stipulates that this source of funding can also finance natural disaster prevention and control measures as well as extraordinary national defense spending. See Table 3.1.

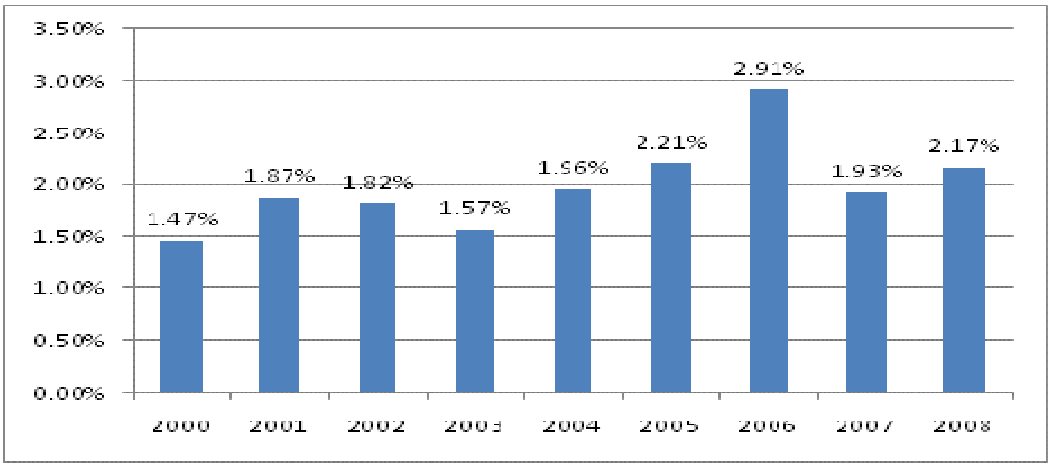
Table 3.1. Vietnam Planned budget expenditure and contingency expenditure 2006 to 2008

	Million US$			% of total expenditures		
	Plan 2006	**Plan 2007**	**Plan 2008**	**Plan 2006**	**Plan 2007**	**Plan 2008**
Total expenditures of State budget (including central and local budget)	**18,380**	**22,213**	**24,228**	**100.0%**	**100.0%**	**100.0%**
Capital expenditures	5,093	6,181	6,056	27.7%	27.8%	25.0%
Recurrent expenditures	8,208	10,848	12,682	44.7%	48.8%	52.3%
Contingencies	**702**	**562**	**650**	**3.8%**	**2.5%**	**2.7%**
Central Contingencies	*465*	*310*	*345*	*2.5%*	*1.4%*	*1.4%*
Local Contingencies	*237*	*252*	*305*	*1.3%*	*1.1%*	*1.3%*
Other expenditures	4,376	4,622	4,840	23.8%	20.8%	20.0%
Total Contingency				100.0%	100.0%	100.0%
Central Contingencies				66.2%	55.2%	53.1%
Local Contingencies				33.8%	44.8%	46.9%

Source: MoF 2009

The actual central contingency budget, as a percentage of the actual government expenditures, varies from 1.5% to 2.9% over 2000-2008, with an average value of 2.0% per annum. Figure 3.1 depicts the central contingency budget as a percentage of total government expenditures over the period 2000-08.

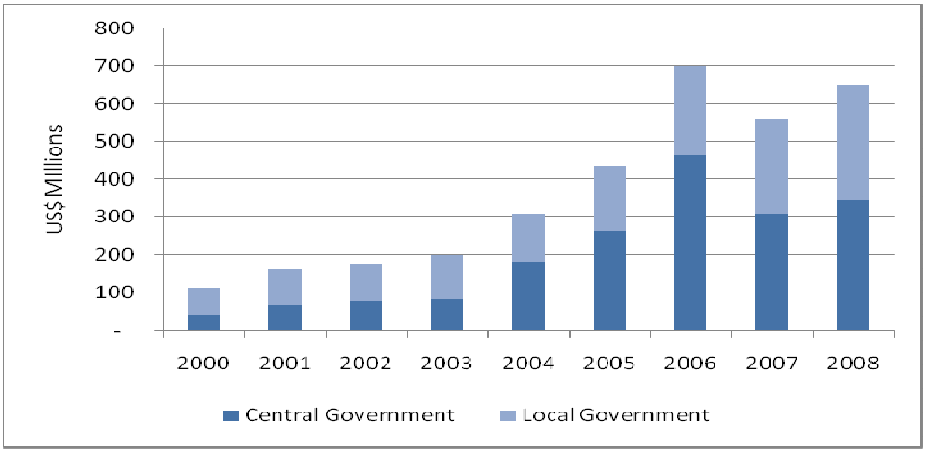
Figure 3.1. Central contingency budget as percentage of government expenditures



Source: MoF 2009

Over the past decade central and local governments' contributions to their annual contingency budgets have increased significantly from US$ 113 million (VND 1,600 billion) in 2000 to US$ 650 million (VND 9,050 billion) in 2008.(Figure 3.2.). Over the 9-year period the total contingency budget has been increased by 475% or an average of over 50% per year.

Figure 3.2. Central and Local Contingency Budgets for Natural Disasters 2000-08



Source: SBD/MoF 2009

Financial Reserve Fund

The Financial Reserve Funds, FRF, are held at Central and Provincial levels and may be used to pay for post-disaster activities when the contingency funds are exhausted. The districts and communes do not have reserve funds for natural disasters. The sources of funding for the FRF includes 50% of any surplus from the central or provincial budgeted revenue over expenditure, part of the annual planned budget expenditure and other sources of finance as prescribed by the Law on Sate Budget of 2002. The current status of the Financial Reserve Funds is not well-known, although it is understood that these reserves have been very limited in recent years. In recent years the government has incurred annual budget deficits in excess of 10% of GDP and therefore any surplus revenue allocation to natural disasters is understood to be very restricted. See Annex 6.4 for full details of budget surplus/deficit between 1991 and 2008.

State Reserve Fund

The State Reserve Fund, SRF, is a central government fund that provides in-kind emergency relief. The SRF, formerly known as the National Reserve Fund, is responsible for post-disaster emergency relief payments *in kind* including emergency food (rice) and equipment. In 2006, a total of 12,128 metric tons of rice were distributed to affected households for 8 natural disaster events. It is managed by the MoF. In recent years, this fund has had very limited resources, partly because the crude oil prices have been lower than forecast with a corresponding reduction in government revenue available to fund the SRF.

In Country Donations

There are various local organizations, including the Fatherland Front Committee, the Gold Hearts Fund and the Vietnam Red Cross which channel emergency relief and private voluntary donations to victims of natural disasters. There is, however, very little available data on the disaster relief expenditure of these charitable organizations. According to the World Bank

(2005) these local organizations contributed over VND 100 billion or 5% of total expenditure on natural disasters in 2000.

There is also a separate Fund for Flood and Storm Protection, FFSP, which operates at Provincial and District levels. It is a compulsory fund which all Vietnamese citizens are required to contribute towards (contributions range from 1 Kg rice to 2 Kg rice per household) and businesses are required to contribute 0.02% of their revenue subject to a cap of VND 5 million per annum.

International Disaster Relief Assistance

International aid donors and NGOs are very active in supporting immediate post-disaster emergency relief activities including the provision of food and drinking water, tents, blankets and medicines etc. It is, however, not possible to conduct a systematic analysis of the historical expenditure on emergency relief as this information is not systematically centrally reported in Vietnam. However, it is understood that DMC has recently starting collecting information on emergency and disaster relief assistance in a systematic way, and this information is then passed to CCFSC.

In 2000 International donors provided a total of VND 197 billion, or nearly 10% of the total natural disaster expenditure of VND 1991 billion total actual disaster expenditure (World Bank 2005). The international assistance falls outside the budget. According to Insurance Supervisory Authority, MoF, international assistance towards post-disaster recovery costs averaged US$ 9.5 million per year during the period 2000 to 2003.

Post-disaster Reallocation of Capital Expenditures

It is understood that the capital expenditures of GoV are planned three years in advance and that this three-year plan is rather inflexible. As a consequence, it can take two to three years to secure funds from the government investment plan for post-disaster reconstruction purpose. For example, several districts visited by the World Bank team in 2009 have reported outstanding reconstruction needs dating back to 2006.

However, it is also understood that following a disaster, the provinces and the Central Government can reprioritize some of their capital investment budgets. A small fraction of the planned capital expenditures can be reallocated in the aftermath of a disaster for the reconstruction of key lifeline infrastructure (such as hospitals or main bridges).

GoV can also access post-disaster reconstruction loans from international financial institutions, such as the World Bank or the Asian Development Bank. The World Bank has provided a US$20 million loan to support reconstruction efforts in eight provinces which were heavily hit by Storm Xangsane (October 2006) and Storm Lekima (October 2007). There is currently an additional finance request from the Government of Vietnam to the World Bank to support future post-disaster reconstruction efforts. This additional financing is off-budget, that is, it is not included in the three-year investment plan, thus providing the Government of Vietnam with some liquidity to start the reconstruction process until additional affected public assets can be budgeted under the next investment plan.

Government of Vietnam's Extraordinary Support to Households prone to Natural Disasters

A large proportion of GoV's post-disaster expenditure is allocated to disaster relief payments to vulnerable rural households to cover death or injury, damage to housing and relocation costs. Under the National decree No. 67/of 2007, financial and other support is provided for disadvantaged persons referred to as "Social Protection Beneficiaries" for loss of life (payment of VND 3 million person), for serious injury (VND 1 million per person), for the destruction of or serious damage to housing due to natural disasters (VND 5 million per household) and where relocation is required following landslide or flood (VND 5 million per household). Full details of the 2007 decree are contained in Annex 5.

According to Article 17 of the decree, the funds for implementation of the extraordinary support program include:

1. Local budget balanced by localities;
2. Donations given by domestic and foreign organizations and individuals to localities directly or via the Government or social organizations;
3. When the above sources of funds are insufficient for providing extraordinary support, presidents of provincial/municipal People's Committees shall report to the Ministry of Labour, War Invalids and Social Affairs and the Ministry of Finance which shall sum up the local proposals for funding and submit them to the Prime Minister for consideration and decision on central budget allocations.

It is understood that the primary source of funding of the above extraordinary financial support to vulnerable households for loss of life and their houses is through the central and local contingency budgets and that these payments represent short-term recovery funds which need to financed in the current budget year.

In addition to the extraordinary support payments, the government also provides disaster relief payments to rural households for loss or damage to their enterprises including crops, livestock, forestry and aquaculture and also other forms of rural enterprises. This study has identified disaster relief payments for losses in agriculture as a major funding requirement under selected natural disasters. These payments are made out of the contingency budget.

In practice, some provinces can cover much more than the official compensation scheme. There is anecdotal evidence that, in some cases, the provinces can pay out considerably more in compensation for private losses than what is legally mandated. However, no official data were available for further investigation.

Natural Disaster Funding Gap: Preliminary Analysis

The occurrence of a natural disaster forces GoV to reallocate its budget and mobilize additional resources to respond to the disaster, potentially impacting on its fiscal balance. Previous studies by the World Bank have tried to identify and quantify the funding gap caused by a natural disaster on the government budget. The funding gap is defined as the residual between total annual losses incurred as a consequence of disasters and funding to meet those losses. See Box 3.1.

Box 3.1. World Bank 2005 Analysis of Natural Disaster Funding Gap

The World Bank 2005 Project Appraisal Document for a Natural Disaster Risk Management Project in Vietnam provided a preliminary analysis of the overall financing gap in 2000, 2002 and 2003. The financing gap is defined as the difference between the CCFSC reported total annual value of storm and flood damage and the total actual expenditures by central and provincial governments and from local donations and international aid donors. It identified an overall funding gap for all natural disaster relief and reconstruction requirements of between US$130 million in 2000 which was a severe year for typhoon and flood losses and US$ 46 million in 2001 which was a low loss year. During the period 2000 to 2003 the major source of funding for post-disaster response was through the National Financial Reserves and surplus income in the budget and on average 46% of actual expenditure came from these two funding sources.

The financing gap analysis noted that it was not possible to quantify the breakdown of post-disaster actual expenditure into short-term emergency relief and recovery spending and medium term reconstruction expenditure because this data was not available from GoV. Similarly the DMC was unable to provide a breakdown of the assessed damage data by category (sub-sector) because some provinces only reported total losses to the DMC. The study also noted that GoV's priority was to finance post disaster humanitarian needs including payments for loss of life and for temporary repairs to rural housing and also to finance early recovery of agricultural production through provision of seeds and fertilizers and replacement livestock. The study concluded that GoV would always meet short-term emergency relief and early recovery needs, and that any funding gap was likely to have particularly detrimental implications for the availability of funds for reconstruction of public infrastructure.

Source: World Bank (2005b)

The CCFSC reported natural disaster losses are compared with the (central and local) contingent budgets for the 9-year period 2000 to 2008. This provides a preliminary analysis of the fiscal funding gap related to natural disasters and expands the Word Bank 2005 analysis. During major disaster years (in 2000, 2006, 2007 and 2008), natural disaster losses (as reported by CCFSC) largely exceed the government contingency budget (See Table 3.5).

Table 3.5. Comparison of Estimated Natural Disasters Losses and Contingent Budget (VND Billion)

Year	GDP	Natural Disaster losses	Disaster Losses as % GDP	Contingency budget	Estimated difference
2000	441,646	5,098	1.2%	1,600	-3,498
2001	481,295	3,370	0.7%	2,400	-970
2002	535,762	1,958	0.4%	2,700	742
2003	613,443	1,590	0.3%	3,100	1,510
2004	715,307	407	0.1%	4,885	4,478
2005	839,211	5,809	0.7%	6,900	1,091
2006	974,266	18,566	1.9%	11,250	-7,316
2007	1,144,015	11,514	1.0%	9,050	-2,464
2008	1,477,700	13,301	0.9%	10,700	-2,601
Total	**7,222,645**	**61,613**	**0.9%**	**52,585**	**-16,849**

Source: GSO, CCFSC, MOF.

However, this preliminary analysis cannot be precisely considered as a funding gap because (i) only a proportion of the CCFSC reported estimated losses in fact fall under the direct responsibility of the Central and Local governments, (ii) only a fraction (and never in excess of 50%) of the central contingency budget is available for post-disaster response and (iii) almost all

of the reconstruction activities of pubic assets and infrastructure are financed through the planned capital expenditures of future years.

Case Studies

Typhoon Xangsane (2006)

The Provincial-level recording of financial damage associated with each natural disaster event is very inconsistent in Vietnam. As noted in Chapter 2, time-series historical disaggregated valuation data by class of damage is not available. However, a detailed case study was conducted for Typhoon Xangsane (2006), which was one of the worst events on record.

Copies of the Typhoon Xangsane Provincial Damage Assessment Reports and Needs Assessment reports submitted to the Prime Minister's office with requests for central government post disaster funding have been analysed under this study. The damage valuation estimates were reworked to classify these figures according to the three main phases of post-disaster operations: (a) ***emergency relief*** including food aid (b) ***recovery*** including damages of housing and agricultural crop, livestock, forestry and fisheries and other production activities, and (c) ***reconstruction***, covering damage to public-sector infrastructure. The results of this analysis are summarized in Table 3.3 and further details are contained in Annex 8. The provincial damage-valuation reports do not include emergency relief as this is not a damage item per se. The analysis shows that 72% of the total estimated value of damage falls under the recovery category including damages to housing and agriculture and private enterprises or business, while the remaining 28% of damage was incurred to public infrastructure and is classified under reconstruction. It is noted that a certain proportion of damages to public infrastructure would in fact fall under recovery operations to restore power, transport and communications etc, but it is not possible to make this distinction from the damage reports.

In this case study more than two thirds of the value of damage reported by the Provinces under Typhoon Xangsane was incurred in private residential property and agriculture and that less than a third of the value of damage was to public infrastructure.

Table 3.3. Typhoon Xangsane Distribution of Estimated Damage by Phase of Operation post-disaster (VND Billion)*

Province	Recovery (Damage to Housing)	Recovery (Damage to Agriculture)*	Total Recovery	Rehabilitation / Reconstruction Public Infrastructure	Total Damage Assessment**	Recovery as % of total estimated damage
Nghệ An	4.2	26.8	31.0	56.6	87.6	35%
Hà Tĩnh	0.0	38.7	38.7	62.1	100.8	38%
Quảng Bình	5.5	17.9	23.4	21.3	44.7	52%
Quảng Trị	29.4	119.2	148.6	53.9	195.2	76%
Thừa Thiên Huế	720.0	1,430.0	2,150.0	760.0	2,910.0	74%
Đà Nẵng	2,037.0	1,980.0	4,017.0	1,273.2	5,290.2	76%
Quảng Nam	0.0	52.0	52.0	295.0	347.0	15%
Quảng Ngãi	16.0	18.0	34.0	6.0	40.0	85%
Bình Định	0.0	0.0	0.0	0.0	1.1	0%
Phú Yên	0.0	0.0	0.0	0.0	0.0	0%
Kon Tum	4.7	0.0	4.7	10.6	10.2	46%
Total VND Billion	**2,816.8**	**3,682.6**	**6,499.4**	**2,538.7**	**9,026.7**	**72%**
US$ Mio	175.9	229.9	**405.8**	158.5	**563.6**	
% of total damage	**31%**	**41%**	**72%**	**28%**	**100%**	

Source: World Bank analysis of Provincial Damage Assessment and Needs Assessment reports provided by CCFSC
Notes. * Damage to agriculture including fisheries and in some cases damage to private enterprises and businesses.
** The total estimated value of damage from the Provincial Reports of VND 9,027 billion is lower than the CCFSC reported total value for this event of VND 10,402 billion.

Provincial funding requests to Central Government were only a very small fraction of the total estimated value of damage arising out of Typhoon Xangsane. Table 3.4 presents a summary of the Provincial Committees' requests to the Prime Minister's office and Central Government for (a) emergency relief and (b) financial assistance listed under each post-disaster phase of recovery and reconstruction and then the actual amount of funding authorized by Central Government. The analysis shows that Central Government authorized the distribution from the State Reserve Fund, SRF, of 3,200 metric tons of rice to 11 provinces. The overall Provincial funding requests to Central Government amounted to VND 1,475 billion (US$ 92 million) or only 16% of the total estimated value of damage for Typhoon Xangsane, with range from 9% of estimated damage in TT Hue province to a maximum of 50% of the estimated value of damage in Quang Ngai and Ha Tinh provinces. ***Overall, the funding request was divided into 55% recovery finance for housing and agriculture and 45% for rehabilitation and reconstruction of public sector infrastructure.***

The funds actually authorized and released by Central Government amounted to VND 594 billion (US$37.1 million) or only 40% of the total amount of funding requested by the Provinces. The reason that conducted the government to cover only 40% of the requests is not known. However, reasons could be (i) the limited funds left in the contingency budget, as typhoon Xangsane occurred in October 2006, i.e., towards the end of the fiscal year; (ii) the central government considered the provincial funding requests to be excessively high; and (iii) the funding request for reconstruction will be covered and budgeted from future years' investment plan. Finally the Central Government post-disaster funding amounted to 7% only of the total CCFSC estimated value of damage arising from Typhoon Xangsane.(Table 3.4.).

It is not possible for Typhoon Xangsane, to report the value of funds which were released by each provincial, district and commune government for post-disaster response as this information is only available at the local level.

Table 3.4. Typhoon Xangsane: Provincial Funding Requests and Actual Payments made by Central Government (VND Billion)

Province	Emergency Relief / Food Aid (Tons of rice)	Funds requested for: Recovery (Damage to Housing)	Funds requested for: Recovery (Damage to Agriculture)	Funds requested for: Re-construction public infrastructure	Total Funding Requested by Province*	Funding Request as % of total estimated value of Damage	Funds paid by Central Govt.	Funding as % of Requested Amount	Funding as % of Total Estimated damages
Nghệ An	100	10.0	10.0		20.0	23%	14.0	70%	16%
Hà Tĩnh	100	6.0	20.0	24.0	50.0	50%	27.0	54%	27%
Quảng Bình	200	2.0	3.0	10.0	15.0	34%	16.5	110%	37%
Quảng Trị	200	1.0	4.0	35.0	40.0	20%	15.0	38%	8%
Thừa Thiên Huế	800	130.0	90.0	50.0	270.0	9%	80.0	30%	3%
Đà Nẵng	600	200.0	250.0	450.0	900.0	17%	201.0	22%	4%
Quảng Nam	1000		70.0	80.0	150.0	43%	215.0	143%	62%
Quảng Ngãi	100	12.0		8.0	20.0	50%	12.0	60%	30%
Bình Định	0				n.a.	0%	3.0	n.a.	n.a.
Phú Yên	0				n.a.		2.0	n.a.	n.a.
Kon Tum*	100	5.0	5.0	5.0	9.9	97%	8.0	81%	78%
Total VND Bio	3200	**366.0**	**452.0**	**662.0**	**1474.9**	**16%**	**593.5**	**40%**	**7%**
US$ Million		**22.9**	**28.2**	**41.3**	**92.1**		**37.1**		
% of total funds requested		25%	30%	45%	100%				

Source: World Bank analysis of Provincial Damage Assessment and Needs Assessment reports provided by CCFSC
Note: * There are minor errors in the reported values for Kon Tum and the correct total funding request of VND 1,480 Bio.

Several tentative conclusions can be drawn from the analysis of the Typhoon Xangsane losses: (a) the evidence that a high proportion (about 70%) of the estimated damage and requests for funding fell under short-term recovery operations, while the remaining 30% of estimated damage was to medium and long term reconstruction of public infrastructure; (b) the Provinces' requests to the Prime Minister for central government funding only represented a small proportion or less than 20% overall of the total estimated damage; and (c) that for this event central government only released 40% of the total disaster recovery funds requested by the Provinces.[17]

Typhoon No 9 in 2009

Following the Typhoon No. 9 that hit Vietnam in October 2009, CCSFC conducted its damage and needs assessment and the 16 affected provinces submitted funding requests to the Central Government for post-disaster assistance. CCFSC estimated and reported damage was valued at almost VND 15,000 billion (US$900 million).

The requests for funding submitted by the Provinces covered between 10% and 100% of the CCFSC reported damage, with an average of 20%. It is estimated that these funding requests were mostly for the financing of short-term emergency relief and recovery expenditures. The

[17] In the absence of Provincial-level actual expenditure data out of provincial funds, it is not possible to report on any provincial -level financial resource gap for Typhoon Xangsane.

Central Government funded between 10% and 50% of the provincial funding requests, with an average of 18%. See Table 3.6.

Table 3.6. Typhoon No.9 (2009). Provincial Funding Request and Actual Payment made by Central Government (VND billion)

Province	CCFSC reported damage (1)	Provincial request for Funding (2)	Central Budget for post-natural disaster aid (3)	(2)/(1)	(3)/(1)	(3)/(2)
Quang Nam	3,500	500	100	14%	3%	20%
Quang Ngai	4,870	500	80	10%	2%	16%
Binh Dinh	232	65	20	28%	9%	31%
Phu Yen	45	45	5	100%	11%	11%
Kontum	2026	1000	100	49%	5%	10%
Daklak	196	115	20	59%	10%	17%
Dacnong	150	115	10	77%	7%	9%
Gia lai	300	50	20	17%	7%	40%
Thanh Hoa	265	50	10	19%	4%	20%
Nghe An	296	50	10	17%	3%	20%
Ha Tinh	95	90	10	95%	11%	11%
Quang Binh	102	40	20	39%	20%	50%
Quang Tri	1936	197	40	10%	2%	20%
Thua Thien Hue	343	200	60	58%	17%	30%
Danang	495	180	40	36%	8%	22%
Lam Dong	--	10	--	--	--	--
Total	**14,851**	**3,042**	**545**	**20%**	**4%**	**18%**

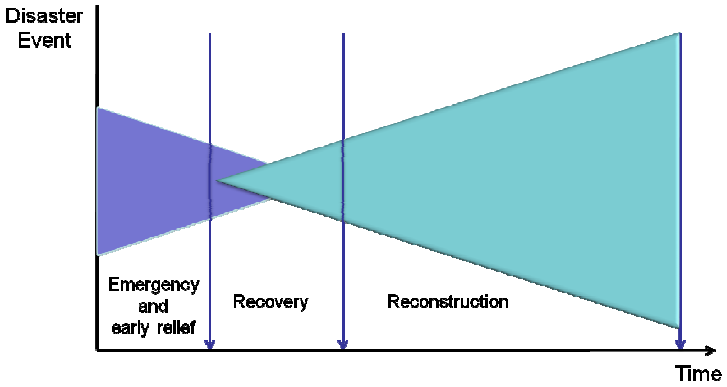
Source: CCFSC, MoF.

The provinces then complement the Central post-disaster financial assistance with their own resources, usually out of their contingency budgets. The provincial post-disaster funding resources are estimated to represent 10-15 percent of the central post-disaster financial assistance. The overall central and provincial post-disaster resources are mainly used to cover short-term emergency and recovery expenditures. Reconstruction expenditures will be financed out of the budget (capital expenditures) of future fiscal years.

Dynamic Funding Gap Analysis in Vietnam

The funding gap analysis is reconsidered with the introduction of the ***time dimension*** and the decomposition of the post-disaster period into three successive phases: (i) emergency and early relief; (ii) recovery; and (iii) reconstruction. Post-disaster expenditures vary over time, as shown on Figure 3.3. In the aftermath of a disaster, the government needs to mobilize adequate resources to meet the emergency and early relief needs. Then additional resources are necessary for the recovery phase and even more for the reconstruction phase. This graph highlights the need for immediate but limited resources to finance the emergency and early relief activities, versus the need for much larger but less urgent resources to finance the reconstruction activities.

Figure 3.3. Post-disaster Phases and Financing needs



Source: Ghesquiere and Mahul (2007).

The post-disaster response can be classified into three main phases: relief operations, recovery operations and reconstruction operations (See Box 3.2). In the context of Vietnam, it is understood that post-disaster relief and recovery expenditures are mainly funded out of the (central and local) contingency budgets, while reconstruction expenditure on public infrastructure is mainly funded out of the capital expenditure budget in future years.

Box 3.2. Post-Disaster Response Phases

Relief operations include emergency assistance provided to the affected population to ensure basic needs, such as the need for shelters, food and medical attention. This is the provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected. This phase aims at stabilizing the society, with termination of further loss. Such costs can be difficult to estimate ex-ante, as they depend on the specific characteristics of the catastrophic event (location, intensity, period of the year (winter or summer), period of the day (day or night), etc.), but are relatively small compared to the subsequent recovery and reconstruction operations. While relief costs are limited, they need to be financed in a matter of hours after a disaster event. The capacity of governments to mobilize resources for relief operation at short notice should be a key component of its risk financing strategy.

Recovery operations following the initial relief efforts are crucial to limit secondary losses and ensure that reconstruction can start at earliest. They are the restoration and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. That is, the society's functions are restored, such as re-opening of schools, businesses, etc, even if only in temporary shelters. They include, among other things, the emergency restoration of lifeline infrastructure (e.g., water, electricity and key transportation lines), the removal of debris and the financing of basic safety nets, and the provision of basis inputs (e.g., seeds, fertilizers) to restart the agricultural activities. It is also during this phase that engineering firms can be mobilized to start the design of infrastructure works that will have to take place during the reconstruction phase. Government may also have to subsidize the basic restoration of private dwellings, particularly for low-income families, before the reconstruction phase starts.

Reconstruction operations generally center on the rehabilitation or replacement of assets damaged by a disaster. They include repair and rebuilding of the housing, industry, infrastructure and other physical and social structures that comprise that community or society. These include public building and infrastructure which are the direct responsibility of the state. National or local authorities generally have to face obligations that go beyond their own assets. In most cases, government will have to subsidize the reconstruction of private assets and in particular housing for low-income families who could not otherwise afford to rebuild their homes.

Source: Ghesquiere and Mahul (2007)

The task of comparing post-disaster financing needs at each stage (phase) with actual expenditure is complicated because although damage estimates are available at national level for each event through CCFSC, there does not appear to be an organization in Vietnam which is charged with monitoring and recording post-disaster central government and local government funding and actual expenditure for emergency relief, recovery and reconstruction operations in each province/district/commune. Furthermore, in practice, the phases identified in Box 3.2 may overlap and it is often not possible to distinguish clearly between government expenditures on relief and recovery operations and indeed immediate reconstruction expenditure on key infrastructure.

The simple comparison of CCFSC reported value of losses and government contingency budget in Table 3.4 does not provide a true picture of the potential funding gap for natural disasters. A dynamic funding gap analysis is conducted in Vietnam to assess the impact of natural disasters on the government fiscal balance and to identify potential funding gaps during the main post-disaster phases.

A more realistic analysis of post-disaster government expenditures and resources is conducted in a dynamic framework. This analysis identifies the post-disaster losses actually covered by government (that is, their contingent liability related to natural disasters) and the resources available in the short term and in the medium term to finance these expenditures. Short term recovery funding gaps and medium-term reconstruction funding gaps are then assessed. The assumptions made and the results of this dynamic analysis are presented below and full details are contained in Annex 9.

Short-Term Recovery and Medium-Term Reconstruction Funding Gaps

Only a fraction of the contingency budgets are available for post-disaster recovery expenditures. Based on case studies and discussion with public finance experts in Vietnam, the best expert's opinion is that on average about 40% of the central contingency budget and 20% of the local contingency budget are available to finance post-disaster recovery activities.

The state contingent liability due to natural disasters is estimated to be 55% of the total CCFSC damage estimates. Assumptions have been made about the percentage of the total estimated value of damage reported by CCFSC which falls into the classification of (i) recovery costs and (ii) reconstruction costs. Based on the previous analysis of case studies and discussion with local experts, the funding gap analysis is based on the assumptions that the government recovery expenditures and the government reconstruction expenditures are 25% and 30% of total CCFSC damage estimates, respectively.

Given the lack of precise data on the government's contingent liability due to natural disasters and on the post-disaster funding mechanisms, these assumptions are the best estimates based on extensive consultations with public finance experts and Government of Vietnam. These assumptions are detailed in Box 3.3. They will be completed by a sensitivity analysis to test how the results, particularly about the funding gaps, are sensitive to these assumptions.

Box 3.3. Natural Disaster Funding Gap Analysis: Assumptions

1) **Short-Term Sources of Funding for Natural Disaster Recovery**

It is assumed that Emergency Relief is financed by local organisations and aid donors and that food aid is also provided by central government. Emergency relief does not enter the calculations of the natural disaster funding gap analysis.

It is assumed that 40% of the Central Contingency Budget is actually spent on financing post-disaster recovery costs; that 20% of the local (provincial/district/commune) contingency budget is actually allocated to post disaster recovery, and finally that other government sources of post-disaster finance are made available by government equivalent to a further 10% of the state (central + local) contingency budget.

Source of Natural Disaster Financing	Expenditure as a % Contingency Budget
from Central Contingency budget	40%
from Local Contingency budget	20%
Other government resources (surplus income, national reserves, etc.) [Percent of State+local Contingency budget]	10%

It is also assumed that government, in the aftermath of a disaster, government can reallocate up to 1 percent of the planned investment expenditures of the fiscal year for the reconstruction of key lifeline infrastructure (e.g., hospitals, main bridges).

2) **Government Expenditure on Post-Disaster Recovery and Reconstruction**

The analysis of CCFSC damage assessment reports suggests that on average 70% of the reported value of damage falls under short-term recovery expenditure and the remaining 30% of total estimated damage falls under medium-term reconstruction expenditure for public assets.

It is assumed that actual expenditure on recovery is equivalent to 25% of total estimated damage and that the 30% reconstruction costs are financed in full.

CCFSC Damage Assessment Data	% of Total Estimated Value of Damage	Actual Natural Disaster Expenditure as % of Total Estimated Value of Damage
Recovery expenditure: (housing/agriculture + emergency repairs/reconstruction of infrastructure	**70%**	**25%**
Reconstruction Expenditure: (Public Assets including schools, hospitals, irrigation networks, transport, communications, power etc)	**30%**	**30%**
	100%	**55%**

.

Source: World Bank (2009).

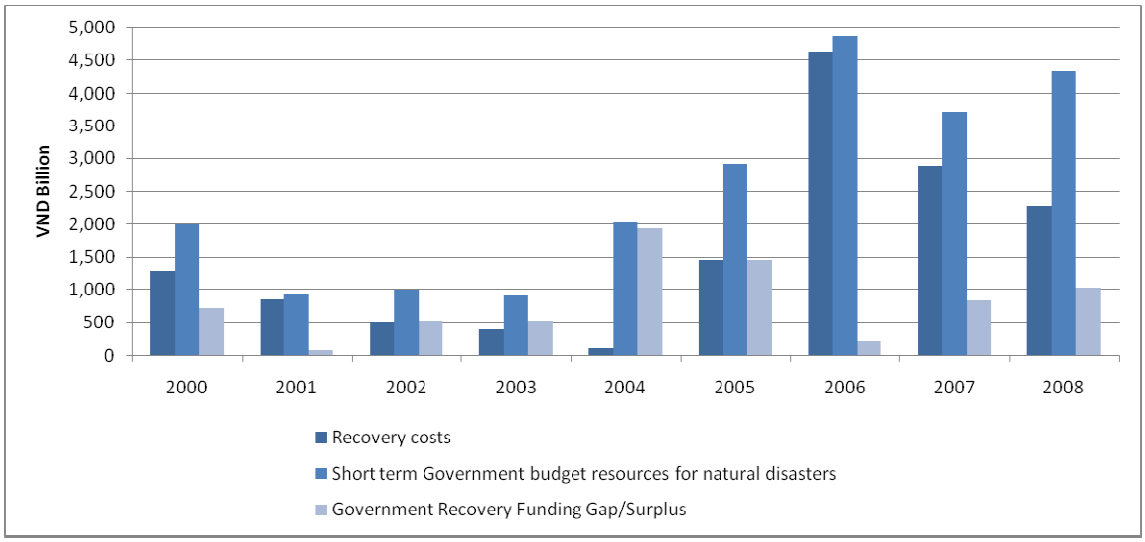
The short term recovery funding gap is defined as the difference between the short term government resources and the estimated recovery costs, if negative. The short term government resources are mainly available from the contingency budget.

Estimated recovery funding gap = Short term government budget resources – estimated recovery costs.

Using the assumptions in Box 3.3, Figure 3.4 depicts the estimated short-term recovery costs, the estimated short term budget resources, and the estimated short-term recovery funding gap over the period 2000-2008. Full details of this analysis are contained in Annex 9.

No short-term recovery funding gap due to natural disasters has been identified in Vietnam over the period 2000-2008. The short term fiscal resources available from the contingency budgets and from other public resources would have been adequate to meet short-term natural disaster recovery expenditures. The analysis shows that even in the very severe loss years of 2006 to 2008, government finances would have been adequate to cover the recovery expenditures. The highest recovery cost expenditure requirement of VND 4,641 billion (US$ 290 million) fell in 2006 which coincided with the major damage caused by Typhoon Xangsane and three other typhoons. Over the nine year period the surplus of government resources over recovery expenditure ranged from a low of VND 76 billion (US$ 5 million) in 2001 to a maximum of VND 1,940 billion (US$ 123 million) in 2004.

Figure 3.4. Estimated Recovery Funding Gap, 2000-2008



Source: World Bank analysis MOF budget data and CCFSC natural disaster losses.

The medium term reconstruction funding gap is defined as the difference between the short-term post disaster capital investment reallocation and the estimated government reconstruction costs, if negative. The analysis assumes that up to 1 percent of the planned capital expenditures in the current fiscal year can be reallocated for the post-disaster reconstruction of critical infrastructure.

Estimated reconstruction funding gap = Short term post-disaster capital investment reallocation - Estimated government reconstruction costs.

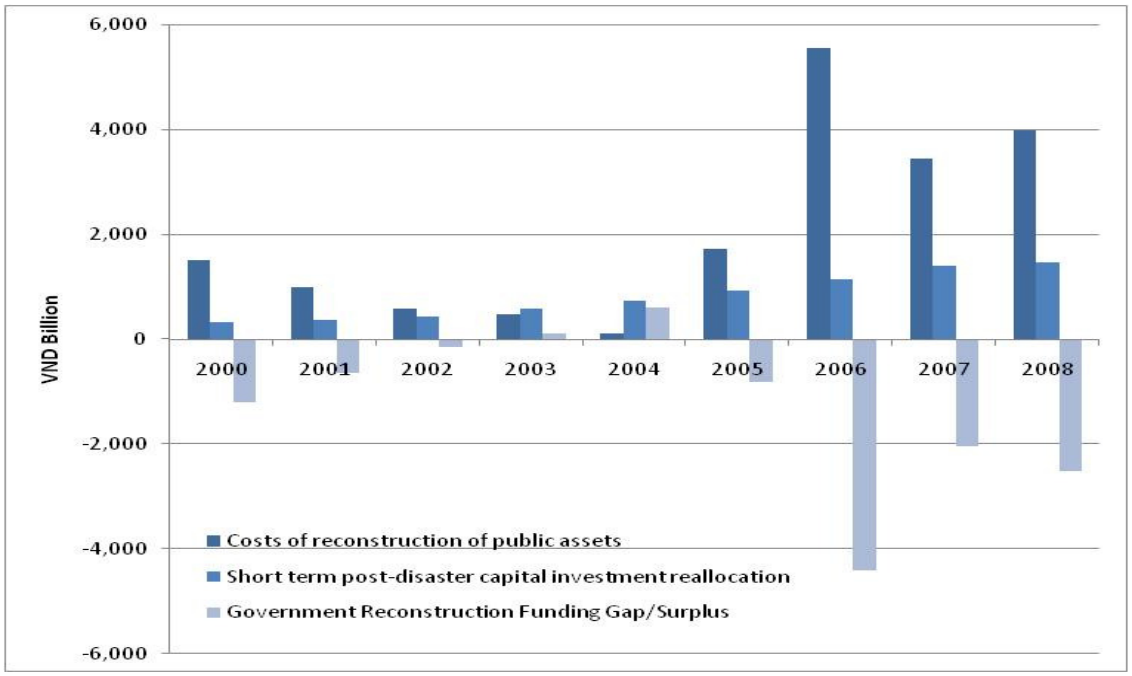
Using the assumptions in Box 3.3, Figure 3.5 depicts the estimated medium-term reconstruction costs borne by government, the estimated balance of short term fiscal resources, and the estimated medium-term reconstruction funding gap over the period 2000-2008. Full details of this analysis are contained in Annex 9.

Major reconstruction funding gaps have been identified in the period 2006-08. Figure 3.5. shows that in the period 2000 to 2004 when the average value of losses due to natural disasters was below the long-term average, the short term capital expenditures reallocation as either

adequate to fully cover reconstruction costs (2003 and 2004) or to ensure that small reconstruction expenditure funding gaps of less than VND one billion were incurred (2000 and 2001). However, major reconstruction funding gaps are observed in 2006 to 2008: VND 4,411 billion (US$275 million) in 2006, VND 2,047 billion (US$127 million) in 2007 and VND 2,510 billion (US$152 million) in 2008. It is likely that these gaps are under-estimated because they are estimated from the CCFSC reported damage estimate, which may underestimate the full reconstruction costs of many public and private buildings and infrastructure.

The outstanding reconstruction expenditures are budgeted out of the capital expenditures of future fiscal years and funded from the future fiscal resources (including loans). These options are discussed further in Chapter 4.

Figure 3.5. Estimated Reconstruction Funding Gap, 2000-2008

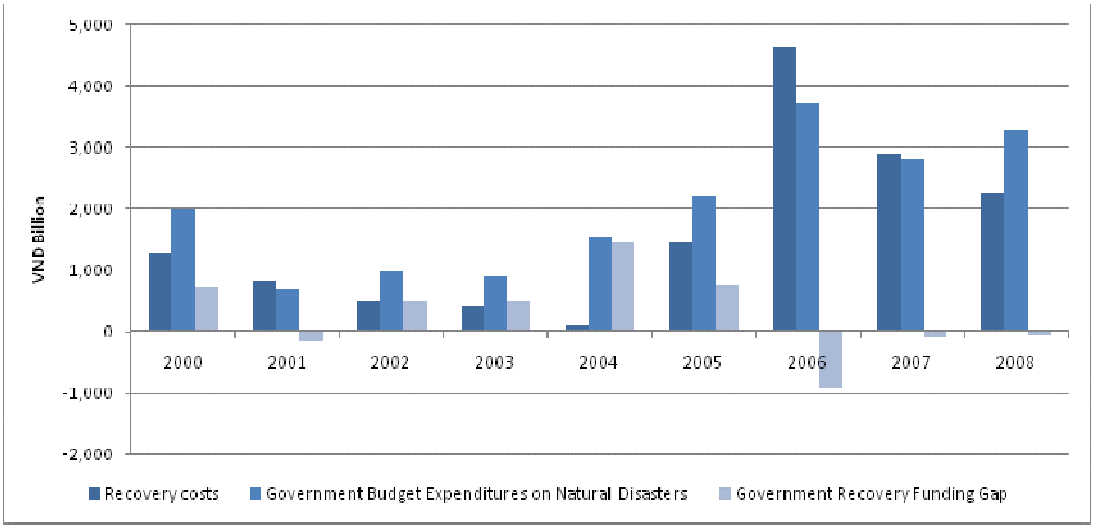


Source: World Bank analysis MOF budget data and CCFSC natural disaster losses (see Annex x for details)

The funding gap analysis is repeated in Annex 9 both in US dollar terms and as a percentage of GDP.

The analysis is sensitive to the assumptions on the short-term government fiscal resources. A sensitivity analysis is presented in Figure 3.6, which shows that in order to cover the average recovery costs of about VND 3,500 Billion per year experienced in 2007 and 2008 and assuming that the only source of recovery finance is from the state contingency budget, central government would need to allocate about 40% of its contingency budget and local government about 20% of its contingency budget to recovery expenditure just to break even. Under a 10% reduction in total government resources for the short term financing natural disaster recovery costs, there would have been a small recovery funding gap or deficit in 2001 and a much larger gap in 2006. The allocated expenditure from the state contingency budget would have been just about adequate (a break-even position) to cover recovery costs in 2007 and 2008.

Figure 3.6. Break-even Analysis for Recovery Expenditures out of State Contingency Budget



Note: Sensitivity analysis assuming the only short term government resources are from the contingency budget (40% central contingency budget; 20% local contingency budget).
Source: World Bank 2009 Analysis of MOF and CCFCS data

As if Analysis of Natural Disasters Funding Gap for Catastrophe Years

The analysis presented above is based on actual damages occurring during the 9 year period 200 to 2008 (in current VND). While this period includes 2006 when the highest annual losses by value were recorded in the past 20 years, much higher losses might be expected to occur in future for two reasons: the growing concentration of population and assets at risk (although it is expected that the new assets will meet higher building standards), and the possible increased severity/frequency of natural disasters due to climate change.

Growing concentration of population and value of assets at risk. Vietnam's GDP has more than tripled over the period 2000-08 (in current VND terms). While this may be partly due to the inflation rates in the early 2000s, this growing GDP shows an increase in assets exposed to natural disasters. A natural disaster with a given intensity would thus create more damage (in VND terms) today that yesterday, although recent risk mitigation projects and high building standards may reduce their vulnerability.

More severe and/or more frequent disasters. Higher losses could occur in the future due to more severe and/or more frequent natural disasters, possibly related to climate change.

The 9-year historical disaster losses and fiscal resources are adjusted with 2008 GDP. Such an adjustment does not affect the sign of the funding gap, but just its size. See Figure 3.7 and Figure 3.8.

Recovery and reconstruction funding gaps have been estimated for natural disasters with various return periods. Based on the preliminary catastrophe risk analysis conducted in Chapter 2, probable maximum natural disaster losses have been estimated as a percentage of GDP for various return periods (10 years, 50 years, 100 years). See Figure 3.7 and Figure 3.8 and Annex 9 for full details.

Figure 3.7. Estimated As If Recovery Funding Gap Analysis at 2008 GDP Values

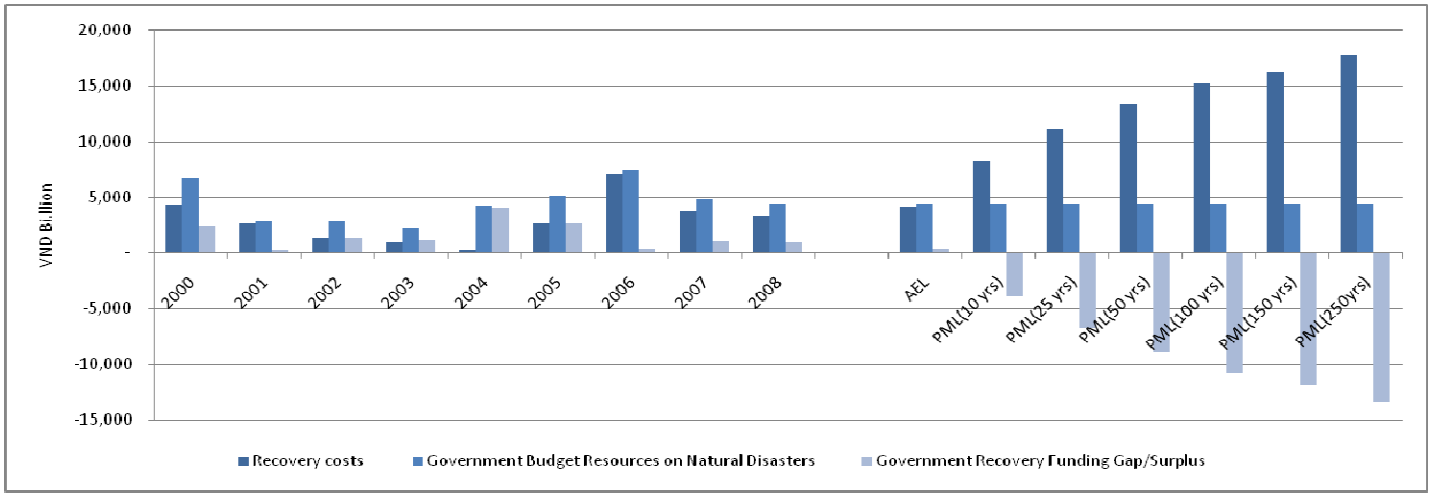
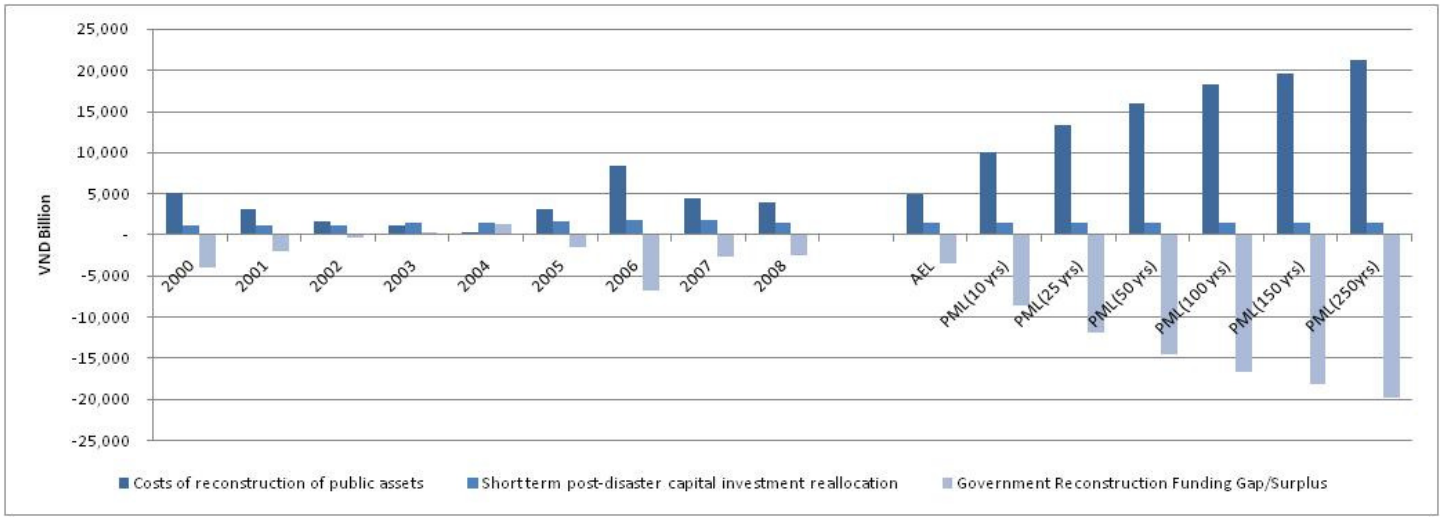


Figure 3.8. Estimated As If Reconstruction Funding Gap Analysis at 2008 GDP Values



Source: World Bank 2009 Analysis of MOF and CCFCS data.

There is likely to be an annual average government recovery funding surplus. At 2008 GDP values, the average annual expected value of total natural disaster damages reported by CCFSC is estimated at VND 16,255 billion (US$987 million). The average expected recovery expenditures are estimated at about VND 4,000 billion (nearly US$247 million) per year. The average annual government expenditures on natural disasters amounts to VND 4,346 billion (US$264 million). This is thus sufficient to pay average expected government recovery expenditures and leave a small surplus to contribute towards reconstruction expenditures.

There is likely to be a government recovery funding gap for natural disaster years with return period higher than 10 years. The preliminary PML analysis shows that, once every 10 years, the total costs of damage at 2008 GDP could be in the order of VND 33,000 billion. With recovery costs estimated at VND 8,300 billion (USD 505 million), there would be a government recovery funding gap of about VND 4,000 billion (US$240 million). This probable recovery funding gap would increase to VND 9,000 Billion (US$ 540 million) once every 50 years. Further modelling and analysis should be conducted in future to refine these preliminary estimates.

There is likely to be an annual average reconstruction funding gap. The As If analysis at 2008 GDP values shows that in an average year GoV can expect to face reconstruction costs of about VND 4,900 Billion (US$296 million) per year, of which about VND 1,500 billion could be financed from the short term reallocation of capital expenditures. The 1-in 10-year government reconstruction funding gap is estimated at about VND 8,500 billion (US$ 516 million). This funding gap would rise to about VND14,500 billion (US$ 880 million) once in every 50 years. Further modelling and analysis should be conducted in future to refine these preliminary estimates.

Chapter 3: **Options for Disaster Risk Financing in Vietnam**

This section describes options for disaster risk financing to improve the capacity of the Government of Vietnam to access liquidity in case of natural disaster while maintaining its fiscal balance. It builds on the country catastrophe risk financing framework developed by the World Bank, which relies on three pillars: (i) assessment of government contingent liability; (ii) promotion of market-based property catastrophe insurance, including agricultural insurance; and (iii) sovereign financial protection against natural disasters.

World Bank Country Catastrophe Risk Financing Framework

To help countries reduce their (over-)reliance on post disaster external assistance, the World Bank has promoted a country catastrophe risk financing framework, which is partly based on corporate risk management principles but also considers economic and social factors such as the government's fiscal profile and the living conditions of the poor (Gurenko and Lester 2003, Cummins and Mahul 2009).

This risk management approach relies on the identification and assessment of the (implicit and explicit) contingent liability of the government in case of natural disasters and on the financing of this contingent liability, possibly using market-based financial instruments. By ensuring that sufficient liquidity exists immediately following a disaster, modern funding approaches can help speed recovery, ensure that scarce government funds are well used, and reduce the risk-enhancing effects of moral hazard. With sufficient liquidity following a disaster, the government can immediately focus on early recovery and not be distracted by having to close short term funding gaps. The government can also start reconstruction, particularly for key public infrastructure (including bridges, hospitals, and schools). In addition, catastrophe risk management can assist countries in the optimal allocation of risk in the economy, which may result in higher economic growth, better mitigation, and more effective poverty alleviation.

The sovereign catastrophe risk financing framework is part of a broader disaster risk management framework promoted by the World Bank, which also includes (i) risk assessment; (ii) emergency preparedness; (iii) risk mitigation; and (iv) institutional capacity building. Catastrophe risk financing aims to complement other disaster risk mitigation activities and particularly to protect against extreme events that cannot be efficiently mitigated. It can also provides incentives to prevention and preparedness activities and allow rapid response once an emergency occurs.

The World Bank country catastrophe risk financing framework is based on three pillars:

- *Assessment of the government's contingent liability*. The first step in understanding the government's contingent liability is to develop precise risk models that accurately reflect the country's risk exposure to natural disasters and the losses associated with various events. Second, a dialogue must take place regarding the roles and responsibilities of the government and individuals in the aftermath of a catastrophic event. The contingent liability of the government due to natural disasters is often implicit, as the law usually does not clearly define the financial responsibility of the government when a disaster hits the country. The government thus acts as a (re)insurer of last resort, without knowing precisely its catastrophe risk exposure. By understanding the full exposure and the extent of public intervention in recovery efforts, it is possible to ascertain the contingent liability carried by the government.

- *Promotion of market-based property catastrophe insurance*. The government can reduce its contingent liability by encouraging private competitive insurance solutions for the transfer of privately-owned risks, including property insurance and agricultural insurance. This can be done by creating an enabling environment that allows private insurers and reinsurers to offer competitive products and, possibly, through the establishment of catastrophe insurance programs based on public-private partnerships, including catastrophe insurance pools. This allows the government to reduce its contingent liability in the case of a natural disaster. The government can thus concentrate its financial support on the poor and disadvantaged.
- *Sovereign financial protection against natural disasters*. The government can manage its remaining contingent liability arising from natural disasters by promoting the insurance of public assets and by protecting its budget against external shocks through sovereign risk financing solutions, including reserves, contingent credit and insurance.

The above-mentioned country catastrophe risk financing framework is applied for Vietnam. Options for the financial protection of the Government of Vietnam against natural disasters are discussed.

Sovereign Risk Financing in Vietnam

Combining Post-Disaster and Ex Ante Financial Instrument against Natural Disasters

The dynamic funding gap analysis conducted in Chapter 3 has identified possible post-disaster funding gaps: short term recovery funding gaps and medium-term reconstruction funding gaps. This analysis allows for the design of cost-effective disaster risk financing strategy, as different financial instruments are available at different periods after a disaster. See Table 4.1.

Table 4.1. Availability of Financial Instruments Over Time

	Short term (1-3 months)	Medium term (3 to 9 months)	Long term (over 9 months)
Ex-post financing			
Contingency Budget	■	■	
Donor assistance (relief)	■	■	
Budget reallocation		■	■
Domestic credit		■	■
External credit			■
Donor assistance (reconstr.)			■
Tax increase			■
Ex-ante financing			
Reserve fund	■	■	■
Contingent debt	■	■	■
Parametric insurance	■	■	■
Traditional insurance		■	■

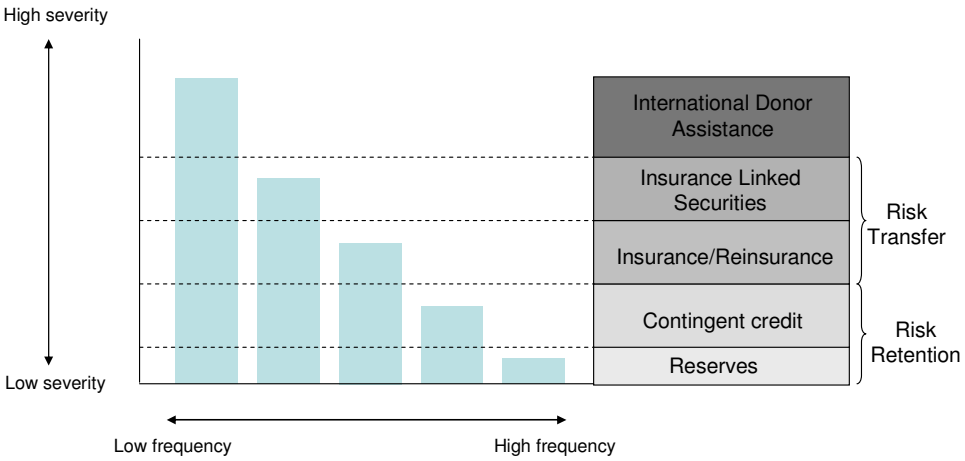
Source: Ghesquiere and Mahul (2007)

Among the ex post (post-disaster) financing tools, contingency budget is the first to be immediately available after a disaster. Government of Vietnam relies heavily on its contingency budget to finance the post-disaster recovery expenditures. Other ex-post financing tools usually

take more time to mobilize and are mainly available for the reconstruction phase. This includes emergency recovery loans and post-disaster reconstruction loans from international financial institutions, such as the World Bank.

Ex ante financing instruments can provide immediate liquidity after a natural disaster. These instruments are designed and implemented *before* a disaster occurs. These instruments include national disaster reserve fund, contingent credit and insurance. An optimal combination of these instruments relies on an optimal disaster risk layering, as shown on Figure 4.1. Small but recurrent losses can be retained through reserves and/or contingent credit. More severe but less frequent events, occurring for example once every 7 years or more, can be transferred to the insurance or capital markets. Finally, international post-disaster donor assistance plays a central role after the occurrence of an extreme natural disaster.

Figure 4.1. Catastrophe Risk Layering



Source: Cummins and Mahul (2009)

Financing of the Recovery Funding Gap: Options for Government of Vietnam

The current financial strategy of Government of Vietnam against natural disasters mainly relies on (i) contingency budget to finance post-disaster emergency and early recovery activities and (ii) (re)allocation of capital expenditures and post-disaster lending to finance the reconstruction of public assets affected by natural disasters.

Government of Vietnam has been able to finance the estimated post-disaster recovery expenditures mostly out of its annual contingency budget over the period 2000-2008. The dynamic funding gap analysis conducted in Chapter 3 has shown that the annual contingency budget (and some additional marginal resources) has allowed the Government of Vietnam to finance about 25% (on average) of the estimated recovery expenditures over the period 2000-2008.

The contingency budget may not be sufficient to cover higher post-disaster recovery expenditures. However, should the Government of Vietnam want to increase its contribution in the financing of the recovery costs, and/or should the country be hit by a more severe event than those recorded over the last ten years, the contingency budget may not be sufficient to cover the government recovery expenditures. Likewise, the occurrence of a major disaster towards the end

of the fiscal year, when most of the contingency budget has already been spent, may result in a recovery funding gap.

This may force GoV to reallocate its planned recurrent expenditures or even its planned capital expenditures in future years, with a negative impact in the long term development agenda of the country. Post-disaster budget reallocations, when possible, may create major disruptions in the long term development agenda of the country, particularly when this affects the planned capital expenditures.

Government of Vietnam could formally allocate a fraction of the planned contingency budget for natural disasters. In order to avoid a situation where contingency funds are almost exhausted when a disaster occurs, GoV could allocate in its planned budget a contingency for the financing of the post-disaster recovery expenditures. Over the period 2001-08, the government-funded recovery expenditure has represented on average 45 percent of the annual contingency budget, that is, an average of 1 percent of the total annual government expenditure.

Government of Vietnam could make provision for an annual budget allocation dedicated to natural disasters into the Financial Reserve Funds. GoV could include in its planned budget an allocation for the financing of post-disaster recovery expenditures. This allocation could be made within an existing reserve fund, such as the Financial Reserve Fund. For example, 0.7% of the planned government expenditures could be allocated to this fund every year. This would allow GoV to build up its financial reserves for natural disasters over time. Should the reserves be exhausted, additional financing would be provided out of the contingency budget.

Government of Vietnam could complement the contingency budget and/or reserves with a contingent credit. The financial reserves and/or the contingency budget may not be sufficient to finance the recovery expenditures when a major disaster happens. The catastrophe risk assessment analysis conducted in Chapter 2 and Chapter 3 showed that a one-in-10 year disaster year could create a recovery funding gap estimated at VND4,000 billion (US$240 million). This funding gap could be financed through a contingent credit, like the World Bank Development Policy Loan (DPL) with CAT DDO. See Box 4.1.

Probability of a short term recovery funding gap. Table 4.1 below shows the probability of having a recovery funding gap depending on the level of contingency budget allocated to natural disasters. If 1 percent of the government expenditures are allocated to natural disasters, through the contingency budget, there is a 30 percent chance that this allocation will be insufficient to cover the post-disaster government recovery expenditures, thus creating a recovery funding gap.

Table 4.1. Estimated Probability of Post-Disaster Government Recovery Funding Gap

% of 2008 Government expenditures	Estimated Annual Probability of a recovery funding gap
1.0%	30%
1.5%	13%
2.0%	6%

Source: Authors.

Box 4.1. World Bank DPL with CAT DDO

The Development Policy Loan (DPL) with Catastrophe Risk Deferred Drawdown Option, ***DPL with CAT DDO***, is a development policy loan that offers IBRD-eligible countries immediate liquidity up to USD$500 million or 0.25 percent of GDP (whichever is less) if they suffer a natural disaster (OP/BP 8.60). It offers bridge financing while other sources of funding are being mobilized. It provides immediate budget support to governments hit by a natural disaster. Funds will be disbursed when a country suffers a natural disaster and declares a state of emergency. Eligible borrowers must have an adequate macroeconomic framework in place at inception and renewal, and a disaster risk management program that is monitored by the World Bank.

The first DPL with CAT DDO was approved in September 2008 by the World Bank's Board of Executive Directors. The US$65 million loan aims to enhance the Government of *Costa Rica*'s capacity to implement its Disaster Risk Management Program for natural disasters. Following the 6.2 magnitude earthquake that hit Costa Rica on January 8, 2009, the Government of Costa drew down approximately US$15 million. A US$150 million DPL with CAT DDO was approved for *Colombia* in December 2008. It will replace the current contingent IBRD investment loan contracted in 2005. DPLs with CAT DDO are currently under preparation in *Guatemala*, *Albania*, and *Croatia.*

As of October 2009, the DPL with CAT DDO has the same lending base rate as regular IBRD loans. The front-end-fee, payable upon effectiveness, is 0.5% and there is no commitment fee. The draw down period is for three years, renewable up to four times (with a renewal fee of 0.25%). Repayment terms may be determined either upon commitment, or upon drawdown within prevailing maturity policy limits. Repayment schedule would commence from date of drawdown.

Source: World Bank Catastrophe Risk Insurance Working Group (2009)

The WB DPL with CAT DDO could offer the Government Vietnam with an option for immediate budget support in case of natural disasters. Government of Vietnam could borrow US$250 million DPL with CAT DDO to secure additional budget support in case of a major disaster. These funds could be used either to complement the contingency budget (and possibly the reserves) for the funding of recovery expenditures or to start the reconstruction activities of lifeline infrastructure. This lending instrument is estimated to be at least 25% less expensive than traditional insurance for the financing of mezzanine risk layers (i.e., disaster losses with a return period of less than 10 years).

The Government of Vietnam could also build a Contingent Emergency Response Component into its standard investment operations with the World Bank. The Operational Policy/Bank Procedure OP/BP 8.00 *Rapid Response to Crises and Emergencies* encourages mainstreaming of disaster risk management in Bank operations, especially in countries that are vulnerable to recurring disasters. Contingent financing is an important instrument in this regard, providing incentives to prevention and preparedness activities and allowing a rapid response once an emergency occurs. The objective of this component is to increase the financial resilience of the Borrower when emergency strikes, but not to provide general budgetary support.

Financing of the Reconstruction Funding Gap: Options for Government of Vietnam

The post-disaster reconstruction expenditures of public assets in Vietnam is mainly financed out of capital expenditures of future fiscal years, although securing funds from the investment plan for post-disaster reconstruction can take several years. The reprioritization of capital expenditures after a disaster may affect the long-term development objective of the country, as it may disrupt the long-term planned capital expenditures. The reconstruction funding gap analysis conducted in Chapter 3 identified reconstruction funding gaps in the disaster years 2006-08, in the range of VND 2500-4500 billion (US$150-275 million), and this gap could be even larger in case of a 1-in-10 year or less frequent disaster.

Government of Vietnam has already identified potential reconstruction funding gaps. As part of the World Bank Natural Disaster Risk Management Project (Phase 1), a rapid disbursement Facility has been created to provide funding for post-disaster reconstruction of eligible small-scale public infrastructure. The US$20 million allocation has been exhausted, and GoV and WB are currently negotiating additional financing for this component.

The reconstruction funding gap could exceed VND 8,500 billion once every 10 years. The preliminary catastrophe risk analysis presented in Chapters 2 and 3 showed that a one-in-ten year event could create a reconstruction funding gap in excess of VND8500 billion (US$516 million).

The Government of Vietnam may want to design a comprehensive financial strategy for the funding of post-disaster reconstruction of public assets. As part of its overall national disaster risk management strategy, the Government of Vietnam could develop a comprehensive financial strategy for the post-disaster reconstruction of public assets. This strategy could rely on an optimal combination of reserves, contingent credit and catastrophe insurance. This would complement post-disaster reconstruction lending, which usually takes some months to be available.

The Government of Vietnam may want to set up a dedicated reserve fund for natural disasters. This fund would aim at securing financing for the post-disaster reconstruction of public assets both from an annual budget allocation and external financing, including insurance. The national disaster fund FONDEN in Mexico is an interesting case the Government of Vietnam may want to further explore, although the catastrophe risk financing structure, and particularly the catastrophe bonds, may be too premature for Vietnam. See Box 4.2.

Box 4.2. Mexico National Disaster Fund FONDEN

Mexico has a long history of natural disaster exposure. Mexico is a seismically active country located along the world's "fire belt", where 80% of the world's seismic and volcanic activity takes place. Mexico is a country most severely affected by tropical storms. It is one of the few regions of the world that can be affected simultaneously by two independent cyclone regions, the North Atlantic and the North Pacific. Historically, Mexico has been consistently impacted by natural disasters.

In 1994, legislation was passed to require federal, state and municipal assets to be privately insured. In 1996, the government created the Fund for Natural Disasters, FONDEN, within the Ministry of Finance. A catastrophe reserve fund was established within FONDEN, which builds on an annual government budget allocation. FONDEN mainly provides financial support to public infrastructure and low-income households affected by a natural disaster.

The Federal Government allows the FONDEN to develop its own financial strategy, relying on private risk transfer instruments such as reinsurance and catastrophe bonds. This helps the FONDEN to increase its financial independence and overcome the delays in budget reallocation. If the financial needs exceed the resources available in the FONDEN, an emergency budget reallocation may take several months, as it has to be approved by the Parliament. In non-disaster years and lower fiscal resources, the annual budget allocation tends to be reduced or even cancelled by the Federal Government.

In March 2006, the Government of Mexico purchased a US$450 million catastrophe coverage, of which US$160 million was issued as a catastrophe bond to cover against the risk of earthquakes (with a return period of 100 years or more), to complement the reserves of the FONDEN. The Mexican earthquake bond, which was sold to institutional investors in the United States and Europe, acts like an insurance policy for the Mexican government. Investors paid US$160 million into a single-purpose reinsurer created for the Government of Mexico. If an earthquake of a specified magnitude occurs in designated areas of the country within the three year period of the contract (2006-2009), the government will be able to draw from these funds. If no disaster occurs during the life of the fund, the money will be returned to the investors. This is the first time a sovereign country has issued a

catastrophe bond. The World Bank has recently assisted the Government of Mexico to issue a new multi-peril (earthquake and hurricane) catastrophe bond to replace the first one which arrived at maturity in 2009. The US$290 million cat bond was issued in early October 2009.

Source: World Bank Catastrophe Risk Insurance Working Group (2009)

Parametric insurance could help Government of Vietnam to secure additional financing in case of a major disaster. Parametric insurance products are insurance contracts that make payments based the intensity of an event (for example, wind speed, earthquake intensity). Unlike traditional insurance settlements that require an assessment of individual losses on the ground, parametric insurance relies on an assessment of losses using a predefined formula that is based on variables that are exogenous to both the individual policyholder and the insurer, but have a strong correlation to individual losses. Parametric insurance products against hurricanes and earthquakes (with a return period higher than 15 years) have been offered by the Caribbean Catastrophe Risk Insurance Facility to the Caribbean island states since 2006. See Box 4.3.

Box 4.3. Sovereign Parametric Insurance in the Caribbean

The World Bank has recently assisted sixteen Caribbean countries in establishing the ***Caribbean Catastrophe Risk Insurance Facility (CCRIF)***, a Caribbean-owned, regional institution which offers parametric insurance, akin to business interruption insurance, against major hurricanes and earthquakes. The CCRIF is the result of two years of collaborative work between CARICOM governments, key donor partners, and the World Bank. The Facility became operational on June 1, 2007.

The financial capacity of the CCRIF relies on its own reserves and on reinsurance. The donor community contributed to the initial reserves of the CCRIF for approximately US$67 million and the CCRIF participants paid one-time participation fees of US$22 million. In 2009, participating countries paid a total premium volume of US$21.5 million for an aggregate coverage of US$602million. The CCRIF retained US$20 million on a first loss basis and successfully placed US$132.5 million of coverage on the international reinsurance and capital markets. The reinsurance strategy of the CCRIF is designed to sustain a series of major natural disasters events (with a probability of occurrence lower than 0.1 percent), achieving a higher level of resilience than international standards.

A similar facility, combined with national disaster reserve funds, is being investigated for the Pacific island states.

Source: World Bank Catastrophe Risk Insurance Working Group (2009)

The damages caused by natural disasters are only partially covered by the Government of Vietnam. While GoV provides emergency relief and finances the reconstruction of public infrastructure, selected case studies of past disasters have shown that damages to residential housing and agricultural losses are marginally covered by GoV. Given that these damages are not the direct responsibility of GoV and because of the lack of developed domestic insurance market these losses are ultimately borne by households. The government could encourage the development of market-based insurance solutions to help households and farmers to transfer their natural disaster risks to the private insurance markets.

Comprehensive disaster risk financing: illustrative example

A comprehensive disaster risk financing strategy for the Government of Vietnam is illustrated below. For the sake of illustration, it is assumed that the GoV's objective is to secure immediate liquidity to finance 30 percent of the CCFSC reported damage caused by a one-in-100 year natural disaster year. This means that GoV wants to secure about US$1,200 million to cover the recovery costs and start the reconstruction of key public assets. Using the preliminary catastrophe risk analysis (see Chapter 2), Figure 4.2 below depicts a possible catastrophe risk financing

strategy combining contingency budget, national reserves, contingent credit and disaster insurance.

Starting from the bottom of Figure 4.2, the contingency budget covers the first US$270 million of government disaster expenditures. It follows the current disaster risk financing strategy where the contingency budget is the main source of funding of natural disasters. It is estimated that such contingency funding is exhausted with a 44 percent probability (about once every 2.5 years). The next layer is a disaster reserve fund, to cover up to US$134 million of losses in excess of the contingency budget. The catastrophe risk financing analysis shows that such a reserve fund combined with the contingency budget can cover probable maximum losses of about US$450 that is likely to occur once every 4 years. This self-retention strategy can be complemented with a contingent credit, like the World Bank DPL with CAT DDO. The CAT DDO would cover the third risk layer of US$250 million. Finally, should this self-retention strategy (including contingency budget, disaster reserves and contingent credit) be exhausted, on average one every 12 years, a disaster insurance policy could be designed to provide up to US$512 million in excess of US$654 million. This illustrative disaster risk financing strategy would allow the GoV to finance disaster years occurring on average once every 100 years.

The proposed disaster risk financing strategy (and its associated costs) offers a basis for further discussion with GoV to devise a strategy to protect the fiscal impact of natural disasters. By combining self-retention and risk-transfer (i.e., insurance) tools, GoV could secure access to immediate liquidity in the aftermath of a disaster at the lowest cost.

Figure 4.2. Illustrative Sovereign Disaster Risk Financing Strategy

Exhaustion point			PFL	RP (Yrs)	AEL (US$ million)	
(US$ million)	Coverage (US$ million)					
	1,167	Disaster Insurance	1%	116		
		512			16	
	654	Contingent Credit	8%	12	37	
		250				
	404	Disaster Reserve Fund	25%	4	45	
		134				
	270	Contingency budget	44%	2	199	
		270				

Note: PFL: Probability of First Loss; RP: Return Period; AEL: Annual Expected Loss

Promoting Private Property Catastrophe Insurance in Vietnam

Catastrophe Property Insurance Market in Vietnam

The Vietnamese life and non-life insurance market has undergone major transformation in recent years. In 2008 there were 39 registered insurance companies, 11 life and 28 non-life and many companies are under foreign ownership. In 2008 non-life gross written premium was VND 11,813 billion (US$ 713 million) representing 0.8% of GDP which although low compared to international norms in OECD countries represents a major growth in demand for insurance - between 2002 and 2006 non-life premiums grew at an average rate of 13% per annum.

The non-life insurance market offers a range of property insurance covers including basic fire & explosion policies through to all risk policies including natural catastrophe perils including earthquake, wind storm and flood. The different types of property insurance covers available include Property and Casualty P&C policies (14% share of 2008 non-life premium), Construction All Risk, CAR, and Erection All Risk, EAR polices (12% of premium), Property All Risk cover (8% of premium) and then a very small market for compulsory fire and explosion insurance (<0.5% of premium). These property and construction risk covers either include catastrophe earthquake, flood and windstorm cover as integral perils (e.g. Property All Risk Cover, CAR/EAR), or as optional perils agreed by underwriters for an additional premium.

There are no reliable figures on the catastrophe insurance penetration levels for privately-owned property including commercial businesses and industry through to private residential housing. However, on the basis of discussions with leading insurers some generalized statements can be made.

All foreign owned businesses or joint-venture enterprises purchase CAR/EAR cover during the construction phase and then once the construction project is completed these companies again purchase All Risks Property insurance including cover against natural catastrophe perils of fire, flood, earthquake, cyclone, tsunami etc.

Few Vietnamese-owned small and medium private commercial companies currently purchase any form of property insurance cover or contents cover and these business are very exposed to catastrophe flood and or cyclone losses. Government does not normally provide any form of disaster relief for small commercial business interruption.

The private residential property insurance market is very poorly developed in Vietnam. In the main cities of Hanoi and Ho Chi Minh City, foreign owned or rented property is usually insured under All Risks property and contents policies. However, very few Vietnamese middle class professionals purchase property insurance cover. A major reason for the lack of a residential property insurance market is that until recently there has not been an active mortgage lending market through the banking sector. Several insurance companies are now offering linked mortgage and property insurance cover for new condominiums (apartments).

There is practically no penetration of the commercial property insurers into rural areas and equally there is no insurance culture on the part of small rural farm households. In central and southern Vietnam much of the traditional rural housing stock is constructed of bamboo, wood and palm thatch and would not conventionally be deemed insurable under a commercial insurance policy.

Promoting Property Catastrophe Insurance in Vietnam

GoV may wish to promote the development of a catastrophe residential housing insurance market in Vietnam as Government post-disaster funding is inadequate to cover all reconstruction costs. Damage to residential housing is typically between one-quarter and one-third of the total estimated value of damage reported by CCFSC, but the government's response is limited to maximum payments of VND 5 million (about US$ 300) for each destroyed house. This payment may not be adequate to finance reconstruction costs, particularly to the more substantial residential housing located in urban areas.

Turkey provides an interesting example of a homeowner's catastrophe insurance program which incepted in 2000. The Turkish Catastrophe Insurance Pool (TCIP) was established to

overcome problems of market failure in Turkey, namely a lack of local market earthquake capacity. The World Bank provided technical and financial assistance in the design stage of TCIP to model and rate the earthquake exposure and then in the start-up implementation phase, a contingent loan to cover claims as part of the risk financing program. A key feature of the cover is that it is a simple property earthquake only policy which is provided at affordable rates. Given the very low voluntary demand by Turkish home-owners for insurance a decision was taken to make cover compulsory for registered houses in urban centers. See Box 4.4.

Box 4.4. Turkey Catastrophe Insurance Pool

The Turkish Catastrophe Insurance Pool, TCIP, was established in the aftermath of the Marmara earthquake in 2000, with assistance from The World Bank.

Turkey has a high earthquake exposure. Traditionally Turkey's private insurance market was unable to provide adequate capacity for catastrophe property insurance against earthquake risk. The government of Turkey traditionally faced a major financial exposure in post-disaster reconstruction of private property.

The government of Turkey's objectives for TCIP were to:

1) Ensure that all property tax paying dwellings have earthquake insurance cover;
2) Reduce government fiscal exposure to recurrent earthquake;
3) Transfer catastrophe risk to the international reinsurance market;
4) Encourage physical risk mitigation through insurance.

Key Features:

1) TCIP is a public sector insurance company which is managed on sound technical and commercial insurance principles. The company's initial capital was supplemented by a World Bank Contingent loan. TCIP purchases commercial reinsurance and the government of Turkey acts as a catastrophe reinsurer of last resort for claims arising out of an earthquake with a return period of greater than 300 years.
2) Attractive and affordable insurance policy. The TCIP Policy is a stand-alone property earthquake policy with a maximum sum insured per policy of US$ 65,000 and an average premium rate of US$ 46 and a 2% of sum insured deductible. Premium rates are based on the construction type (2 types) and property location (5 earthquake risk zones were identified) and vary from less that 0.05% for a concrete reinforced house in a low risk zone to 0.60% for a house located in the highest risk zone.
3) Policy marketing. The policy is distributed by about 30 existing Turkish insurance companies which receive a commission.
4) Achieving market penetration/overcoming traditional resistance to property insurance. The government invested heavily in insurance awareness campaigns and also made earthquake insurance compulsory for home-owners on registered land in urban centers. Cover is voluntary for homeowners in rural areas.
5) The program is reinsured by international reinsurers.

Since inception in 2000, TCIP has achieved an average penetration rate of about 20% of domestic dwellings (about 3 million dwellings). Romania is about to set up a similar pool for earthquakes and floods.

Source: Cummins and Mahul (2009)

Should Vietnam want to establish a private residential catastrophe insurance program, key decisions which will need to be considered include whether to:

(a) Form a new public-sector catastrophe insurance fund as in the case of Turkey or to promote some form of "coinsurance pool" through the involvement of the existing 28 non-life private commercial insurers.

(b) Make homeowners property insurance compulsory or to market this cover on a purely voluntary basis. The Turkish example showed that the demand by homeowners for property insurance was very low due to the lack of an insurance culture by Turkish homeowners and this also appears to be a major issue in Vietnam. If GoV is to reduce its fiscal contingent liability to natural disasters, it may consider compulsory earthquake, storm and flood cover for selected residential properties.

(c) Target this product at urban property owners as opposed to rural households. In Turkey earthquake insurance is only compulsory in urban areas. In Vietnam rural areas much of the housing stock is of wooden construction and it is likely that this would not meet the minimum building standards required by local insurers and their reinsurers.

(d) Involve government in this program, possibly through the provision of start-up funding and or catastrophe reinsurance support. In any case the national reinsurer VinaRe could actively support the reinsurance of this private residential catastrophe insurance program.

Promoting Property Catastrophe Insurance of Public Assets

High value state-owned enterprises including aviation, the petroleum and gas sectors, and the power and telecommunication sectors purchase natural catastrophe insurance. It is also understood that during the construction phase of any new infrastructure project (especially those involving foreign contractors) such as a major road or bridge construction, CAR/EAR is purchased, but once the project is completed, insurance cover ceases to be purchased.

Property fire cover is compulsory for all public buildings and businesses. Fire (& explosion) cover is compulsory for public sector buildings in Vietnam and the MOF regulates a policy and sets market fire tariffs which average about 0.4%, with range from between 0.04% to over 1% according to the type of insured property, its use and fire exposure. This product is underwritten by the private insurance companies but in 2008 total premiums amounted to only VND 52,363 million (US$ 321,500). In practice, it appears that a very low percentage of public sector buildings are insured either because the buildings would not meet the minimum fire regulations to be insured or because insurance premiums are not budgeted for and finally because there is no tradition of insuring public property.

Although compulsory fire and explosion cover should be purchased on all public sector property in practice very few buildings are insured either against fire or flood and wind storm. The main reasons why very few public-sector buildings are insured include: (a) the buildings would not meet the minimum fire regulations to be insured or (b) insurance premiums are not budgeted for and finally (c) there is no tradition of insuring public property in Vietnam.

Under each major event, severe damage amounting to between 30% and 40% of the total estimated value of damage is incurred in rural schools, hospitals and public offices or businesses and rural infrastructure, and because these public assets are by and large not insured against natural catastrophe perils, the burden for rehabilitation and reconstruction falls almost entirely on public sector finances and or local and international donations.

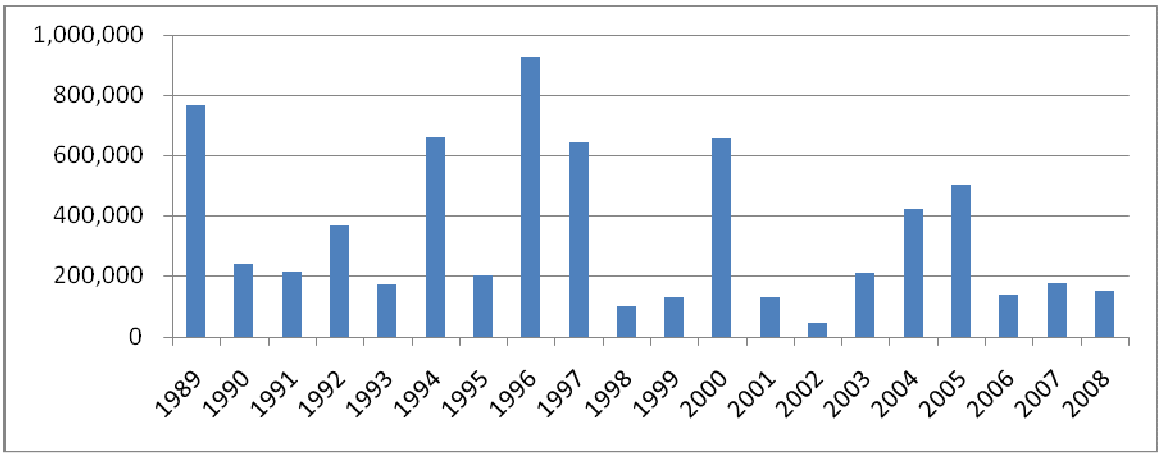
Critical public assets, including lifeline infrastructure (e.g., hospitals), could be insured to make certain that funds will be immediately available for their reconstruction after a disaster. The insurance of key public assets also contributes to greater financial discipline within the government, and provides an economic signal of the cost of natural disasters through the payment of insurance premiums. The Government of Costa Rica has recently asked the World Bank to

provide technical assistance to help the public insurance company INS develop an insurance strategy for public assets.

Promoting Agricultural Insurance in Vietnam

Agriculture is extremely exposed to natural disasters in Vietnam. The CCFSC reported data over the past 20 years show that each time a major tropical cyclone or flood event occurs that the highest value of damage or about 35% of total is typically incurred by the agricultural crop, livestock, forestry and aquaculture sectors in Vietnam. Under each event large areas of crops including paddy rice are damaged as illustrated by the CCFSC data in Figure 4.2 showing an average damaged area of 340,000 ha of rice and peak of over 900,000 ha in 1996 (which was a major storm and flood year). Large numbers of livestock and poultry are killed by storm and flood and also major damage is incurred to the aquaculture sector (Annex 6).

Figure 4.2. Annual Area of Rice Crop damaged by storm and floods (hectares)



Source: CCFSC Damage statistics

Agricultural Insurance Provision

The supply of agricultural crop and livestock insurance in 2009 is extremely restricted in Vietnam and for most farmers the only source of compensation following a major flood or storm event is through the disaster relief payments made by central and local governments and MARD. Government attempts to assist rural households following each major disaster by providing recovery finance usually in kind in the form of seeds and fertilizers and small livestock. Government cannot, however, afford to compensate the full economic costs of the losses incurred by farmers, livestock breeders and aquaculture farmers.

The government has made various attempts in the past to encourage the insurance sector to develop and implement agricultural crop and livestock insurance for the countries predominately small and marginal farmers. In 1980, the Vietnam Insurance Group introduced a pilot multiple-peril crop insurance program for paddy in Nam Nunh and Vu Ban districts. Bao Viet, the former public sector insurer subsequently expanded the paddy insurance scheme to 16 provinces, but on account of high losses, Bao Viet terminated the paddy scheme in 1999. Today, Bao Viet only provides insurance for industrial crop-crops including rubber, livestock insurance

for dairy cattle and a pilot aquaculture scheme for catfish (MoF, 2009)[18]. In 2001, GoV granted Groupama the French mutual agricultural insurer the first licence issued to a foreign insurance company to develop crop and livestock insurance in Vietnam. Groupama attempted to market voluntary crop and livestock mortality insurance products to individual farmers in the Mekong River Delta region for a number of years, but encountered very low demand by small farmers for their products and major problems of anti-selection, particularly in the case of flood[19]. Other key issues identified by the company included the lack of awareness and understanding by rural households of the role and operation of agricultural insurance, and the prohibitively high administrative costs of trying to market and administer individual grower agricultural insurance in Vietnam. The company has withdrawn from crop insurance and in 2009 is underwriting a very small livestock portfolio only.

In 2009 Bao Viet and Groupama are the only insurers which are offering very restricted agricultural insurance in Vietnam. In 2008 total agricultural insurance premiums only amounted to VND 1,683 million (US$ 103,000).

There is major lack of knowledge and expertise on the part of local Vietnamese Insurance companies in the design and implementation of agricultural insurance products and programs. With the exception of Bao Viet and Groupama none of the local insurers have any experience with agricultural insurance and this is a major constraint to their developing this class of business for Vietnamese farmers.

Various international aid donors including the World Bank, ADB and Ford Foundation have assisted GoV in recent years with research into crop insurance products for small farmers. In 2007 the CRMG of the World Bank conducted initial research into flood index insurance cover for rice growers in Vietnam. Subsequently ADB and Ford Foundation have funded research and development by an international consultant into (a) a meso-level flood index insurance cover to protect VIBARD seasonal production loans to small rice growers in the Mekong Valley against catastrophe flood leading to inability of the farmers to repay their loans and (b) micro-level or individual grower insurance against drought (rainfall deficit) in coffee grown in the central highlands of Vietnam. The flood index program for VIBARD was ready for launch in 2009 with Bao Minh as the local ceding company and lead reinsurance through ParisRe, but is currently on hold pending decisions by the client. The drought index insurance cover is due for launch on 2010[20].

Government of Vietnam 2008/09 Agricultural Insurance Initiative

In 2008 GoV appointed MOF/MARD and VinaRe to conduct a feasibility study for the introduction of a national agricultural insurance program into Vietnam. The feasibility study was chaired by VinaRe and in 2009 the "Working Group" comprising VinaRe and the Insurance Commission of the MoF visited France and China to study the public-private partnership agricultural insurance schemes in these countries. According to VinaRe the commission studied options based on the private-public pool coinsurance schemes in China to provide state subsidised

[18] MoF (2009). "*Natural Disaster Insurance in Vietnam – Current Situation, Solutions and Development Trend*". Department of Insurance, Ministry of Finance.

[19] In 2002 Groupama also introduced a pilot aquaculture scheme mainly for shrimp, but withdrew cover after incurring heavy storm losses.

[20] For details of the flood index program see: Skees. J., and J. Hartell, Vietnam: Agricultural Insurance Product Briefing Note. Ford Foundation Project *Developing Index Based Agricultural Insurance to Enhance Financial markets for Poverty Reduction in Vietnam*,. Prepared for VIBARD Agricultural Insurance Working Group, Hanoi, Vietnam, November 2008

crop, livestock, forestry and aquaculture insurance. Other options under consideration included forming a National Agricultural Insurance Fund. (MoF, 2009). VinaRe noted that if a national agricultural system was to be introduced into Vietnam, they believed that farmers might not be able to afford cover without heavy premium subsidies of up to 70% of premium and this might cost government between US$200 to 500 million per annum. The Working Group was due to submit its findings and recommendations to GoV for a national agricultural insurance program at end September 2009.

The World Bank has major international experience with the planning and design of agricultural crop and livestock insurance programs and has suggested that before the Working Group opts for premium subsidies it should establish the institutional framework for a private-public partnership for Vietnam under which the private commercial insurance sector would hopefully take a major lead in implementing agricultural insurance possibly through the rural cooperative sector which is very active in Vietnam and which could form a low-cost delivery channel for administering agricultural insurance with large numbers of small Vietnamese farmers.

There are major challenges for introducing agricultural insurance into Vietnam given the high catastrophe exposures to flood, storm and drought. Any insurance solutions are likely to require a combination of private sector insurance and reinsurance and public-sector catastrophe reinsurance under a carefully designed private-public partnership program for Vietnam. A combination of traditional and index insurance products may offer solutions which permit government to transfer a major share of its current natural disaster relief fiscal burden to the insurance sector. Pre-conditions for the introduction of agricultural insurance into Vietnam include the need for technically-based risk assessment, product design and rating and a commercial insurance approach to program implementation.

Chapter 4: **Conclusions and Options for Consideration**

Vietnam is one of the most exposed countries to multiple natural disasters. The country is extremely vulnerable to natural disasters including tropical cyclones (typhoon), tornados, landslide and drought and 59% of the total area of the country and 71% of the population are prone to cyclones and floods.

The economic impact of natural disasters is significant and could further increase due to climate change. In addition to the enormous human toll, natural disasters create enormous strain to the economy of an affected country. Over the past 20 years, natural disasters have resulted in total damage of US$6.4 billion and a total loss of life of more than 13,000 persons, with major damage to residential housing and public-sector property, agriculture, and infrastructure valued at an annual average of about 1 percent of GDP with a peak loss of nearly 3 percent of GDP in 2006. Moreover, there are rising concerns about the impact of climate change on the frequency and intensity of climatic hazards in Vietnam. The country has been identified as one of the five worst affected countries by climate change because a large proportion of the population, industry, infrastructure and agriculture are concentrated in the narrow coastal strip and low-lying Red River Basin and Mekong Delta.

The Government of Vietnam has developed a strategy and institutional framework to strengthen Vietnam's resilience to disasters. Strengthening disaster management remains a priority for the Government of Vietnam. In November 2007, the Government approved the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. This strategy recommends the development of catastrophe risk financing solutions (including insurance) to complement other disaster risk mitigation measures.

In this context, the Ministry of Finance requested the World Bank to conduct a study on the financial protection of the state against natural disasters. This study aims to build institutional capacity on catastrophe risk financing and to identify financial options which are affordable and effective to the Government of Vietnam, including both sovereign risk financing and private insurance instruments. The study relies on the following four components:

- *Financial Risk Assessment* of the frequency and severity of natural hazards with an emphasis on flood and storm hazards and an analysis of the costs of natural disaster damages to private and public assets in Vietnam;
- *Review of Government Budgetary process for financing natural disasters,* including the sources of funding and changes in funding levels over the past decade;
- *Dynamic Fiscal Funding Gap Analysis* which aims to assess the impact of natural disasters on the Government's fiscal balance and to identify potential funding gaps during the main post-disaster phases.
- *Options for the sovereign financial protection against natural disasters* are reviewed drawing on relevant international experience. Options for sovereign risk financing are considered including a combination of post-disaster and financial instruments. In addition, options are presented for the Government to consider including the promotion of private residential catastrophe property insurance and agricultural insurance.

This report draws heavily on international experience. This study benefits from the international experience of the World Bank, which has assisted many countries in the design and implementation of sovereign catastrophe risk financing strategies (such as in Mexico and the Caribbean island states) and to set up property catastrophe risk insurance programs (such as in Turkey and Romania). This experience is tailored to the social and economic characteristics of Vietnam.

Key Findings and Challenges

A financial assessment of natural disasters in Vietnam has been performed, which highlights the need for an improved comprehensive post-disaster damage assessment and reporting system, and especially the estimated financial value of the damages. Drawing on available published data in Vietnam, the report has performed an analysis of natural disasters in terms of frequency and severity of occurrence, with a particular focus on floods and tropical cyclones. This has then been complemented by an analysis of the physical and financial damage to mainly public-sector property and infrastructure but also rural and agricultural households. While this disaster risk assessment is preliminary, it highlights the need for more standardized damage data, especially estimated financial values for each category of damage, to be collected through a comprehensive damage and needs assessment system.

Vietnam has formally conducted post-disaster damage assessment to measure the physical and financial losses to human life, property, infrastructure, production and industry for more than 25 years. The Central Committee for Flood and Storm Control (CCFSC) is the government agency responsible for disaster risk management in Vietnam. CCFSC's Secretariat is hosted by the Department of Dyke Management and Flood and Storm Control of the Ministry of Agriculture and Rural Development (MARD).

The natural disaster damage assessment procedure was upgraded in 2006 but is not yet widely adopted in Vietnam. The revised Damage and Needs Assessment (DANA) methodology, developed with assistance from UNDP, was considered too complicated by CCFSC and has still be to be simplified and fully implemented in Vietnam.

The current disaster damage assessment system may under-estimate the damage to private sector property and commercial business and industry. The disaster damage assessment system is mainly intended to record direct physical damage to public sector property and infrastructure in order to facilitate post-disaster recovery and reconstruction financing decisions by government. The system appears to under-estimate the value of damage to private sector property and commercial businesses or industry. Although damage to private rural housing and agriculture (crops, livestock, aquaculture and forestry) is reported, the DANA procedure does not systematically record damage to private commercial businesses or private-urban property. It is likely therefore that the true economic value of damage arising from natural disasters is under-reported, at least for private urban residential property and for commercial business and industry.

The financial estimation of damage is often reported by the Provinces as a single event value and no breakdown of values is available by category of damage or sub-sector. As such it is not possible to make a comprehensive analysis as to which sub-sector incurs the highest financial damage although from the limited data available this is usually agriculture and fisheries, irrigation

infrastructure and residential housing. In addition, there is no standard for estimating the actual financial cost, and the verification process varies on the ground from province to province.

There is some uncertainty on the relationship between the CCFSC reported damage and the Government's contingent liability related to natural disasters. The damage assessment reports are submitted by each Province to the Prime Minister's Office for authorization and approval to release Central government funds. It is not clear how the Province damage assessment, the Province's funding request and the funds approved by the Central Government are related. Specific issues which require clarification include the provincial and central governments' respective extent of financial liability for the post-disaster costs of repairs and reconstruction of private housing and rehabilitation of damage to crops, livestock, forestry and business enterprises. Furthermore the Provincial government payment requests usually represent only a fraction of the total estimated value of damage and, in turn, the actual payments authorized by Central government are usually well below the amount requested by the provinces. The criteria used by the Prime Minister's office to determine the amount of central contingency funds allocated to post-disaster emergency and recovery operations should be clarified.

The annual average value of natural disaster losses, as reported by CCFSC, are equivalent to 1 percent of GDP over the last 20 years, mainly caused by floods and tropical storms. The pattern of natural disaster losses expressed at a percentage of GDP does not show any long-term trend, although some years have been particularly severe like in 1996 and 2006 with total assessed value of damage of US$ 725 million and US$ 1,159 million, respectively. Excessive and extended inundation flooding and tropical storms represent about 95 percent of the reported value of losses. However, it should be noted that CCFSC does not report losses caused by drought and frost. Finally it is noted that the CCFSC estimates do not record secondary or consequential losses and the official figures may therefore under-estimate considerably the true financial costs of natural disaster events to the Vietnamese economy.

The analysis of selected events shows under a catastrophic typhoon event, approximately one third of all the value of damage is incurred by agriculture, a quarter by private housing and the rest by public-sector property. A major drawback of the CCFSC database is that with very few exceptions, the reported value of damages is not separated by sub-sector. The case study of Typhoon Xangsane which struck Vietnam in October 2006 suggests that the agricultural sector and the housing sector tend to be the most disaster-prone sectors.

Preliminary catastrophe risk analysis suggests that a one in hundred year event in Vietnam could cause damage in excess of US$3.8 billion, or about three times the worst losses actually experienced over the past twenty years. Past losses may not be good indicators of future losses, particularly in the context of climate change and the growing concentration of assets at risk in disaster-prone areas due to the steady economic growth in Vietnam. Preliminary catastrophe risk analysis, to be further completed through the development of country-specific catastrophe risk models, indicates that a major disaster year in Vietnam, like one occurring every century, could cause losses in excess of US$4 billion at 2008 GDP values. A challenge for Government of Vietnam would be to secure adequate and timely access to funds to cover the costs of recovery and reconstruction after major disasters.

The main source of post-disaster financing of emergency relief and recovery expenditures by the Government of Vietnam is the Contingency Budgets. Under the State Budget Law of 2002, Central and Local governments are required to allocate between 2 percent and 5 percent from their total planned budget for capital and recurrent expenditures to a contingency budget "to meet contingent spending on preventing, combating, and overcoming natural disasters and in important

tasks of national defense and security". The actual Central contingency budget was on average 2 percent over 2000-08 and it is expected to be 2 percent in 2010. This represented US$650 million in 2008. In practice it is understood that a high proportion of the Central and Local Contingency Budgets are actually expended on natural disaster risk prevention / mitigation prior to the onset of the main typhoon and flood seasons and therefore that the proportion of funds available to pay for natural disaster recovery operations is much lower than the 2 percent figure. The contingency funds can be complemented by other sources, such as the Financial Reserve Funds or the Surplus Revenue, although these additional resources have been very scarce in recent years.

Post-disaster reconstruction needs are mainly financed out of the Government capital expenditures, but it can take several years to secure the funds. The post-disaster reconstruction activities undertaken by the government are mostly financed out of the capital investment plan. This plan is agreed with the Provinces every three years and is rather inflexible. As a consequence, post-disaster reconstruction activities are usually budgeted in the next capital investment plan, creating significant delays in the reconstruction process. However, it is understood that in some cases lifeline infrastructure (such as schools, hospitals or strategic bridges) can be financed in the aftermath of a disaster through an emergency reallocation of the capital expenditures. In addition, the Government of Vietnam can access post-disaster reconstruction loans from international financial institutions such as the World Bank, which provides immediate liquidity to start the reconstruction phase. For example, a rapid disbursement facility has been set up under the World Bank Natural Disaster Risk Management Project (2005-2010) to fund the post-disaster reconstruction of eligible public infrastructure, to be possibly extended through additional financing.

A dynamic natural disaster funding gap analysis has been performed under this study. This approach relies on the decomposition of the post-disaster period into three phases: (i) emergency relief; (ii) recovery; and (iii) reconstruction. Then for the recovery and reconstruction phases, post-disaster financial needs and resources were assessed and compared, and potential natural disaster funding gaps were identified. It has not been possible to conduct any analysis of relief needs and actual expenditure for relief operations because this information does not appear to be systematically recorded at central government level.

No short-term recovery funding gap for natural disasters has been identified in Vietnam in the period 2000-08. The dynamic funding gap analysis suggests that the Government of Vietnam has been able to finance the post-disaster recovery needs out of its short term fiscal resources, and mainly from the central and local contingency budgets. Based on the data available, the analysis shows that even in the very severe loss years of 2006 to 2008, government finances have been adequate to cover the short-term recovery expenditures.

Should a 1-in-10 year natural disaster occur, there is likely to be a recovery funding gap. The preliminary catastrophe risk analysis carried out in this study indicates that, once every ten years, the government contingency budget allocated to natural disasters may not be enough to cover the recovery costs estimated at US$500 million.

Major reconstruction funding gaps have been identified between 2006 and 2008. The financing of the reconstruction activities cannot be secured through short-term fiscal resources: the contingency budgets cannot be used for post-disaster reconstruction activities and the planned capital expenditures cannot be easily reallocated. As a consequence, the Government of Vietnam faces major reconstruction funding gaps in the aftermath of a disaster. Based on the data available, this funding gap was estimated at US$275 million in 2006, which is probably an underestimate due to the fact that the CCFSC damage assessment procedures may underestimate

the full costs of reconstruction. Such gaps are expected to be even bigger for major disasters: based on the preliminary catastrophe risk analysis, a one-in-50 year event would create a reconstruction funding gap estimated between US$850 million and US$900 million.

Options for Consideration

Catastrophe risk financing should be part of the National Disaster Risk Management Strategy. A comprehensive disaster risk management strategy, involving risk assessment, institutional capacity building, investments in risk mitigation, emergency preparedness, and catstrophe risk financing, can be very effective in mitigating the impact of natural disasters.

The damage assessment system should be further strengthened. The current damage assessment system should be revisited to allow for more standardized damage data, especially estimated financial values for each category of damage. This would help Government of Vietnam better assess its implicit and explicit contingent liability related to natural disasters and to design a cost-effective disaster risk financing strategy.

Catastrophe risk modeling tools could be further developed for Vietnam. Catastrophe risk models offer numerous applications to assist the public and private decision makers in the management of natural disasters: emergency preparedness, risk mitigation investments, catastrophe risk insurance development, etc. Such models require detailed hazard modules, which can simulate millions of events using historical data and simulations techniques, and a detailed GIS exposure database of public and private assets at risk. Open source models for disaster risk management are under development in Latin America and in the Pacific. They could be adapted in the context of Vietnam, using the existing storm and flood engineering models developed by the local experts.

A cost-effective disaster risk financing strategy should rely on an optimal combination of financial instruments including, but not only limited to, contingency budgets. Contingency budgets give the Government of Vietnam some flexibility to finance post-disaster recovery needs, but this source of financing is likely to be insufficient for major natural disasters. Major disaster losses should be layered and financed through a combination of financial instruments including, contingency budget, national disaster reserves, contingent credit, and risk transfer instruments (including insurance).

Government of Vietnam could formally allocate a portion of its contingency budget for natural disasters. In order to avoid a situation where contingency funds are almost exhausted when a disaster occurs, Government of Vietnam could allocate in its contingency budget a fixed percentage for the financing of the post-disaster recovery expenditures. Over the period 2001-08, the government-funded recovery expenditure has represented on average almost half of the Contingency budget.

Government of Vietnam could also build up reserves dedicated to natural disasters from an annual budget allocation into the existing Financial Reserve Fund. Government of Vietnam could complement the contingency budget with a reserve mechanism for natural disasters, for example to be built up over time from an annual budget allocation to the Financial Reserve Fund. These reserves could be used once the contingency budget is exhausted to finance post-disaster recovery expenditures and/or to start reconstruction operations.

Contingency budgets and/or reserves could be complemented with a contingent credit. Should the contingency budgets and/or the national reserves be insufficient to cover the recovery needs in the aftermath of a disaster, the Government of Vietnam could access additional financial resources through a contingent credit. For example, the World Bank offers a Development Policy Loan (DPL) with a Catastrophe Risk Deferred Drawdown Option (CAT DDO) to IBRD-eligible countries as an immediate budget support to governments hit by a natural disaster. Government of Vietnam could also build a Contingent Emergency Response component in its standard investment operations with the World Bank. Preliminary analysis in this report shows that a US$250 million contingent credit, on the top of the contingency budget and reserves, would allow the Government of Vietnam to finance the recovery and/or reconstruction activities caused by a major disaster.

Should the Government of Vietnam want to design a financial protection for major events occurring every ten years or more, parametric disaster insurance could be considered. Parametric insurance is an innovative form of insurance triggered by pre-defined parameters such as the wind speed or the excess rainfall level for tropical storms and typhoons. It provides immediate liquidity to the policyholder in the aftermath of a disaster. Sovereign parametric insurance against natural disasters has been purchased by many of the Caribbean islands and by Mexico.

The Government of Vietnam could set up a dedicated reserve fund for natural disasters for the post-disaster reconstruction of public assets. This fund would aim at securing financing for the post-disaster reconstruction of public assets both from an annual budget allocation and from external financing, including insurance. The national disaster fund FONDEN in Mexico is an interesting case the Government of Vietnam may want to further explore. Such a fund could build upon the ongoing rapid disbursement facility set up under the Natural Disaster Risk Management Project co-financed by the World Bank.

In the medium term, the Government of Vietnam could promote the development of the local property catastrophe insurance market, especially for private urban dwellings of middle- and high-income households. The private residential property insurance market in Vietnam is still under-developed. As this market develops in the future, the Government could promote a private residential catastrophe insurance program through the establishment of a catastrophe insurance pool, like in Turkey.

Agricultural insurance could also be promoted through public-private partnerships. The agricultural sector in Vietnam is highly exposed to natural disasters. The supply of agricultural insurance in 2009 is extremely restricted and the past attempts have not been very successful. Further work could build on the ongoing initiatives to design and pilot-implement an agricultural insurance program based on public-private partnerships.

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Glossary

Accumulation	The concentration of similar risks in a particular area such that an insured event may result in several losses occurring at the same time.
Actuarial	Branch of statistics dealing with the probabilities of an event occurring. Actuarial calculations, if they are to be at all accurate, require basic data over a sufficient time period to permit likelihood of future events to be predicted with a degree of certainty.
Ad hoc Response	Disaster relief arranged in the aftermath of a disaster. Ad hoc responses are generally less efficient than planned responses or a well-designed risk-management framework.
Adverse Selection	Adverse selection occurs when potential insurance purchasers know more about their risks than the insurer does, leading to participation by high-risk individuals and nonparticipation by low-risk individuals. Insurers react by either charging higher premiums or not insuring at all, as in the case of floods.
Agricultural Insurance	Insurance applied to agricultural enterprises. Types of business include crop insurance, livestock insurance, aquaculture insurance, and forestry, but normally exclude building and equipment insurance, although these may be insured by the same insurer under a different policy.
Area-Based Index Insurance	The essential principle of area-based index insurance is that contracts are written against specific perils or events (such as area yield loss, drought, or flood) defined and recorded at a regional level (for example, at a county or district level in the case of yields, or at the local weather station in the case of insured weather events). Indemnities are paid based on losses at the regional level rather than farm level.
Asset Risk	Risk of damage or theft of production equipments and assets.
Asymmetric Information	An information imbalance due to one party in a transaction possessing more or better information than the other party (parties), such as knowledge of hidden costs or risky behavior. Buyers of insurance products typically have better information about their level of risk exposure, which they may hide from insurers in order to gain lower premium rates.
Basis Risk	The risk with index insurance, that the index measurements will not match individual losses. Some households that experience loss will not be covered, for example, and some households that experience no loss will receive indemnity payments. As the geographical area covered by the index increases, basis risk will increase as well.
Capacity	The maximum amount of insurance or reinsurance that the insurer, reinsurer, or insurance market will accept.
Catastrophe	A severe, usually sudden, disaster that results in heavy losses.
Ceding company	A direct insurer that places all or part of an original risk on a reinsurer
Claim	An insurer's application for indemnity payment after a covered loss

	has occurred.
Cognitive Failure	In the case of decision making in risk management, cognitive failure occurs when decision makers fail to account for the possibility of infrequent catastrophic risks.
Coinsurance	1. The situation where the insured is liable for part of each and every loss, which is often, expressed as a percentage of the sum insured. 2. When each of several insurers covers part of a risk.
Collective Policy	A policy issued on behalf of a number of insurers or a policy covering a number of items, each being insured separately.
Commission	A proportion of the premium paid by the insurer to the agent for services in procuring and serving the policyholder.
Correlated Risk	Risks that is likely to affect many individuals or households at the same time. A clear example is a fall in commodity price. For example, coffee growers in the same community are likely to be simultaneously affected by a decrease in price. Futures and options markets can be used to transfer these risks to parties outside the local community. Another example is a widespread drought, which can damage agricultural production over an entire region.
Country Risk Profile	The level of risk exposure of a country, determined by the occurrence of events such as price shock and adverse weather events that impact major private and public assets and economic activities within a country at the micro, meso, and macro levels.
Crop Insurance	Provides financial compensation for production or revenue losses resulting from specified or multiple perils, such as hail, windstorm, fire, or flood. Although most crop insurance pays for the loss of physical production or yield, coverage is often available for loss of the productive asset, such as trees in the case of fruit crops.
Deductible (Excess)	An amount representing the first part of a claim, which an insured has to bear as stated in the policy. The deductible is frequently expressed as a percentage of the sum insured, but may just as often be a monetary amount.
Default	Failure to fulfill the obligations of a contract.
Direct Premium Subsidy	A subsidy which is calculated as a percentage of the insurance premium paid. Such a subsidy is problematic, because it disproportionately benefits high-risk farmers who pay higher premiums. Attracting higher-risk farmers can significantly increase the costs of insurance.
Disaster-Index Insurance	An insurance contract in which payments are triggered by extreme weather events. Disaster-index insurance is a form of weather insurance, which covers catastrophic weather events or the extreme tail of the probability distribution of weather events for a region or country. *See also Index Insurance.*
Drought	One of the most commonly requested peril covers by farmers, but it is also one of the most difficult perils to insure because of problems of definition, isolation, and measurement of effects on crop production. In contrast to most weather perils, drought is a progressive phenomenon, in terms of an accumulating soil moisture deficit for plant growth, and its impact on crop production and yields is often

	extremely difficult to predict, then measure and isolate from other noninsured causes.
Due Diligence	The responsibility of an external reviewer to perform an investigation of risk associated with a potential client, considered prudent and necessary for an adequate assessment of that client's level of risk. The process associated with "due diligence" in insurance includes underwriting, contract design, rate making, and adverse selection and moral hazard controls.
Endogenous Market Factor	A factor occurring within the market which impacts market transactions, such as fluctuations in local supply or demand or political instability within a country.
Ex ante Risk Mechanism	Action taken prior to a potential risk event. Making preparations before a disaster helps avoid inefficient, quick-response coping decisions. If ex ante strategies are not in place, resort will be to short-term coping strategies that have no significant benefit in the long run.
Ex post Risk Mechanism	Risk-management strategies that are developed in reaction to an event, without prior planning. Although ex post strategies have a role to play in a risk-management program, risk-management mechanisms can be more effective when introduced ex ante.
Exposure	The amount (sum insured), exposed to the insured peril(s) at any one time. In crop insurance, exposure may increase, and then decrease, during the coverage period, following the growth stages of the crop from planting to completion of harvest.
Exogenous Market Factor	A factor occurring outside the market which impacts transactions within the market, such as a shift in the global demand for a commodity.
Financial Intermediary	An institution (such as an insurance company, bank, or microfinance institution) that serves as a middle man or acts as a go-between for sellers and buyers of financial services such as credit or insurance.
Financial Risk	Risk that income will not reach expected levels, or the invested value in a crop will be lost due to adverse changes in weather and price. Many agricultural production cycles stretch over long periods of time, and farmers must anticipate expenses that can only be recouped once the product is marketed, leading to cash-flow problems that can be made even more severe by a lack of access to credit, or the high cost of borrowing in rural areas.
Fondo	According to Mexican laws, fondos are nonprofit organizations constituted by the farmers as civil associations without the need to provide any capital endowment, except their willingness to associate among themselves. From a risk-financing perspective, fondos pool crop-yield risks from farmers with similar risk profiles.
Franchise	An amount of loss which has to be reached before the insurer will pay a claim, and once this threshold is met, the insurer has to pay the claim in full. For example, a farmer insures his crop for $1,000 with a franchise of $100. If the claim is for $99, then this is borne by the farmer. If the claim is for $101, however, then the whole amount of the $101 is paid by the insurer.
Gross Net Premium	Gross written premium of a primary insurer, minus cancellations,

Income	refunds, and reinsurance premium paid to other reinsurers.
Guaranteed Yield	The expected physical yield of a crop stated in the insurance policy, against which actual yields will be compared when adjusting any losses.
Hazard	A physical or moral feature that increases the potential for a loss arising from an insured peril or that may influence the degree of damage.
High-Probability Low-Consequence Events	High-probability, low-consequence risks are frequent risks that cause mild to moderate damage. Insurance products for high-frequency, low-consequence losses are seldom offered, because the transaction costs associated with frequent loss adjustment makes the insurance cost prohibitive for most potential purchasers. These high transaction costs are in part due to information asymmetries that cause the problems of moral hazard and adverse selection. *See also Moral Hazard and Adverse Selection.*
In-Between Risk	Agricultural production risks, such as natural disasters, that lack sufficient spatial correlation to be effectively hedged using exchange-traded futures or options instruments. At the same time, they are generally not perfectly spatially independent, and therefore traditional insurance markets cannot cover these risks. Skees and Barnett (1999) refer to these risks as "in-between" risks. Because of their unique characteristics, in-between risks require more innovative instruments.
Indemnity	The amount payable by the insurer to the insured, in the form of cash, repair, replacement, or reinstatement in the event of an insured loss. This amount is measured by the extent of the insured's pecuniary loss. It is set at a figure equal to but not more than the actual value of the subject matter insured just before the loss, subject to the adequacy of the sum insured. For many crops, this means that an escalating indemnity level is established as the growing season progresses.
Independent Risk	Risks such as automobile accidents, fire, or illness that generally occur independently across households. Such statistical independence allows effective risk pooling across entities in the same insurance pool, making insurance possible. For independent risks, the law of large numbers suggests that, on average, the insurance indemnity paid to claimants in a particular year can be offset by the premiums received from clients who did not experience indemnifiable losses. *See also Risk Pooling.*
Index Insurance	Index insurance makes indemnity payments based not on an assessment of the policyholder's individual loss, but rather on measures of an index that is assumed to proxy actual losses. Two types of agricultural index insurance products are those based on area yields, where the area is some unit of geographical aggregation larger than the farm, and those based on measurable weather events. *See also Weather-Index Insurance.*
Informational Constraint	Limited access to or availability of reliable data can be a significant constraint to the development and performance of risk transfer markets.
Institutional Risk	Institutional or regulatory risk is generated by unexpected changes in regulations, especially in import and export regimes, and influences

	producers' activities and their farm profits.
Insurability	The conditions that determine the viability of insurance as a method of managing a particular risk.
Insurable Interest	An insurance policy is valid only if the insured is related to the subject matter insured in such a way that he or she will benefit from its survival, suffer from loss or damage caused to it, or may incur liability in respect of it.
Insurance	A financial mechanism that aims to reduce the uncertainty of loss by pooling a large number of uncertainties so that the burden of loss is distributed. Generally, each policyholder pays a contribution to a fund in the form of a premium, commensurate with the risk he introduces. The insurer uses these funds to pay the losses (indemnities) suffered by any of the insured.
Insurance Agent	The person who solicits, negotiates, or implements insurance contracts on behalf of the insurer.
Insurance Broker	The person who represents the insured in finding an insurer or insurers for a risk and negotiating the terms of the insurance contract. A broker may also act as an agent (that is, for the insurer) for the purposes of delivering a policy to the insured and collecting premium from the insured.
Insurance Policy	A formal document (including all clauses, riders, and endorsements) that expresses the terms, exceptions, and conditions of the contract of insurance between the insurer and the insured. It is not the contract itself but evidence of the contract.
Insured Peril	The cause of loss stated in the policy, which on its occurrence entitles the insured to make a claim.
Layer	The term used to define a range of potential loss that is covered by insurance. For example, an insurance contract may pay indemnities only for losses within a specified range of magnitude. *See also Risk Layering.*
Livestock Risk	The risk of death, injury, or disease to livestock.
Loss Adjustment	Determination of the extent of damage resulting from occurrence of an insured peril, and settlement of the claim. Loss adjustment is carried out by the appointed loss adjuster who works on behalf of the insurer.
Loss Ratio	The proportion of claims paid (or payable) to premium earned. A loss ratio is usually calculated for each class of business in which an insurer participates. Analysis of loss ratios can be useful in assessing risks and designing appropriate insurance structures.
Low-Probability High-Consequence Events	Low-probability, high-consequence risks are events that occur infrequently yet cause substantial damage. Decision makers, including agricultural producers, tend to underestimate their exposure to low-probability, high-consequence losses, because people forget the severity of the loss experienced during infrequent extreme weather events. Thus, an insurance product that protects against these losses is frequently discounted or ignored altogether by producers trying to determine the value of an insurance contract.
Macro Level	The economic level at which countries and large donor agencies

	working with these countries experience risk of weather-induced humanitarian crisis or economic instability caused by price volatility.
Market Failure	The inability of a market to provide certain goods at the optimal level because market prices are not equal to the social opportunity costs of resources. The high cost of financing catastrophic disaster risk prohibits most private insurance companies form covering this risk, resulting in market failure.
Market Risk	Input and output price volatility are important sources of market risk in agriculture. Prices of agricultural commodities are extremely volatile as a result of both endogenous and exogenous market shocks, and some commodities experience shocks more frequently than others do.
Meso Level	The economic level at which banks, microfinance institutions, producers, traders, processors, and input providers experience risk due to the vagaries of weather and price.
Micro Level	The economic level at which individual farm households experience risks due to shocks such as adverse weather events, price fluctuations, or disease.
Microclimate	The climates of localized areas, which may differ considerably from the climate of the general region. These climate variations are caused by geographical differences in elevation and exposure.
Moral Hazard	In insurance, moral hazard refers to the problems generated when the insured's behavior can influence the extent of damage that qualifies for insurance payouts. Examples of moral hazard are carelessness, fraudulent claims, and irresponsibility.
Non proportional Treaty Reinsurance	An agreement whereby the reinsurer agrees to pay all losses which exceed a specified limit arising from an insured portfolio of business. The limit is set by the reinsurer and may be monetary (for example, excess of loss) or a percentage (for example, stop loss). The rates charged by the reinsurer are calculated independently of the original rates for the insurance charged to the insured.
Personal Risk	The risk to an individual of personal injury or harm.
Premium	The monetary sum payable by the insured to the insurers for the period (or term) of insurance granted by the policy. Premium = premium rate x amount of insurance Also, the cost of an option contract—paid by the buyer to the seller.
Premium Rate	The price per unit of insurance. Normally expressed as a percentage of the sum insured.
Probable Maximum Loss	The largest loss believed to be possible for a certain type of business in a defined return period, such as 1 in 100 years, or 1 in 250 years.
Proportional Treaty Reinsurance	An agreement whereby the insurer agrees to cede and the reinsurer agrees to accept a proportional share of all reinsurances offered within the limits of the treaty, as specified on the slip. Limits can be monetary, geographical, by branch, class of business, and so forth. The reinsurer has no choice of which risks to accept or decline; he is obliged to accept all good and bad risks that fall within the scope of the treaty.

Quota Share Treaty Reinsurance	An agreement whereby the ceding company is bound to cede and the reinsurer is bound to accept a fixed proportion of every risk accepted by the ceding company. The reinsurer shares proportionally in all losses and receives the same proportion of all premiums as the insurer, less commission. A quota share often specifies a monetary limit over which the reinsurer will not accept to be committed on any one risk—for example, 70 percent each and every risk, not to exceed $700,000 any one risk.
Rapid-Onset Shock	A sudden large shock, such as a flood, hurricane, frost, freeze, excess heat, high wind speed, storm, or commodity price shock. Rapid-onset events are easier to identify than slow-onset shocks, and their impact can be easier to determine.
Rate On Line	A rate of premium for a reinsurance which, if applied to the reinsurer's liability, will result in an annual premium sufficient to meet expected losses over a number of years.
Regulatory Risk	Institutional or regulatory risk is generated by unexpected changes in regulations, especially in import and export regimes, and influences producers' activities and their farm profits.
Reinsurance	When the total exposure of a risk or group of risks presents the potential for losses beyond the limit that is prudent for an insurance company to carry, the insurance company may purchase reinsurance (that is, insurance of the insurance). Reinsurance has many advantages, including (1) leveling the results of the insurance company over a period of time; (2) limiting the exposure of individual risks and restricting losses paid out by the insurance company; (3)possibly increasing an insurance company's solvency margin (percent of capital and reserves to net premium income), hence the company's financial strength; and (iv) enabling the reinsurer to participate in the profits of the insurance company, but also to contribute to the losses, the net result being a more stable loss ratio over the period of insurance.
Risk Aggregation	The process of creating a risk-sharing arrangement that gathers together or pools risks, thereby reducing transaction costs and giving small households or other participants a stronger bargaining position.
Risk Assessment	The qualitative and quantitative evaluation of risk. The process includes describing potential adverse effects, evaluating the magnitude of each risk, estimating potential exposure to the risk, estimating the range of likely effects given the likely exposures, and describing uncertainties.
Risk Management	Care to maintain income and avoid or reduce loss or damage to a property resulting from undesirable events. Risk management involves identifying, analyzing, and quantifying risks and taking appropriate measures to prevent or minimize losses. Risk management may involve physical mechanisms, such as spraying a crop against aphids, using hail netting, or planting windbreaks. It can also involve financial mechanisms such as hedging, insurance, and self-insurance (carrying sufficient financial reserves so that a loss can be sustained without endangering the immediate viability of the enterprise in the event of a loss).

Risk Mitigation	Actions taken to reduce the probability or impact of a risk event, or to reduce exposure risk events.
Risk Retention	Risk retention is the process whereby a party retains the financial responsibility for loss in the event of a shock.
Risk Transfer	Risk transfer is the process of shifting the burden of financial loss or responsibility for risk financing to another party, through insurance, reinsurance, legislation, or other means.
Risk Coping	Strategies employed to cope with a shock after its occurrence. Some examples of risk-coping strategies include the sale of assets, seeking additional sources of employment, and social assistance.
Risk Financing	The process of managing risk and the consequences of residual risk through products such as insurance contracts, CAT bonds, reinsurance, or options.
Risk Layering	The process of separating risk into tiers that allow for more efficient financing and management of risks. High-probability, low-consequence events may be retained by households to a certain extent. The market insurance layer is characterized by the ability of the market to manage risks through insurance or other contracts. Low-probability, high-consequence events characterize the market-failure layer, and at this layer of risk, government intervention may be necessary offset the high losses.
Risk Pooling	The aggregation of individual risks for the purpose of managing the consequences of independent risks. Risk pooling is based on the law of large numbers. In insurance terms, the law of large numbers demonstrates that pooling large numbers of roughly homogenous, independent exposure units can yield a mean average consistent with actual outcomes. Thus, pooling risks allow an accurate prediction of future losses and helps determine premium rates.
Shock	An unexpected traumatic event such as death in the family or loss of land and livestock, which can be caused by catastrophic weather events or other unexpected phenomenon. Price shocks occur when the price of a commodity changes dramatically due to changes in local or global supply and demand, affecting the livelihood of households dependent on this commodity, for either income or caloric intake. Economic shocks can occur at the micro, meso, and macro levels and can have long-term consequences for the economic well-being of actors at each level.
Slow Onset Shock	A shock that unfolds slowly, such as drought; it starts unnoticed, and its impact is difficult to assess or may not be recognized until high losses are realized.
Social Safety Net	Various services, usually provided by the government, designed to prevent individuals or households from falling below a certain level of poverty. Such services include free or subsidized health care, child care, housing, welfare, and so on.
Stop Loss	This term, usually applied to reinsurance business, refers to a policy that covers claims once they have exceeded a certain amount. A policy with a stop-loss provision is a non-proportional type of reinsurance, where the reinsurer agrees to pay the reinsured for losses

	that exceed a specified limit, arising from any risk or any one event. For example, a reinsurer may agree to pay claims of $200,000 in excess of $100,000. If the claims are more than $300,000, the reinsured (that is, the insurer) will have to bear the remainder of the claims or make additional financing arrangements to cover the remaining risk exposure.
Subsidy	A direct or indirect benefit granted by a government for the production or distribution (including export) of a good or to supplement other services. Generally, subsidies are thought to be production- and trade-distorting and to cause rent-seeking behavior, resulting in an inefficient use of resources.
Transaction Costs	Transaction costs are the financial costs or effort required to engage in business transactions, including the cost or time spent obtaining information. Transaction costs of insurance include those associated with underwriting, contract design, rate making, adverse selection, and moral hazard.
Underwrite	To select or rate risks for insurance purposes.
Weather-Index Insurance	Contingent claims contracts for which payouts are determined by an objective weather parameter (such as rainfall levels, temperature, or soil moisture) that is highly correlated with farm-level yields or revenue outcomes. *See also Index Insurance*.
Yield Risk	Unique to agricultural producers; like most other entrepreneurs, agricultural producers cannot predict the amount of output that the production process will yield, due to external factors such as weather, pests, and diseases.

Annex 1. Vietnam Natural Hazard Risk Assessment

This annex presents an analysis of the natural hazard frequency and severity in Vietnam including Tropical Cyclones, flood, earthquake and other natural perils. Then, in Annex 3, the physical and financial damages associated with cyclones, flood and landslides are analyzed for the past 20 years.

1.1. Natural Disaster Hazard Exposure in Vietnam

Vietnam is ranked as the seventh most exposed country in the world to multiple natural disasters including floods, tropical cyclones (typhoon), tornados, landslide and drought and 59% of the total area of the country and 71% of the population are exposed to cyclones and floods. (World Bank 2005)[21].

According to GoV 2004[22], floods, typhoons, flash floods, tornados and droughts are high frequency events in Vietnam: hail, landslide, forest fires and salinisation of soils due to tidal surge are medium exposures and earthquakes are considered low frequency events.

Table A.1.1. Vietnam: Relative Frequency of Natural Disasters

High	Medium	Low
Flood, Inundation	Hail rain	Earthquake
Typhoon, tropical depression	Landslide	Accident (technology)
Flash flood	Forest fire	Frost
Tornado	Salt water intrusion	
Drought		

Source: GOV 2004

The country is divided into 8 Natural Hazards Risk Regions as shown in Table A.1.2. and Figure A.1.1. along with a classification of the disaster severity of each peril in each region (GoV, 2004). Key features of the regions include:

North West: comprised of the 4 provinces in the north west of North Vietnam, sharing borders with Laos and China. This region is mountainous and not densely populated. This region is prone to flash floods, floods, and landslides.

North East: comprised of 11 provinces, also mountainous and sharing a border with China in the north and facing the sea in the east. Like the North West region, this region is also prone to flash floods, floods and landslides. In addition, the coastal zone is prone to storm surge, storm and whirlwind.

[21] World Bank (2005). *Natural Disaster Hotspots: A Global Risk Analysis*. Disaster Risk Management Series No. 5, Hazard Management Unit, The World Bank

[22] Socialist Republic of Vietnam (GOV) 2004, National Report on Disaster Reduction in Vietnam (for the World Conference on Disaster Reduction, Kobe-Hyogo, Japan, 18-22 January 2005), Hanoi, September 2004

Red River Delta: consisting of 9 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 2 main rice bowls of Vietnam (Mekong Delta is another one). The delta of the Red River is a flat, triangular region of 15,000 square kilometers. 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.

North Central Coast: located in the northern part of central Vietnam, consisting of 6 provinces. This region has a long coast line and 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.

South Central Coast : contains five coastal provinces in the southern half of Vietnam's central part. Vietnam 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**.**

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

Southeast: contains those parts of lowland southern Vietnam which are north of the Mekong delta. There are seven provinces, plus the independent municipality of Ho Chi Minh city. There is a concentration of economic activities and population in this region. The region is prone to storm, flood, whirlwind and forest fire.

Mekong Delta: it is Vietnam'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 Vietnam 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 kilometers, 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.

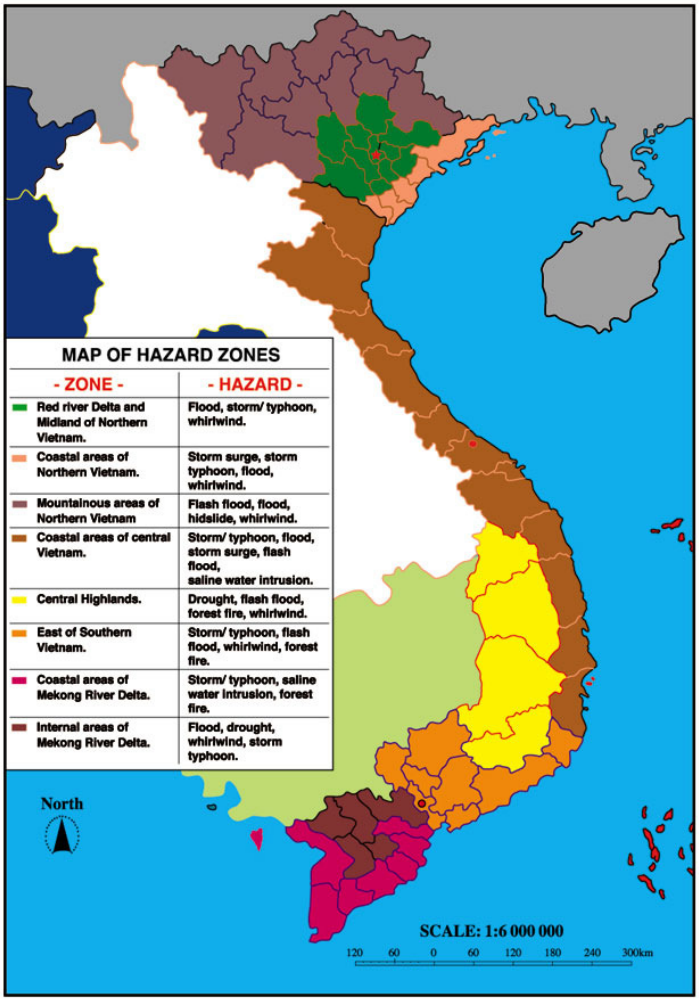
Table A.1.2. Assessment of Disaster Severity in Different Geographic Areas and in the Coastal Economic Zone of Vietnam

Disaster	**Geographic Areas and Economic Zones**							
	North east and north west	Red River Delta	North central coast	South Central Coast	Central highlands	North east south	Mekong River Delta	Coastal Economic Zone
Storm	+++	++++	++++	++++	++	+++	+++	++++
Flood	--	++++	++++	+++	+++	+++	**+++++**	++++
Flashflood	+++	--	+++	+++	+++	+++	+	+++
Whirlwind	++	++	++	++	+	++	++	++
Drought	+++	+	++	+++	++	+++	+	+++
Desertification	--	--	+	++	++	++	+	++
Saline intrusion	--	+	++	++	+	++	+++	++
Inundation	--	+++	++	++	--	++	+++	+++
Landslide	++	++	++	++		++	+++	++
Storm surge	--	++	++	++	++	++	+++	++
Fire	++	+	++	+++	--	+++	+++	+++
Industrial and environmental hazard	--	++			+++	+++		+++

Source: GOV 2004

The Table shows the assessment of disaster severity in each zone:
Very severe (++++); Severe (+++); Medium (++); Light (+); None (--)

Figure A.1.1. Map of Vietnam showing Natural Hazard Zones



Source: GOV 2004

1.2. Tropical Cyclone Analysis

This sub-section presents an analysis of the tropical cyclone record in Vietnam for 48 years from 1961 to 2008 drawing on data which is available from the National Hydro-Meteorological Service (NHMS) website[23].

NHMS Tropical Cyclone Data

The NHMS data is available by year for each event which hit the Vietnamese mainland with a wind speed in excess of Beaufort scale 6 (39-49 km/hr) up to Beaufort scale 13 (>133 Km/Hr) and the following variables are recorded: Coastal Region affected, Beaufort Storm scale 6 to 13, Month and Year of the event. Over the 48-year reference period a total of 233 wind storm events

23 *National Hydro-Meteorological Services* http://www.thoitietnguyhiem.net/BaoCao/BaoCaoBaoVung.aspx

were recorded associated with wind speeds of Beaufort scale 6 to 13 and which hit the Vietnamese mainland[24].

Table A.1.3. presents a comparison of the Beaufort Scale which is used to classify tropical cyclones in Vietnam and in most of South East Asia and the Saffir-Simpson scale which is used to classify North Atlantic and Caribbean Tropical Cyclones. In Vietnam the terminology used to classify cyclones is (1) Tropical Depression for wind speeds from 0 to 62 km/hr (up to and including category 7, (2) Tropical Storm (62 to 88 Km/Hr), Severe Tropical Storm (89 to 117 km/hr) and Typhoon which is equivalent to Hurricane (sustained wind speeds > 118 Km/hr). While the Saffir-Simpson scale distinguishes between 5 categories of Hurricane in Vietnam, NHMS data is only available for Beaufort scale 12, 118-133 km/Hr and then Cat 13, wind speeds > 133 km/hr.

Table A.1.3. Tropical Cyclone Naming Definitions used in Vietnam and Comparison Beaufort Scale and Saffir-Simpson scale

Beaufort Scale					Saffir-Simpson Scale			
scale	mph	km/hr	Description	Classification	mph	km/hr	metres/sec	Classification
0	<1	<2	Calm	Tropical Depression	0-38	0-62	0-17	Tropical Depression
1	1-3	2-5	Light air					
2	4-7	6-12	Light breeze					
3	8-12	13-19	Gentle breeze					
4	13-18	20-28	Moderate breeze					
5	19-24	29-38	Fresh breeze					
6	25-31	39-49	Strong breeze					
7	32-38	50-61	Near gale					
8	39-46	62-74	Gale	Tropical Storm	39-73	63-117	17-33	Tropical Storm
9	47-54	75-88	Severe Gale					
10	55-63	89-102	Storm	Severe Tropical Storm				
11	64-72	103-117	Violent Storm					
12	73-83	118-133	Hurricane	Typhoon	74-95	118-153	33-42	Hurricane 1
13	>83	>133	Hurricane					
					96-110	154-177	43-49	Hurricane 2
					111-130	178-209	50-58	Hurricane 3
					131-155	210-249	59-69	Hurricane 4
					>155	>250	>70	Hurricane 5

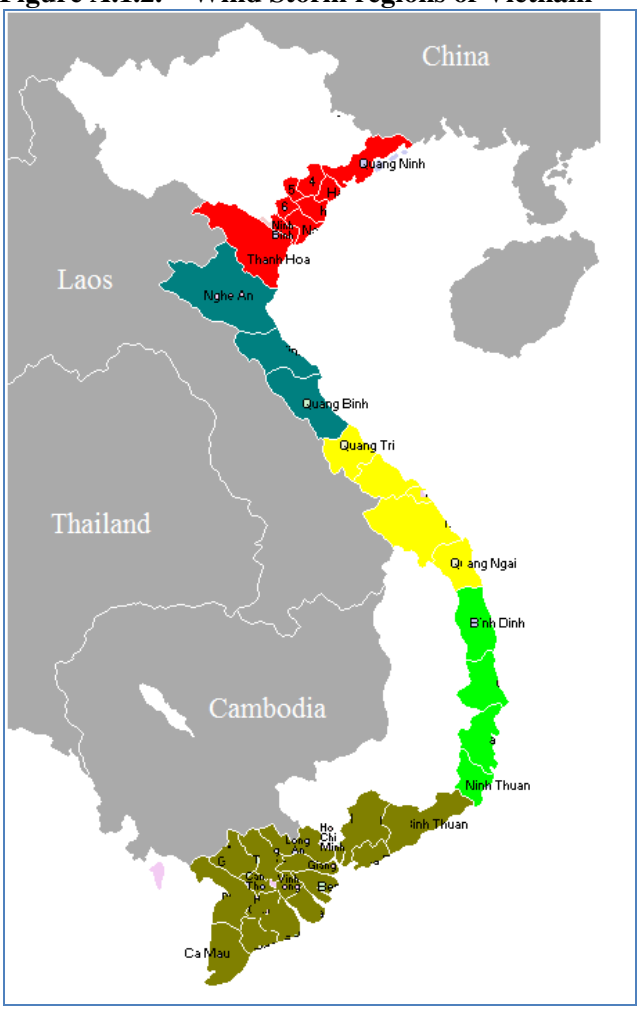
Source: World Bank 2008

Windstorm Analysis by Region

NHMS identifies 5 main windstorm regions in Vietnam from North to South as follows: Quang Ninh – Thanh Hoa; Nghe An – Quang Binh; Quang Tri – Quang Ngai; Binh Dinh – Ninh Thuan; Binh Thuan – Ca Mau, see Figure A.1.2.

[24] A further 4 events in 2008 were recorded out to sea but did not hit mainland Vietnam

Figure A.1.2. – Wind Storm regions of Vietnam



Source: *NHMS, Vietnam*

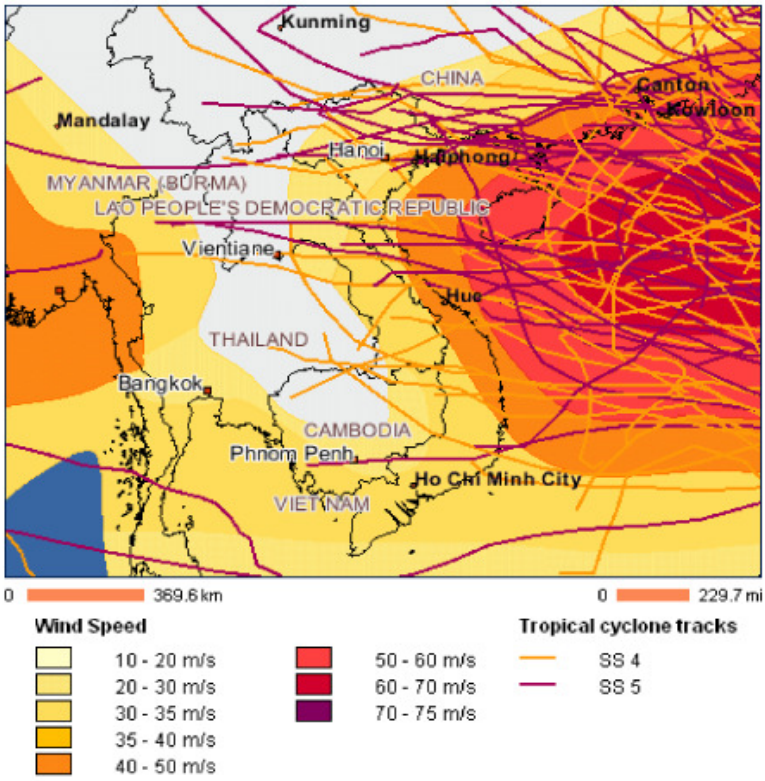
There is a marked north-south gradient in tropical cyclone exposure in Vietnam: the north and centre of the country is very exposed to tropical storms and typhoons (hurricanes) while the south of the country has historically experienced very few typhoons. Over the past 48 years (1961 to 2008) Vietnam has experienced a total of 233 tropical cyclone events with wind speeds of Beaufort category 6 and above, or an average of nearly 5 events per year. The northern regions of Vietnam exhibit a much higher frequency and severity of wind storm events than the south, with an average of 1.7 events per year in Quang Ninh – Thanh Hoa and an average of 0.7 events per year which are classified as category 10 and greater (Severe Tropical Storm and Typhoon), compared to an average for Binh Thuan – Cau Mauc (Mekong delta) of only 1 storm event every three years and a category 10 and greater event only 1 in 10 years. Indeed over the 48 year record only one typhoon (hurricane) has been registered in southern Vietnam namely Typhoon Durian of 2008 (Table A.1.4.). This pattern of more frequent exposure to tropical cyclones in the north and central regions of Vietnam can also be seen from the windstorm tracking map in Figure A.1.3.

Table A.1.4. Vietnam Analysis of Tropical Cyclones from 1961 to 2008 by Region (Beaufort scale 6-13)

Region	No. of storm events	Average No. of storms per year	No. Storms Scale 10 & above	Average No. of storms 10+ per year
Quang Ninh - Thanh Hoa	82	1.7	32	0.7
Nghe An - Quang Binh	41	0.9	17	0.4
Quang Tri - Quang Ngai	44	0.9	10	0.2
Binh Dinh - Ninh Thuan	51	1.1	8	0.2
Binh Thuan - Ca Mau	15	0.3	3	0.1
Grand Total	**233**	**4.9**	**70**	**1.5**

Source: World Bank analysis of NHMS tropical cyclone data

Figure A.1.3. Vietnam: Tropical cyclone tracks by wind speed (metres/second)



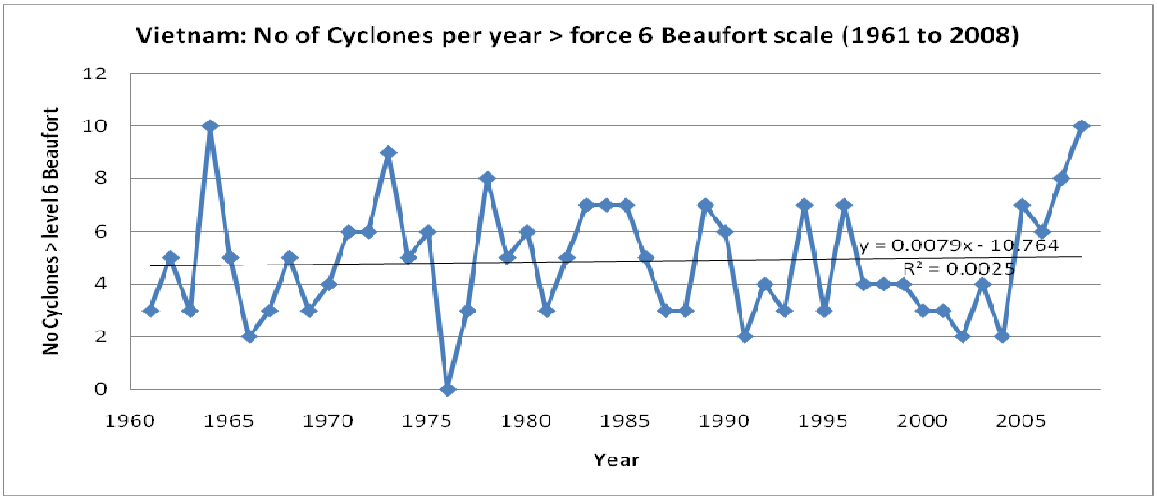
Source: AXCO 2009

Tropical Cyclone Trends over time (1961 to 2008)

There have been an average of nearly 5 tropical cyclone events per year in Vietnam over the past 48 years but there are no statistically significant trends in the frequency of events over this period. Reference to Figure A.1.4. shows that 1964 and 2008 were peak years for tropical cyclone activity with 10 events of Beaufort scale 6 and greater. The analysis shows that tropical cyclone activity was well below average during the period 1995 to 2005 and has been on the

increase over the past three years. There are, however, no statistically significant trends in the annual frequency of tropical cyclones in Vietnam, although there is some evidence of more severe events in the past 5 years (discussed further below).

Figure A.1.4. Analysis of Tropical Cyclone Frequency by Year (1961 to 2008)

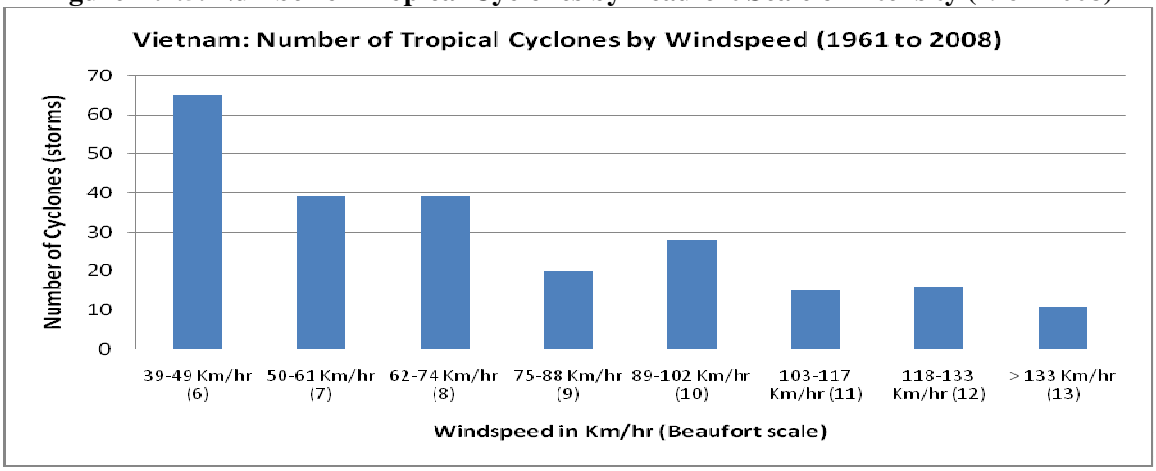


Source: World Bank analysis of NHMS tropical cyclone data

Analysis of Tropical Cyclone Severity

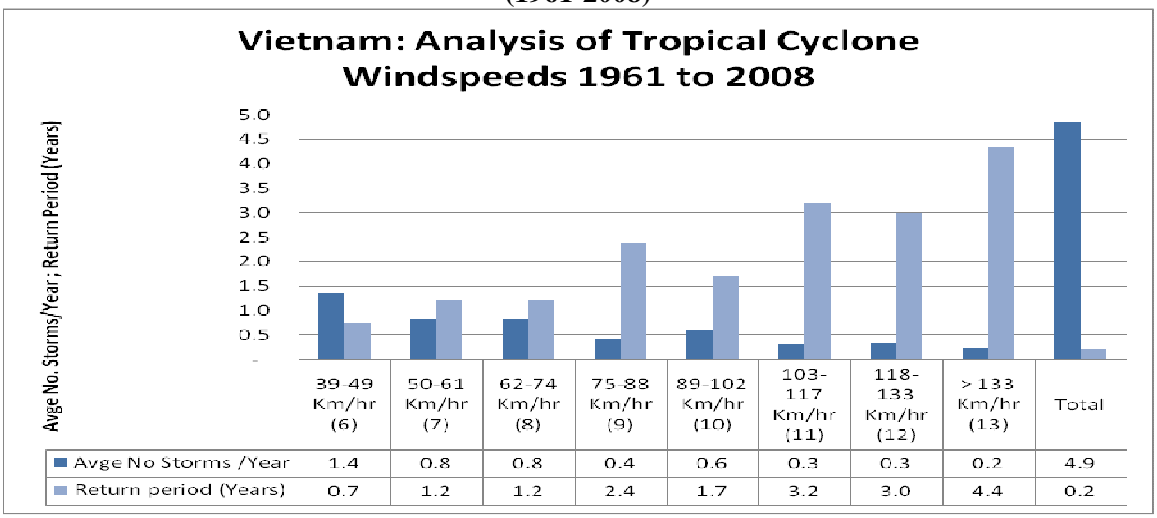
Over the past 48 years, Vietnam has experienced an average of 5 tropical cyclone events per year of which 27 have been severe typhoon or hurricane event equivalent to a return period of 1 in 2 years. Figures A.1.5. and A.1.6. report the frequency of Category 6 (Tropical Depression) through to Category 12 and 13 (Typhoon or Hurricane) events which have hit mainland Vietnam over the past 48 years. Over the period there have been a total of 16 category 12 typhoons with a return period of 1 in 3 years and 11 category 13 severe typhoons with a return period of 1 in 4.4 years.

Figure A.1.5. Number of Tropical Cyclones by Beaufort Scale of intensity (1961-2008)



Source: World Bank analysis of NHMS tropical cyclone data

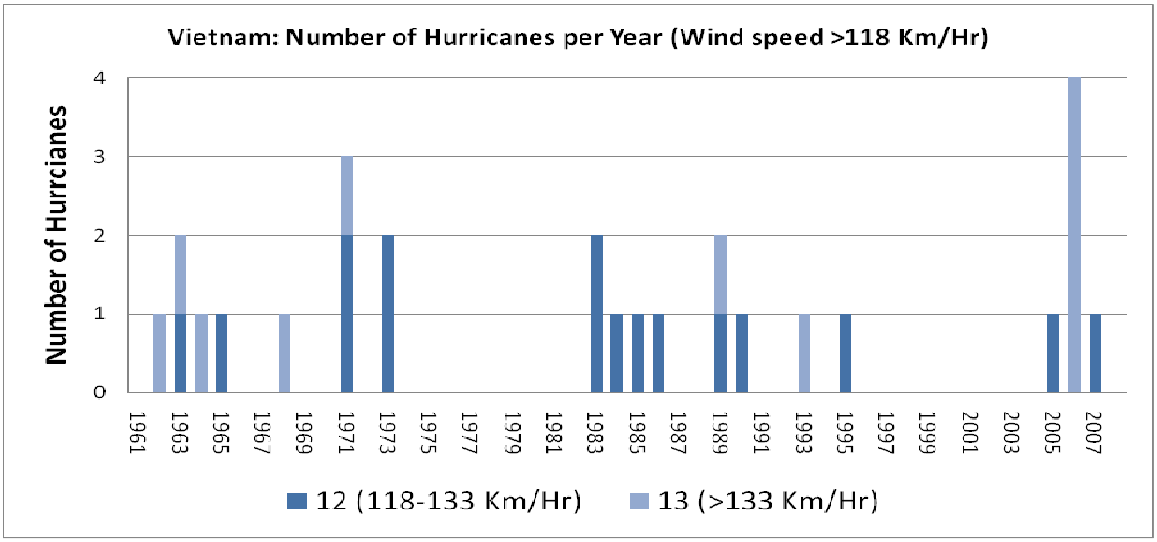
Figure A.1.6. Return Periods for Tropical Cyclones by Beaufort Scale of intensity (1961-2008)



Source: World Bank Analysis of NHMS tropical cyclone data

Although the frequency of tropical cyclones is fairly stable over time, the pattern of severe typhoon events (Beaufort Categories 12 and 13) shows two distinct cycles of peak typhoon activity followed by approximately a decade of zero typhoons. Between 1995 and 2004 Vietnam did not experience any direct typhoon hits on the mainland, but since 2005 there have been 6 typhoons (an average of 1.5 events per year) and 2006 was the worst year on record with 4 category 13 typhoons including Typhoon Xangsane which caused major damage to 15 provinces in central Vietnam. (Figure A.1.7 and Table A.1.5.).

Figure A.1.7. Vietnam: Typhoon (Hurricane Record (1996 to 2008)



Source: World Bank analysis of NHMS tropical cyclone data

The pattern of typhoons (hurricanes) Table A.1.5. shows that over the past 48 years nearly two thirds of all typhoons have struck the central region of Vietnam, once third of typhoons have hit

the north of the country and during this period only 1 typhoon, Durian affected the south of the country.

Table A.1.5. Vietnam Named Typhoon (Hurricane) events by Region 1996 to 2008

Region / Named Typhoon event	Quảng Ninh - Thanh Hóa	Nghệ An - Quảng Bình	Quảng Trị - Quảng Ngãi	Bình Định - Ninh Thuận	Bình Thuận - Cà Mau	Total
1961-1970	**4**	**2**				**6**
CARMEN, Scale 12 (118-133 km/h)	1					
CHARLOTTE, Scale 13 (> 133 km/h)	1					
CLARA, Scale 13 (> 133 km/h)		1				
FAYE , Scale 13 (> 133 km/h)	1					
NADINE , Scale 12 (118-133 km/h)		1				
ROSE , Scale 13 (> 133 km/h)	1					
1971-1980	**2**	**2**	**1**			**5**
ANITA, Scale 12 (118-133 km/h)		1				
HESTER, Scale 12 (118-133 km/h)			1			
JANE, Scale 13 (> 133 km/h)	1					
KATE , Scale 12 (118-133 km/h)	1					
KIM, Scale 12 (118-133 km/h)		1				
1981-1990	**2**	**4**	**2**			**8**
AGNES, Scale 12 (118-133 km/h)			1			
BECKY, Scale 12 (118-133 km/h)		1				
BRIAN, Scale 12 (118-133 km/h)		1				
CECIL, Scale 12 (118-133 km/h)			1			
DAN, Scale 13 (> 133 km/h)		1				
GEORGIA, Scale 12 (118-133 km/h)	1					
LEX, Scale 12 (118-133 km/h)		1				
WAYNE, Scale 12 (118-133 km/h)	1					
1991-2000			**1**	**1**		**2**
KYLE, Scale 13 (> 133 km/h)				1		
ZACK, Scale 12 (118-133 km/h)			1			
2001-2008	**1**		**2**	**2**	**1**	**6**
Chebi, Scale 13 (> 133 km/h)			1			
Cimaron, Scale 13 (> 133 km/h)				1		
DAMREY, Scale 12 (118-133 km/h)	1					
Durian, Scale 13 (> 133 km/h)					1	
Hagibis, Scale 12 (118-133 km/h)				1		
Xangsane, Scale 13 (> 133 km/h)			1			
Total 1961 to 2008	**9**	**8**	**6**	**3**	**1**	**27**
% of Typhoons by Region	**33%**	**30%**	**22%**	**11%**	**4%**	**100%**

Source: World Bank analysis of NHMS tropical cyclone data

Tropical Cyclone Season

In the north of Vietnam the peak tropical cyclone season falls between July and August and is progressively later in the centre and south of the country such that in the far south the cyclones strikes are experienced in October and November. This finding has significant implications for the planning and deployment of typhoon emergency relief resources by region during the hurricane season (1 May to 30 November).

Table A.1.6. Tropical Cyclone distribution by month and by Region (1961 to 2008)

	North – South direction →					
Month	**Quang Ninh - Thanh Hoa**	**Nghe An - Quang Binh**	**Quang Tri - Quang Ngai**	**Binh Dinh - Ninh Thuan**	**Binh Thuan - Ca Mau**	**Grand Total**
Jan					2	2
Feb						0
Mar				1		1
Apr				1		1
May			2			2
Jun	**10**	1	4	2	1	**18**
Jul	**25**	4	1			**30**
Aug	**23**	**10**	**6**	1		**40**
Sep	**18**	**15**	**17**	1		**51**
Oct	5	**11**	**10**	**20**	**4**	**50**
Nov	1		3	**21**	**8**	**33**
Dec			1	**4**		**5**
Total	*82*	*41*	*44*	*51*	*15*	*233*

Source: World Bank analysis of NHMS tropical cyclone data

1.3. Flood and Flash Floods

Vietnam has a dense river network which is very prone to flooding in the summer rainy season. Rivers with a length of over 10 km total about 2,372, comprising 13 large river systems. They cover 80% of the country's territory. The total basin area of the river systems, both outside and inside Vietnam, is 1,167,000 km^2 and the total annual water flow is 847 billion cubic meters. Of this total, the Mekong River carries the biggest water amount (500 billion cubic meter), followed by the Red River (126 billion cubic meter). These two rivers are very prone to flood in the summer rainy season from June to September (See Flood Map in Figure A.1.8.)

Flash flooding is a feature of the Central Highlands and Central Coast where average rainfall is highest at between 2000 to 2500 mm per annum. The rivers are steep and highly incised and flow into the narrow coastal region where population and agriculture are concentrated: these rivers are very prone to flash flooding in the summer months.

Figure A.1.8. Flood Map of Vietnam

Source: SwissRe 2009

The flood seasons in different regions are as follows:

	Start	**End**
North	May-June	September-October
North Central	June-July	October-November
Center and South Central	October	December
Central Highlands	June	December
South	July	December

Source: Hydro-Meteorological Data Center at http://www.hymetdata.gov.vn/

Flood statistics

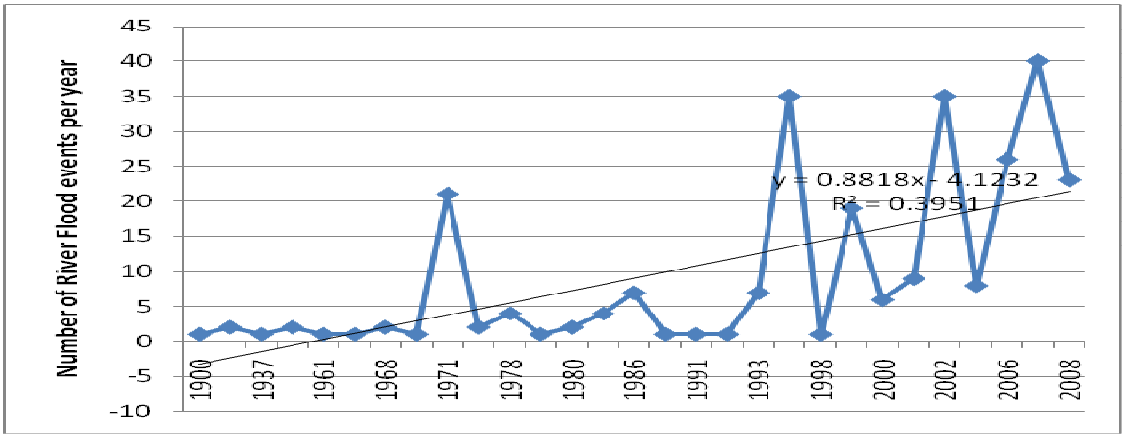
The National Hydro-Meteorological Service, NHMS, publishes flood data on its website. During the period 1961 to 2008 a total of 238 floods were recorded by NHMS with a further 26 events only recorded between 1900 and 1960, or a grand total of 264 flood events. The analysis of the statistical data shows that:

- The flooding in the Mekong Delta (An Giang province) occurs around August each year and lasts an average 111 days. The long lasting flooding is explained by the fact the

Mekong river catchment area is huge and very low-lying and drains water from as far away as the Tonle Sap Lake in Cambodia.

- The duration of floods and flooding in some northern provinces is shorter, averaging between 7 – 8 days (Nghe An; Bac Giang) or 12 – 13 days (Thanh Hoa; Hue).
- 243 flood events or 92% of total have occurred between July and November. August is the peak month for flooding with 100 events, followed by October (47 incidents).
- There was a peak in 1971 (21 recorded flood events), followed by a low period until 1996 (35 incidents).
- In general, there appears to be an increasing trend in the incidence of flooding since 1993, (see Figure A.1.9). However, this possible trend may in fact be explained by an increase in the density of flood river gauges on Vietnam's 2,360 river and improved monitoring and reporting and recording of floods.

Figure A.1.9. Number of Flood events per Year 1900 to 2008



Source: Data taken from National Hydro-Meteorological Service at *http://www.thoitietnguyhiem.net/BaoCao/BaoCaoLuLichSu.aspx*

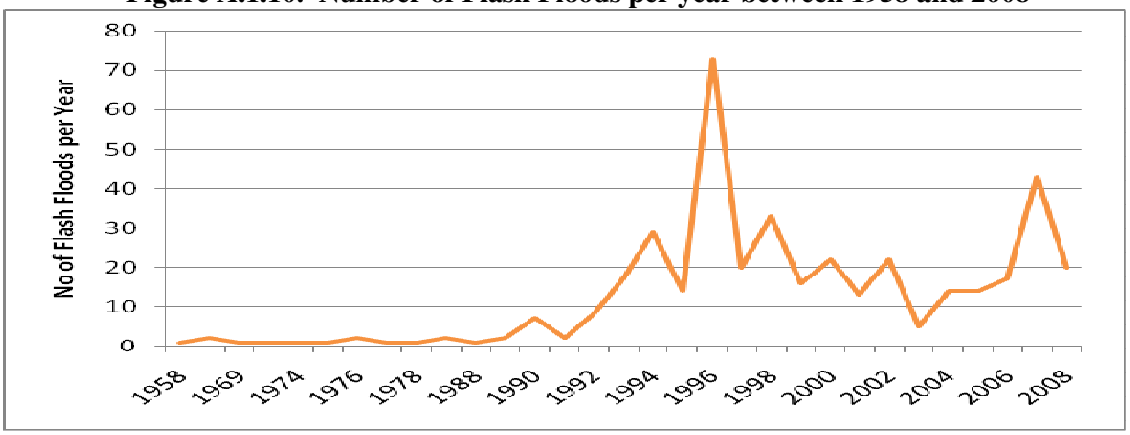
Flash Floods

According to NHMS data a total of 405 flash floods occurred between 1958 and 2008 in 36 provinces. Ten provinces account for 298 incidents (73% of total) and are all located in the North-West region. The peak month for flash flooding is July (118 incidents), followed by August (89) and June (66).

The annual number of flash floods is reported in Figure A.1.10. for the period 1958 to 2008. The data appear to suggest that there has been a major increase in the incidence of flash floods since 1992, but it again suggested that this is not the case and this is due to improved recording and reporting of flash floods in Vietnam.

The extremely high incidence of flash flooding in 1996 (73 recorded events) coincides with a year of well above average precipitation and major flood damage in Vietnam (See Annex 4 for further discussion of 1996 flood damage).

Figure A.1.10. Number of Flash Floods per year between 1958 and 2008



Source: Data taken from National Hydro-Meteorological Service at http://www.thoitietnguyhiem.net/BaoCao/BaoCaoLuQuet.aspx

1.4. Earthquake Analysis

Earthquake exposure is highest in north-western Vietnam, including Hanoi which lies on the Red River Fault (See Map in Figure 1.1.11.a).

Earthquake is not recognized by the Vietnamese insurance industry as a major hazard. AXCO (2009)[25] reports that despite the fact that many earthquakes of magnitude 7.0 and greater have occurred in Vietnam in the past, earthquake has never been recognized as a major hazard. This is due to the fact that mountainous north-west region which has the highest earthquake exposure has a very low population density and there is no industry or infrastructure of any consequence.

Figure A.1.11.a Seismic Map of Vietnam

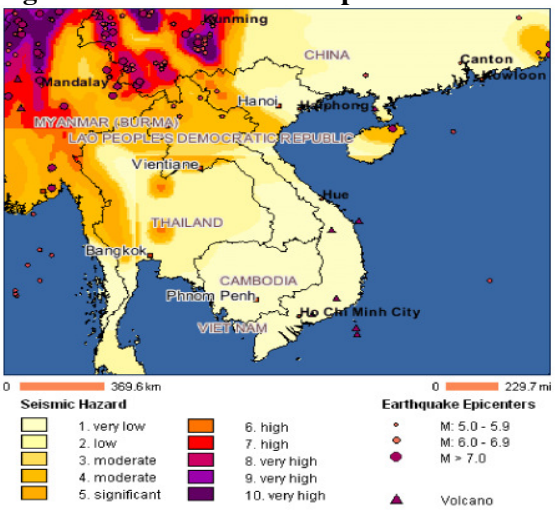
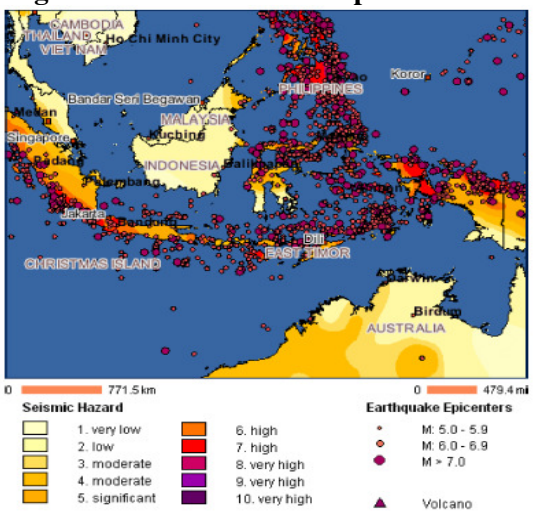


Figure A.1.11.b Seismic Map of Indonesia



Source: SwissRe CatNet reported by AXCO 2009

The earthquake exposure in Vietnam may in fact be higher than recognized. AXCO (2009) also notes that since 1900 Vietnam has experienced two level 8 (Richter scale) or more

[25] AXCO (2009). Vietnam-Non-Life (P&C) Insurance Market Report

earthquakes, 17 level 7.0 or greater and 115 level 6.0 or greater earthquakes suggesting that the country is not as low an earthquake risk as often claimed**.**

Reference to Figure A.1.11b.shows that the extremely low-lying areas of Southern Vietnam could in fact be severely impacted by a Tsunami caused by a sub-sea earthquake in the Indonesian Fault zone. It is not known whether any modeling has been conducted by the Vietnamese insurance industry to model the potential return period and impact of such an event on loss of life and economic damage in the Mekong Delta region.

1.5. Other Natural Perils

Other catastrophes include drought, bush fire, saline water intrusion, high and low temperatures cause relatively less damage. Droughts and bush fires are mostly reported in the central highlands and Mekong delta during the dry season: and drought is considered the third most damaging peril in Vietnam after flood and typhoon because of its impact on crop production[26]. Cold weather and frosts are only reported in the northern part of Vietnam.

Some typical event during the last few years include[27]:

- Drought (1998): 3.1 million people were affected by lack of water. Total estimated damage was VND500 billion (US$37 million);
- Drought (2002): Total estimated damage was VND2,060 billion (US$135 million);
- Drought (2005): Total estimated damage was VND1,743 billion (US$110 million);
- Bush fire (2002) in U Minh (Mekong Delta): 5,415 ha of forest was destroyed.
- Bush fire (2007): 791 bush fires destroyed a total 4,740 ha of forest.
- Cold (1991) in Central Vietnam: 251 dead.

[26] According to GoV, (2007) in severe drought years food crop production is reduced 20% to 30% threatening people's livelihoods. Prolonged droughts results in desertification risks especially in the South Central region.

[27] Workshop on Non-water related natural catastrophes in Vietnam, Hanoi, 5/2008.

Annex 2. Natural Disaster Damage Assessment System

This annex presents further details of the DANA, Damage Assessment and Needs Assessment procedures and forms which were introduced into Vietnam in 2006 in order to strengthen the measurement, recording and reporting of the value of damage to public infrastructure, private housing and agriculture etc, following a major natural disaster event. It is, however, not the intention of this annex to provide an evaluation of the DANA system as this is the focus of a separate study by an international consultant on behalf of MoF and MARD[28].

2.1. Agencies involved

The Government agency responsible for coordinating disaster risk management is the Central Committee for Flood and Storm Control, CCFSC. CCFSC has representation at central level, provincial, district and commune levels following Vietnam's administrative system. At provincial, district and commune level it is called the "Committee for Flood and Storm Control and Search and Rescue". (See Figure A.2.1. for the organizational structure of CCFSC).

At the central level, CCFSC consists of a number of relevant line ministries and services such as the hydro-meteorological service, radio and television service. The Ministry of Agriculture and Rural Development, MARD, takes the chair while representatives of the Office of The Government and Ministry of Defense are vice-chairmen (See organogram in Figure A2.1.).

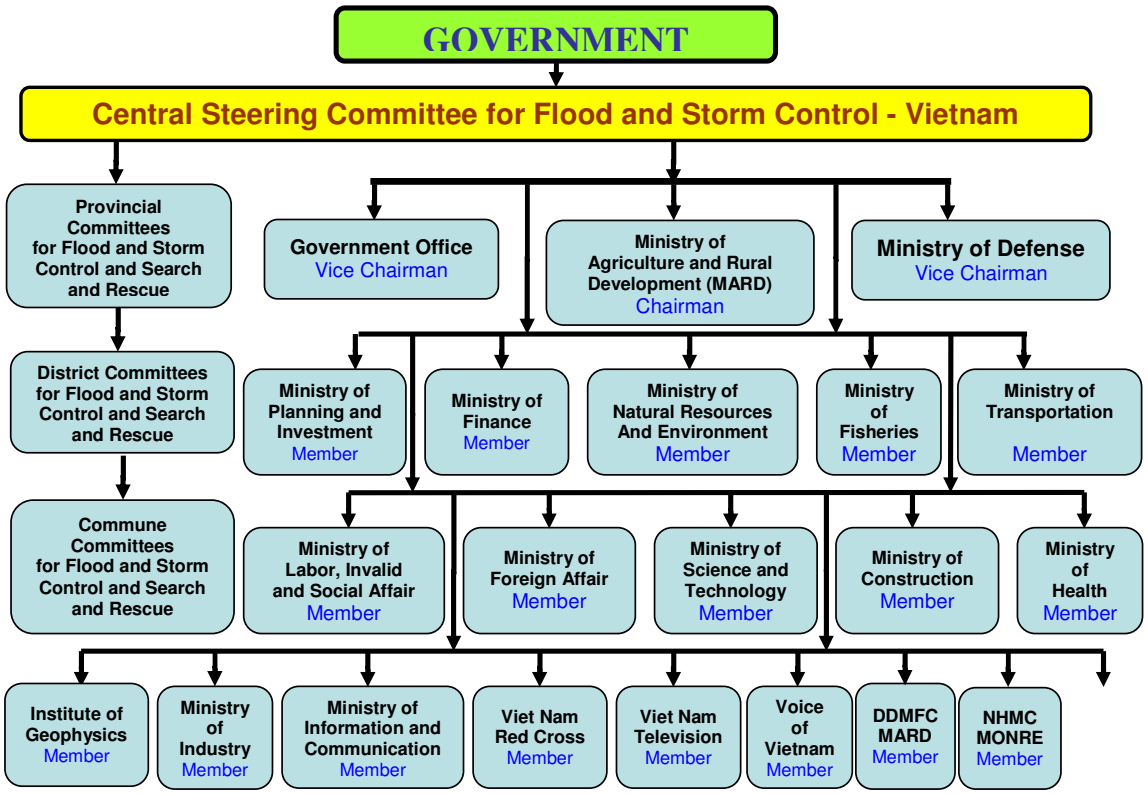
Decision 557/QD-TTG of the Prime Minister dated May 18, 1999 specifies that the functions of CCFSC are to assist the Government with:

- Monitoring and ensuring that the line ministries and local authorities prepare and implement annual plans to prevent and control storms and floods;
- Allocation of human resources and means to timely intervention in cases of emergencies that are beyond the capacity of a line ministry of the local authority;
- Coordination with local authorities to rectify the aftermaths of storms and floods;
- Reviewing the activities and sharing lessons and scientific-technological advancements in storm and flood control with local authorities.

Within each relevant ministry, there is also a committee responsible for flood and storm in their own sector and authority.

[28] Scawthorn, C., (2009). Natural Disaster Risk Management Project: Disaster Damage Assessment in Vietnam: Report 01: Current Status, prepared for Central Project Office, MARD, the Socialist Republic of Vietnam, 20 February 2009

Figure 2.1. Organisational Structure of CCFSC, Vietnam



Source: CCFSC website

2.2. Damage and Loss Assessment Procedure

Following a disaster the Commune-level Committees for Flood and Storm Control are responsible for collecting and collating damage information from individual households and this is complemented by damage assessment data from the local line-Ministry representatives. The damage data are typically updated on a daily basis after an event. The damage data is passed up from Commune to District-level where it is consolidated into a District-level report and this is in turn passed to the Provincial level where a Provincial level report is prepared and financial estimates of the damage are added. (See below for further discussion). The Provincial damage assessment reports are then submitted to the Standing Office of CCFSC who is Department of Dyke Management and Flood and Storm Control (DDMFC) in MARD for consolidation and advice to CCFSC and Prime Minister to decide the amount of post-disaster funding to be supported from the central government's contingency budget and reserve funds and or other sources. DDMFC also shares the consolidated damage reports, often by provinces and per event on CCFSC's website at www.ccfsc.org.vn, and directly with interested parties for information or research purposes.

In 2006, MARD implemented a project to strengthen Vietnam's natural disaster damage assessment procedures under the DANA System, Damage Assessment and Needs Assessment System. A revised and strengthened Damage Assessment Form was designed under this project and a copy of this is attached as Table A2.1. This is a very detailed damage assessment form which contains 13 sub-sections ranging from Human loss of life (Section 1) through to damage to Clean Water and Environment (Category 13). The form requires the commune-level assessors to

complete the physical damage or "quantity": it is then understood that the Provincial level Committees are responsible for completing the financial valuation of the damages (see columns titled "unit price in Million VND" and then the "In cash Million VND" or quantity x unit value).

The revised DANA Damage Assessment form shown in Table A2.1. is currently being implemented in three provinces only, Lao Cai, Dong Thap and Quang Tri. The other provinces are using an earlier version of the form and thus the system is not standardized across all Provinces of Vietnam.

The recording of physical damage appears to be very comprehensive over the past 20 years. On the basis of this study's review of 193 separate damage assessment reports for the period 1989 to 2008 it appears that the recording of physical damage data on numbers or quantities damaged or totally destroyed is comprehensive and complete for each sub-category of damage.

The recording of the financial value of damage is, however, extremely incomplete and inconsistent over the 193 recorded events and in most cases there is only a single event estimate of damage rather than a breakdown per category of damage. For 31 events or 16% of the total number of events reported to CCFSC over this 20 year period, there is no available financial loss data at all. Furthermore in nearly all cases, the value of damage is not recorded for each category of damage. To illustrate this problem, Table A. 2.2. presents a summary of the damages resulting from a flood event in Central Vietnam between 1 and 6 November 1998. This is one of the most complete event reports available in terms of the financial value of damage: however, only VND 1,866,837 million or 49% of the total value of damage is specified and the remaining VND 1,906,962 million is not specified. This problem continues through to today.

2.3. Needs Assessment Procedure and Authorisation of Expenditure on Post-Disaster Recovery

Under the revised DANA system, each Commune is again responsible for completing a series of post-disaster physical and financial "**Needs Assessment** "forms under three phases, namely:

1) **Emergency Relief** (immediate response)
2) **Post-disaster** (or short-term recovery) and
3) **Recovery / Rehabilitation** (Reconstruction)

Copies of the Needs Assessment Forms are available in Scawthorn (2009).

The Communes submit their Needs Assessment forms to the District-level committees where the data are consolidated and then forwarded to the Provinces where the Peoples' Committees are responsible for preparing a funding request to the CCFSC.

Under this study it was not possible to conduct a detailed review of the level of adoption of the strengthened DANA Needs Assessment reporting by Lao Cai, Dong Thap and Quang Tri Provinces to the CCFSC nor the procedures for authorising the release of funds for post disaster 1) emergency relief, 2) post-disaster and c) Recovery/Rehabilitation.

It appears that there is no centralized data-base, either at a MoF level or CCFSC level, recording the post-disaster authorized expenditure for each event and then the actual expenditure by central, provincial, district and local commune government for each event.

On the basis of a review of example Province Damage Relief Payment Requests made to CCFSC it appears that the procedures are not consistent or standardized across provinces.

Table A.2.3. presents a short 1 page summary request from Ha Tinh Province for central funding to cover damages arising from Storms No 2 and 5, 2007. The short report requests VND 61.3 million of central government funding for repairs to housing and humanitarian support, VND 8 million for seeds to enable farmers to replant crops, VND 100 million to cover emergency repairs to infrastructure, food aid, VND 70 billion to cover repairs to public sector buildings and utilities and finally VND 55 billion to upgrade roads and dams. The report is not, however, accompanied by any completed Damage Assessment or Needs Assessment forms and it is not possible to analyse the short-term, medium-term and long-term damages arising from these 2 events.

In comparison, Table A.2.4. for Quang Tri Province provides an example of an extremely comprehensive Payment Request submitted to the Prime Minister's offices following Typhoon Xangsane in 2006. This report is accompanied by a detailed completed Damage Assessment form on which basis central government can much more easily audit and check the damage and damage valuation estimates.

In Summary, the lack of (a) a standardized Damage Assessment and Needs Assessment Reporting system for natural disaster damages in Vietnam and (b) a centralized data-base for recording actual expenditure on post-disaster emergency relief, early recovery and medium to long term reconstruction, makes it very difficult to conduct a detailed review of the financial costs to government of natural disaster recovery and rehabilitation.

Table A.2.1. DANA Damage Assessment Form

(Summary of disaster damage (DDMFSC 2006)

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
1	HUMAN	NG01	**Number of dead people**	person		x	x	
		NG011	*Children (under age of 16)*	person		x	x	
		NG012	*Female*	person		x	x	
		NG02	**Number of missing people**	person		x	x	
		NG021	*Children (under age of16)*	person		x	x	
		NG022	*Female*	person		x	x	
		NG03	**Number of injured people**	person		x	x	
		NG031	*Children (under age of 16)*	person		x	x	
		NG032	*Female*	person		x	x	
		NG04	**Number of affected households**	*family*		x	x	
		NG05	**Number of affected people**	person		x	x	
2	HOUSING	NH01	**Houses collapsed/swept away**	*No.*				
		NH011	*Strong houses*	*No.*				
		NH012	*Semi-strong houses*	*No*				
		NH013	*Temporary houses*	*No.*				
		NH02	**Houses damaged, wind-blown up and tottering**					
		NH021	*Strong houses*					
		NH022	*Semi-strong houses*					
		NH023	*Temporary houses*					
		NH03	**Submerged houses**	*No.*				
		NH031	*Strong houses*	*No.*				
		NH032	*Semi-strong houses*	*No.*				
		NH033	*Temporary houses*	*No.*				
		NH04	**Damaged property**	*million VND*				
		NH05	**Number of households having houses damaged**	*Family*				
3	EDUCATION	GD01	**Number of affected schools**					
		GD011	*Classrooms collapsed / swept away*	*room*				
		GD012	*Damaged classrooms*	*room*				
		GD013	*Submerged classrooms*	*room*				
		GD02	**Pupils' tenement & boarding houses damaged or collapsed**	*No.*				
		GD03	**Functional & public mission rooms damaged**					
		GD04	**Number of off-school pupils**	*person*				
		GD05	**Damaged desks and chairs**	*set*				
		GD06	**Damaged books**	*No.*				
		GD07	**Damaged educational equipments**	*million n VND*				
4	HEALTH CARE	YT01	**Number affected hospitals/policlinics**	*No.*				
		YT011	*Rooms collapsed/swept away*	*room*				
		YT012	*Rooms damaged*	*room*				

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		YT013	*Rooms submerged*	*room*				
		YT02	**Medicine damaged**	*million VND*				
		YT03	**Medical materials & equipments damaged**	*million VND*				
		YT04	**Other assets damaged**	*million VND*				
5	**OTHER CONSTRUCTIONS**	**CT01**	**Cultural works collapsed/swept away**	*No*				
		CT011	Normally cultural works					
		CT012	Historically cultural heritage and /works					
		CT02	**Cultural works damaged**	*No.*				
		CT021	Normally cultural works					
		CT022	Historically cultural heritage and /works					
		CT03	**Head offices collapsed/ swept away**	*No.*				
		CT04	**Head offices damaged**	*No.*				
		CT05	**Markets and commercial centres collapsed/swept away**	*No.*				
		CT06	**Markets and commercial centres damaged**	*No.*				
		CT07	**Warehouses collapsed/swept away**	*No.*				
		CT08	**Warehouses damaged**	*No.*				
		CT09	**Defence works damaged**	*No.*				
		CT10	**Other works damaged**	*No.*				
6	**AGRO-FORESTRY**	**NN01**	**Damaged rice area**	*ha*				
		NN011	*Lost completely*					
		NN012	*Seed lost(be just sown)*					
		NN013	*Productivity decreased*	*ha*				
		NN02	**Damaged flowers and/vegetable farming area**	*ha*				
		NN021	*Lost completely*	*ha*				
		NN022	*Productivity decreased*	*ha*				
		NN03	**Damaged industrial tree area**	*ha*				
		NN031	*Dead*	*ha*				
		NN032	Productivity decreased	*ha*				
		NN04	**Damaged fruit tree area**	*ha*				
		NN041	*dead*	*ha*				
		NN042	Productivity decreased	*ha*				
		NN05	**Damaged forest area**	*ha*				
		NN06	**Area of damaged seed trees**	*ha*				
		NN07	**Damaged seeds**	*ton*				
		NN08	**Damaged food**	*ton*				
		NN09	**Number of dead big livestock**	*No.*				
		NN10	**Number of dead little livestock**	*No.*				
		NN11	**Dead poultries**	*No.*				
		NN12	**Damaged insecticides**	*ton*				

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		NN13	**Damaged fertilizer**	*ton*				
		NN14	**Area of damaged salt fields**	*ha*				
		NN15	**Quantity of damaged salt**	*ton*				
		NN16	**Housing land completely lost without possible recovery**	*Ha*				
		NN17	**Farmland area eroded without possible recovery**	*Ha*				
		NN18	**Cattle & poultry foodstuff damaged**	*ton*				
		NN19	**Decorative plants damaged**	*No.*				
7	**IRRIGATION**	**TL01**	**Dykes of level III to special level damaged**					
		TL011	*Length*	*m*				
		TL012	*Quantity of earth*	*m3*				
		TL013	*Quantity of stone and concrete*	*m3*				
		TL02	**Dykes of level IV and lower level damaged**					
		TL021	*Length*	*m*				
		TL022	*Quantity of land*	*m3*				
		TL03	**Damaged embankments**					
		TL031	*Length*	*m*				
		TL032	*Quantity of earth*	*m3*				
		TL033	*Quantity of stone and concrete*	*m3*				
		TL04	**Damaged canals and ditches**					
		TL041	*Length*	*m*				
		TL042	*Quantity of earth*	*m3*				
		TL043	*Quantity of stone and concrete*	*m3*				
		TL05	**Damaged water reservoirs and dams**					
		TL051	*Quantity of earth*	*m3*				
		TL052	*Quantity of stone and concrete*	*m3*				
		TL06	**Other irrigational constructions damaged**	.				
		TL061	*Strong irrigational works damaged, collapsed and swept away*					
		TL062	*Temporary irrigational works damaged, collapsed and swept away*					
8	**TRANSPORTATION**	**GT01**	**Damaged national and provincial roads**					
		GT011	*Length of roads swept away and slided*	*m*				
		GT012	*Length of roads submerged*	*m*				
		GT013	*Quantity of earth*	*m3*				
		GT014	*Quantity of stone and concrete*	*m3*				
		GT02	**Damaged rural roads**					
		GT021	*Length of roads swept away and slided*	*m*				
		GT022	*Length of roads submerged*	*m*				
		GT023	*Quantity of earth*	*m3*				
		GT024	*Quantity of stone and concrete*	*m3*				
		GT03	**Damaged railways**					
		GT031	*Length of railways swept away and slided*	*m*				

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		GT032	*Length of railways submerged*	*m*				
		GT033	*Quantity of earth*	*m3*				
		GT034	*Quantity of stone and concrete*					
		GT04	**Damaged bridges and sluices**					
		GT041	*Chain-bridges swept away /collapsed*					
		GT042	*Strong bridges swept away /collapsed*	*m3*				
		GT043	*Temporary bridges (made of wood or plank) swept away, collapsed*					
		GT044	*Underground sluices swept away, collapsed*	*No.*				
		GT05	**Other means of transportation damaged**					
		GT051	*Ferry-boat, canoes and ships sunk*	*No.*				
		GT052	*Ferry-boats, canoes and ships damaged*	*No.*				
		GT053	*Motorbikes and auto mobiles damaged*	*No.*				
		GT054	*Other Jolly-boats and junks damaged*	*No.*				
		GT06	***Traffic points submerged causing traffic- jam***	*No.*				
		GT07	*Ports damaged*	*mil. VND*				
		GT08	*Airports damaged*	*mil. VND*				
9	**FISHERIES**	**TS01**	**Area of aquaculture and seafood damaged**	*ha*				
		TS02	**Amount of mature shrimps and fish lost**	*ton*				
		TS03	**Amount of breeding shrimps and fish lost**					
		TS031	*Breeding shrimp*	*No.*				
		TS032	*Breeding fish*	*No.*				
		TS033	*Other types*	*No.*				
		TS04	**Other types of fisheries damaged**	*ton*				
		TS05	**Shrimp and fish cages, rafts, ponds and traps damaged**	*No.*				
		TS06	**Other means of developing fisheries damaged**					
		TS061	*Boats and ship lost and sunk*	*No.*				
		TS062	*Boats and ships damaged*	*No.*				
		TS063	*Casting nets damaged*	*ton*				
		TS064	*Small boats and coracles (under 15 horsepower) damaged*	*No.*				
10	**COMMUNICATIONS**	**TT01**	**Damaged communication stations**	*No.*				
		TT02	**Equipments and assets damaged**	*mil.VND*				
		TT03	**Communication poles collapsed**					
		TT031	*Temporary poles*	*No.*				
		TT032	*Strong poles*	*No.*				
		TT04	**Cut communication wires**	*m*				
		TT05	**Other constructions damaged**	*mil. VND*				

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		TT06	**Total number of telephones damaged**	*No.*				
11	**INDUSTRY**	**CN01**	**Collapsed tension poles**					
		CN011	*High and medium tension poles*	*No.*				
		CN012	*Low tension pole*	*No.*				
		CN02	**Cut electric wires**	*m*				
		CN021	*High and medium tension poles*					
		CN022	*Low tension pole*					
		CN03	**Damaged transformer stations**	*No.*				
		CN04	**Damaged small -scale hydroelectric constructions**	*No.*				
		CN05	**Damaged factories and plants**	*No.*				
		CN06	**Damaged mines**	*No.*				
		CN07	**Coal lost and swept away**	*ton*				
		CN08	**Damaged machineries and equipments**	*million n dong*				
		CN09	**Industrial products swept away**	*Mil. VND*				
		CN10	**Localities and factories having power cut**	*No.*				
		CN11	Other constructions damaged	*mil.V ND*				
12	**CONSTRU CTION**	**XD01**	**Soaked cement**	*ton*				
		XD02	**Klanh ke damaged**	*ton*				
		XD03	**Brick and tiles klins collapsed/swept away**	*No.*				
		XD04	**Brick and tiles klins submerged/broken**	*No.*				
		XD05	**Bricks and tiles damaged**	*No.*				
		XD06	**Unfinished constructions swept away, collapsed**	*No.*				
		XD07	**Constructional instruments damaged**	*No.*				
		XD08	**Other materials damaged**	*mil. VND*				
13	**CLEAN WATER & ENVIRON MENT**	**MT01**	**Polluted residential area**	*ha*				
		MT02	**Number of populations lacking clean water**	*person*				
		MT03	**Number of damaged well**	*No.*				
		MT04	**Constructions of water supply** damaged	*No.*				
		MT05	**Latrines/bathrooms damaged**	*No.*				

Source: Scawthorn (2009)

Table A.2.2. CCFSC Damage Assessment for Flooding in Central Vietnam 1-6 November 1998

Category Damage	Item	Unit	No. Damaged	Value of Damage (VND Million)	%
Humanitarian	Districts affected	No	9		
	Communes Affected	No	216		
	Households affected	No	705,002		
	People killed & Missing	No	624		
	People needing aid	No	926,500		
Housing	Houses damaged (destroyed) by flood	No	584,044 (41,846)		
Education	Classrooms damaged (destroyed)	No	4,532 (570)		
Hospitals	Clinics damaged (destroyed)	No	482 (75)		
Other	Storage facilities damaged (destroyed)	No	12 (0)		
Construction	Offices damaged (destroyed)		238 (69)		
	Sub-constructions damaged	No	14630	226,200	6%
Agriculture	Paddy Area damaged (destroyed)	Ha	24,121 (5242)		
	Sugar Cane damaged	Ha	10,357		
	Trees collapsed	No	5,417,000		
	Cattle killed	No	32,124		
	Pigs killed	No	296,628		
	Poultry killed	No	1,703,235	310,252	8%
Water Resources	Dykes, Reservoirs, Canals, culverts				
	Pumping stations flooded	No	221	282,583	7%
Transportation	Bridges damaged (destroyed)	No	1577 (436)		
	Ferries/ships/cars damaged				
	Roads damaged	Km	3,185	821,105	22%
Aquatic Production	Area of fish/shrimp ponds damaged	Ha	4,830		
	Shrimp lost production	Ton	1,118		
	Ships and boats damaged (destroyed)	No	1,605 (563)	130,673	3%
Communications	Telephone poles/cable/switchboards			30,198	
Energy	Electric wires damaged broken	Km	436.5		0%
	Transformer stations damaged	No	105	40,679	1%
Other	Cement/fertilisers etc damaged			25,147	1%
	Specified Costs of damage			1,866,837	49%
	Non-specified costs of damage			1,906,962	51%
	Total estimated Economic Cost			**3,773,799**	100%

Source: CCFSC website. http://ww.ccfsc.org.vn.

Table A.2.3. Ha Tinh Province: Example of Disaster Relief Payment Request to Prime Minister's Office

Ha Tinh People's Committee	**SOCIALIST REPUBLIC VIETNAM**
No. 2451/UBND-NL2	**Independence – Freedom – Happiness**
V/v: Request for subsidy of storm damage	***

Ha Tinh, 5 October 2007

SUBMISSION TO THE PRIME MINISTER

The Storm No.2, then Storm No.5 in 2007 has caused the hard damages for Ha Tinh province. Therefore, the People's Committee of Ha Tinh province requires to The Government for subsidy as follows:

- Provide VND 61.3 billion to subsidy the people for repairing houses and human supports.
- Provide a subsidy to buy seeds: VND 8 billion.
- Emergency spending to repair infrastructure works (sea-dykes: Hoi Thong of Nghi Xuan district; Phuc – Long - Nhuong of Cam Xuyen district; Ky Ha of Ky Anh district; Huu Phu of Thach Ha district, Ta Nghen of Loc Ha district): VND 100 billion.
- Regarding the subsidy in-kind, the Government is requested to provide: 50 ton of maize; 10 ton of vegetable seeds; 1,000 ton of rice to help the needy and one power-boat for rescue.
- Provide VND 70 billion to repair public works, including:
    - Schools: VND 12 billion;
    - Hospitals and similar works: VND 10 billion;
    - Irrigations: VND 23 billion;
    - Transportations: VND 10 billion;
    - Telecommunications: VND 15 billion;
- Provide VND 55 billion to upgrade the Lake Kim Son and 12 km of the way to this lake.

We respectfully request the Prime Minister to approve the above.

On behalf of the People's Committee of the Ha Tinh Province

Chairman
Le Van Chat

Recipients:
- As above
- Office of the Government
- CCFSC
- National Committee for Search and Rescue
- Central Regional CCFSC Office
- Military Command of Zone 4
- MPI, MARD, MOF, MOLISA
- Standing Committee of Provincial Party and People's Council
- Members of Provincial People's Council
- Provincial CFSC
- Office of the Provincial Party and People's Council
- Head and Deputy Manager of Provincial Administration Office

Filing.

Table A.2.4. Quang Tri Province: Example of Disaster Relief Payment Request to CCFSC

Quang Tri People's Committee
No. 83/BC-UBND

SOCIALIST REPUBLIC VIETNAM
Independence – Freedom – Happiness

Dong Ha, 3 October 2006

REPORT
The prevention and control of Storm No. 6 (Typhoon Xangsane) as of 10:00h on 3 October 2006
To the Prime Minister

Following is the situation in the province with regards to Storm No. 6 between 17:00h on 30 September and 10:00h on 3 October 2006:

1. Weather development
During the last 4 days, wind speed was on average 18m/s (force 8), maximum 24m/s (force 9 and 10) as recorded in Con Co station at 13:00h on 1 October 2006.
Average rain fall varied between 250mm – 300 mm.
The water level has risen on all rivers causing deterioration of soil on the river banks and flooding in lowland areas.

2. Coordination and management
All authorities have followed the instructions of the Prime Minister and CCFSC and the National Committee for Search and Rescue.
Provincial authorities have met to discuss implementation issues and appointed 3 teams to go to 3 regions to act on the spot.
At the end of 1 October the wind speed has decreased, but rain fall increased fast threatening to cause floods. The Provincial People's Committee decided to move people from lowland areas before 20:00h of 1 October.
7 additional teams were appointed on the morning of 2 October to go to localities.
The People's Committee has issued a total 7 emergency official letters and submitted 8 reports to the Prime Minister and CCFSC.

3. Damages: total estimated damage of VND81 billion
Preliminary consolidation from district reports:

- 8,304 households have been moved to safer locations.
- 7,564 people have helped in moving the families.
- No dead.
- 23 injured.
- … (more details in the attached table)

4. Tasks being implemented urgently

- First aid to injured people, bringing families back to their homes, but no permission is granted if the return is not safe yet.
- Provide food, medicaments and temporary housing.
- Recover damage to roads, telecommunication, environment hygiene and be alert regarding next possible flooding.
- Closely follow the storm development.
- Have people on duty 24 hours and regularly report as regulated.

5. Recommendation to the Government
<u>For the short term, the Government is requested to:</u>

- Provide VND1 billion directly to the people to repair houses.
- Provide seed: VND3 billion.
- Medicament, environment cleaning, clean water: VND1 billion.

- Emergency spending to repair infrastructure works, road, irrigation -- VND25 billion, including:
  - Cua Tung Dyke VND5 b
  - Cua Tung Resort Road and Dyke VND2 b
  - Cua Viet – Cua Tung Road VND3 b
  - Small irrigation structures VND8 b
  - Provincial roads VND5 b
  - Hospitals, schools VND2 b
- Besides, continue funding for Phase 1 of Cua Viet – Cua Tung Road (shortfall of VND30 b)
- Continue funding for Cua Tung bridge (shortfall of VND11 b).

For the long term

- The Government to upgrade small irrigation structures.
- Provide funding for sea-going fishers and rescue forces for the purchase of telecommunication and other rescue equipments.
- Approve the construction of dykes to protect residential areas.
- Provide people in lowland areas with small boats.
- Construct the road Hai An – Hai Khe
- Finalize the construction of sand-wall.
- Construct a dam around the lowland area of Hai Lang.

We respectfully request the Prime Minister to approve the above.

On behalf of the Chairman, Vice chairman of the
Provincial People's Committee
Nguyen Duc Cuong
Recipients:

- As above
- Office of the Government
- CCFSC
- National Committee for Search and Rescue
- Central Regional CCFSC Office
- Military Command of Zone 4
- MPI, MARD, MOF, MOLISA
- Standing Committee of Provincial Party and People's Council
- Members of Provincial People's Council
- Provincial CFSC
- Office of the Provincial Party and People's Council
- Head and Deputy Manager of Provincial Administration Office
- Filing.

Table A.2.4. Continued: Quang Tri Disaster Relief Payment Request

QUANG TRI, STORM NO. 6, 2006 (Typhoon Xangsane)			DAMAGE	UNIT COST	TOTAL LOSS
Category of Damage	**Detail**	**Unit**		**VND Million**	**VND Million**
Human loss	Dead	Person	3.00		-
	- of which children	Person			-
	Injured	Person	23.00		-
	Missing	Person	1.00		-
					-
Housing	House swept away	house	6.00	50.00	300.00
	House collapsed	house	90.00	40.00	3,600.00
	House flooded	house	11,934.00	0.50	5,967.00
	Roof damaged	Roof	1,535.00	5.00	7,675.00
	House tilted	House	326.00	3.00	978.00
	Sub-total				**18,520.00**
Agriculture	Total rice cultivated area affected	Ha	585.00	4.00	2,340.00
	Total cultivated area affected, other farm produce	Ha	1,882.00	4.00	7,528.00
	Pepper tree	Tree	3,450.00	0.20	690.00
	Rubber tree	Tree	12,510.00	0.50	6,255.00
	Coffee plantation	Ha	200.00	20.00	4,000.00
	Other industrial trees	Ha	1,748.00	0.10	174.80
	Other trees alongside the roads	Tree	12,858.00	0.01	128.58
	Dead buffalos, cows	Buffalo	46.00	5.00	230.00
	Dead poultry	Chicken	1,550.00	0.02	31.00
	Cement wetted	Ton	30.00	0.80	24.00
	Food wetted	Ton	1,135.00	2.30	2,610.50
	Cultivation land filled with sand	Ha	6.00	5.00	27.50
	Soil washed from cultivation land	Ha	5.00	5.00	25.00
	Cultivation land inundated with salt water	Ha	300.00	2.00	600.00
	Sub-total				**24,664.38**
Aquaculture	Farming area flooded	Ha	652.00	2.00	1,304.40
	Fish farming loss	Ton	2.00	20.00	40.00
	Shrimp breed loss	10,000 shrimp	63.00	5.00	315.00
	Boat/ship damaged		1.00	10.00	10.00
	Boat/ship lost		1.00	20.00	20.00
	Sub-total				**1,689.40**
NatCat Prevention structures	Hai Lang Dam	m3	7,850.00		240.00
	Gio Linh Dam	m3	1,500.00		150.00
	Other Dams	m3			1,795.00
	Other Dyke				5,000.00
	Sub-total				**7,185.00**
Irrigation	Provincial (Dept Agric+fisheries)				3,480.00
	Bridges/Gates - partial loss	Bridge	7.00	100.00	700.00
	Dykes - partial loss	dyke	13.00	150.00	1,950.00
	Concrete damaged	m3	260.00	1.00	260.00
	Soil swept away	m3	19,000.00	0.03	570.00
	Provincial level (Irrigation company)				10,672.00
	Clean water supply				3,070.00
	Sub-total				**17,222.00**
Road system	National road, soil swept away	m3	56,000.00	0.05	2,800.00

	National road, bridges damaged				2,110.00
	Rural road, soil swept away	m3	41,500.00	0.03	1,245.00
	Rural road, bridges damaged		1.00	20.00	20.00
	Sub-total				**6,175.00**
Hospital	Hospital, roof damaged		6.00	5.00	30.00
Electricity	Electric mast broken	mast	58.00	2.00	116.00
	Electric mast fallen down	mast	15.00	1.00	15.00
	Network damaged		5.00	20.00	100.00
	Low voltage electric wires damaged	m	6,540.00	0.02	130.80
	High voltage electric wires damaged	m	800.00	0.06	48.00
	TBA equipment damaged	set	4.00	60.00	240.00
	Sub-total				**679.80**
Telecommunication	Network cable	m	5,150.00	0.04	180.25
	Telephone mast		179.00	1.00	179.00
	Switch board		1.00	20.00	20.00
	Sub-total				**379.25**
Education	School roofs		58.00	2.00	116.00
	Class room		12.00	0.50	6.00
	Garages		4.00	10.00	40.00
	School gates		1.00	10.00	10.00
	Teacher's dormitory		10.00	5.00	50.00
	Tent		2.00	2.00	4.00
	School electricity system		1.00	10.00	10.00
	Store		1.00	5.00	5.00
	Sub-total				**241.00**
Others	Fence	m	35.00	0.20	7.00
	Public building flooded		4.00	0.10	0.40
	PC		1.00	8.00	8.00
	Photocopier		1.00	35.00	35.00
	TV set		1.00	3.00	3.00
	Car		10.00	25.00	250.00
	Roofing material	sheet	1,210.00	0.04	42.35
	Dyke enforcement mast		2.00	10.00	20.00
	Coastal fence	m	20.00	0.50	10.00
	Resettlement area				505.00
	Sub-total				**880.75**
Relocation	Households	household	8,304.00	0.30	2,491.20
	Labor force	person	7,564.00	0.10	756.40
	Material/equipment				500.00
	Sub-total				**3,747.60**
					-
	TOTAL				**81,384.18**

Source: CCFSC, Hanoi, September 2009

Annex 3. Financial Costs of Natural Disasters in Vietnam 1989 to 2008

This annex presents an analysis of the costs of natural disasters in Vietnam based on the CCFSC damage-data base from 1989 to 2008. The analysis is presented in both in original VND (dong) and US$ using the official VND: US$ annual average exchange rates set out in Annex 6. The analysis is conducted on the annual aggregate losses for all provinces and events, but to complement this analysis, there is a provincial level analysis of Typhoon Xangsane of October 2006 which caused major losses across 15 provinces.

There are 193 recorded events over the past 20 years on the CCFSC data-base. However, for 31 events (16% of total) there are no financial damage estimates and this applies particularly to earlier years. Therefore it is recognized that the reported values prior to the mid 1990s probably under-estimate considerably the true value of damage from natural disasters.

The primary objective of the natural disasters' damage assessment system in Vietnam is to record the physical and financial value of damage to public sector property and state-owned enterprises and public-infrastructure as opposed to private property and private and commercial businesses. The 20 year record therefore is likely to under-estimate considerably the full cost to the Vietnamese economy of natural disaster losses. As noted in Section 2, however, there is an attempt to record the value of damage to private residential property and to agricultural production.

3.1. Overview of 20-years of Damages due to Natural Disasters

Table A.3.1. presents a summary of the CCFSC recorded damages due to natural disasters over the past 20 years in terms of loss of human life, damage to agriculture and residential housing and the financial value of damage amounting to VND 91 trillion or US$ 6.4 billion over this period. Over the 20 year period catastrophe losses due to tornados, tropical cyclones (including tropical storms and typhoon), floods, flash floods and landslides, resulted in a total loss of life of 13,035 persons, with total damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) valued at VND 91 billion (US$ 6.4 billion) or an average of VND 4,547 billion (US$ 322 million) per year[29].

An average of 652 people have either lost their lives or been reported missing each year with a peak of 3,083 lost lives in 1997. The highest lost of life in 1997 occurred under Tropical Storm Linda (category 10, Beaufort scale) when a total of 2,901 people either died or were reported as missing: the main cause of loss of life was flood causing drowning. (Figure A.3.1.).

Each year an average of 36,488 houses have been totally destroyed (classified as collapsed) by natural disasters, mainly flood or windstorm. The worst year was 1989 with a total of 235,729 reported collapsed housed. (Figure A.3.1.). If partial flood or storm damage to housing is included the number of damaged houses increases significantly to an average of 565,140 houses per year with peak damage in 1996 which was a very severe storm and flood year and when 2,024,025 houses incurred damage. The potential cost to government of assisting households to repair or rebuild their damaged houses is very significant: under the 2007 decree, households are

[29] VND 90.9 billion or an average of VND 4.5 billion per year

entitled to receive up to NVD 5 million if their house is damaged, and if this sum is paid out to an average of 565,000 households per year, the total bill would amount to VND 2.825 billion (US$ 172 million at the 2008 exchange rate) per year.

The damage to public-sector owned schools, hospitals, and other buildings is usually very high under major flood and storm events. Reference to Figure A.3.1. shows that an average of 7,812 school rooms are damaged each year with a peak of 34,105 rooms damaged in 1996 when severe flooding occurred in much of Vietnam.

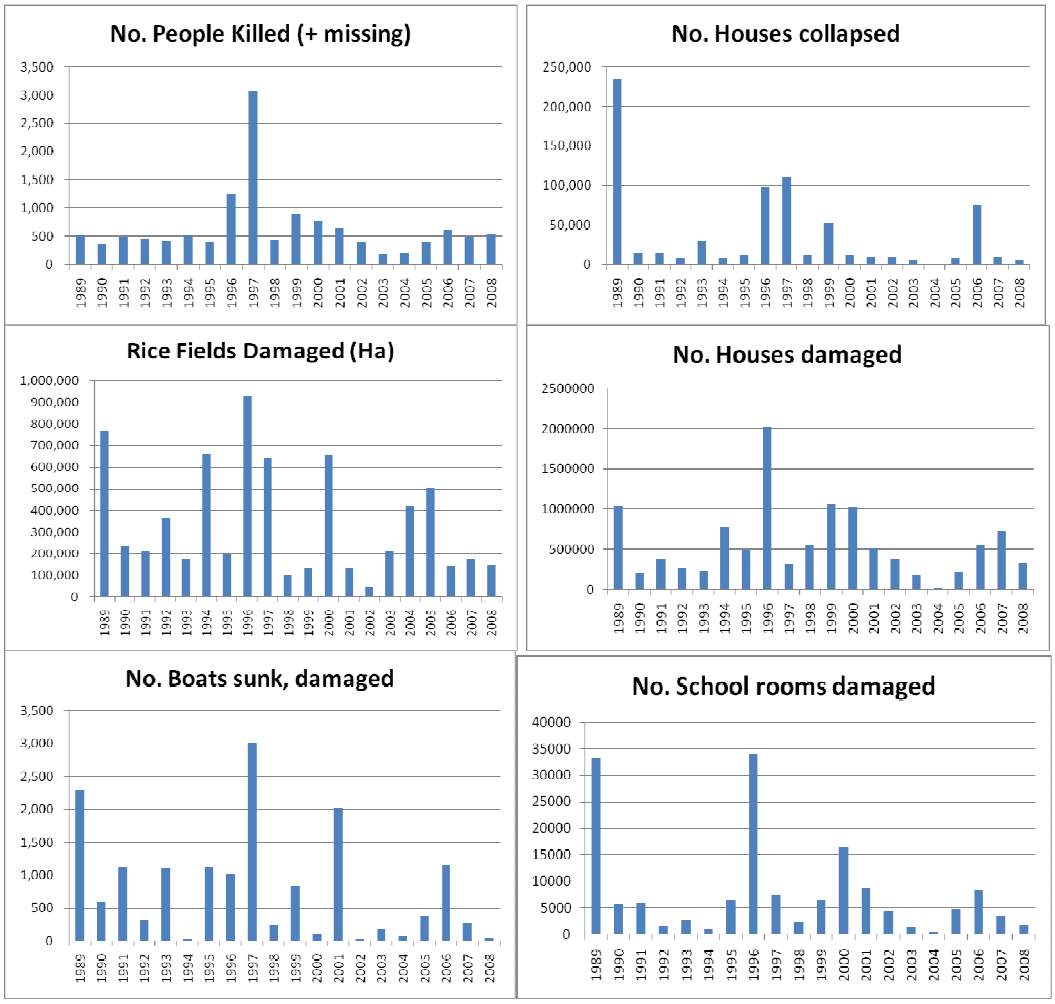
The damage to agriculture is also extremely high. On average more than 340,000 Ha of paddy (rice) are damaged by natural disasters each year, with a worst loss in 1996 when nearly 1 million hectares of paddy were damaged by severe storms and flooding. Damage to the fishing industry is also high as evidenced by the average of 799 boats which are sunk each year under natural disasters (mainly storms).

Table A.3.1. Vietnam: Natural Disaster Losses 1989 to 2008 (VND Billion and US$ Million)

Year	No. People Killed (+ missing)	No. Houses collapsed	Rice Fields Damaged (Ha)	Fish Shrimps lost (Tons)	No. Boats sunk, damaged	Area of forest fire (Ha)	Total Value losses (VND Billion)	Total Value losses (US$ Million)
1989	516	235,729	765,375	30	2,299	n.a.	350	54
1990	354	14,521	237,800	25	598	n.a.	200	31
1991	490	15,063	211,377	52	1,130	n.a.	680	71
1992	452	8,211	366,572	3,550	321	n.a.	469	42
1993	420	29,475	171,560	60	1,097	n.a.	698	66
1994	508	7,302	658,676	6,364	43	8,322	2,850	258
1995	399	11,043	198,434	120	1,117	9,648	1,129	103
1996	1,243	96,927	927,506	4,761	1,017	12,758	7,998	725
1997	3,083	111,037	641,393	34,619	3,008	1,361	7,730	667
1998	434	12,171	103,422	215	231	14,812	1,797	136
1999	901	52,585	131,267	1,419	845	1,139	5,427	390
2000	775	12,253	655,403	2,877	109	850	5,098	360
2001	629	10,503	132,755	1,002	2,033	1,845	3,370	229
2002	389	9,802	46,490	310	26	15,548	1,958	128
2003	186	4,487	209,764	10,581	183	1,402	1,590	103
2004	212	1,192	422,806	1,334	68	n.a.	407	26
2005	399	7,586	504,098	3,663	381	n.a.	5,809	368
2006	612	74,783	139,231	566	1,151	n.a.	18,566	1,159
2007	495	9,908	173,830	3,308	266	n.a.	11,514	716
2008	538	5,180	146,945	100,104	52	n.a.	13,301	808
Total	**13,035**	**729,758**	**6,844,704**	**174,960**	**15,975**	**67,685**	**90,943**	**6,437**
Average	**652**	**36,488**	**342,235**	**8,748**	**799**	**6,769**	**4,547**	**322**
Minimum	186	1,192	46,490	25	26	850	200	26
Maximum	3,083	235,729	927,506	100,104	3,008	15,548	18,566	1,159

Source: Vietnam Natural Disasters Damage Data 1989 to 2008 from CCFSC web site. http//.www.ccfsc.org.vn

Figure A.3.1. Natural Disaster Losses in different Sectors 1989 to 2008



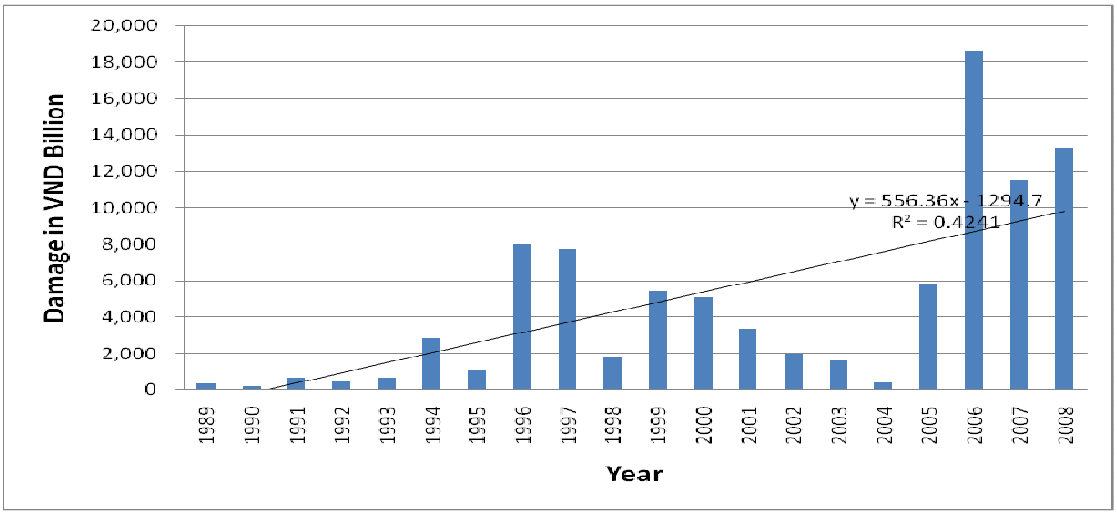
3.2. Trends in Assessed Value of Damage from Natural Disasters

The CCFSC reported data show that the estimated value of damage from natural disasters in the past three years has been much higher than the long-term annual average. Figures A.3.2. A.3.3. show the annual value of damage in VND Billion and US$ Million respectively. Over the past 20 years the annual average value of damage has been VND 4,547 billion or US$ 322 million. Over the past 20 years there have been two distinct periods of below average losses (1989 to 1995 and 2000 to 2005) and two periods of above average losses (1996 to 1999 and 2006 to 2008).

Over the past three years the total annual value of natural disaster losses has been between two and three times higher than the long-term average, with peak losses in 2006 valued at VND 18,566 billion or US$ 1.16 billion, when the central regions of Vietnam incurred major wind storm damage under Typhoon Xangsane. Although Figure A.3.2. and A.3.3. suggests a trend towards increasing natural disaster losses, this is partly explained by the major growth in the Vietnamese economy in recent years, the increasing value of underlying national asset values and

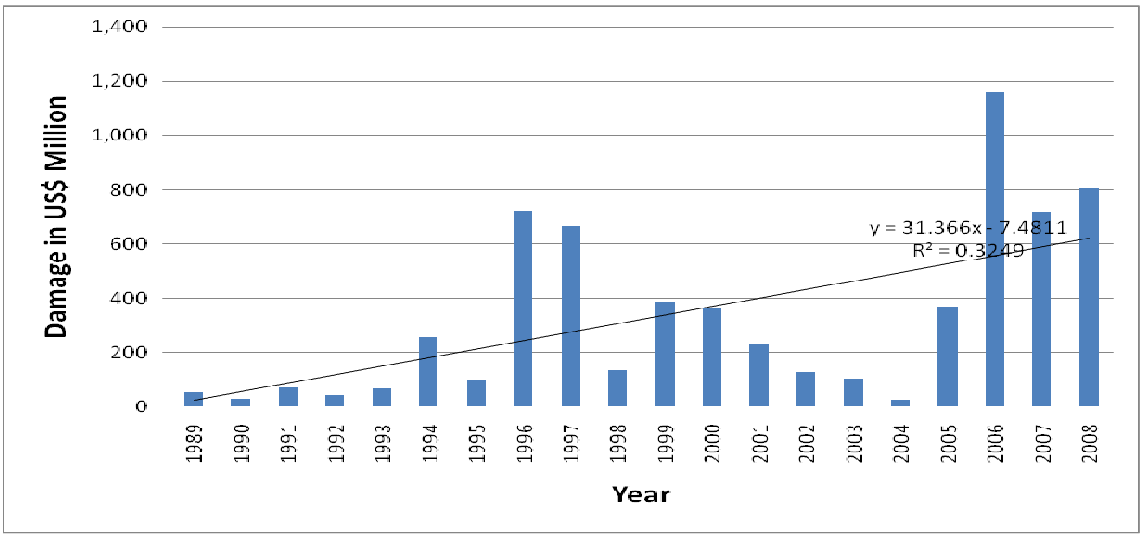
the increase in construction costs and rehabilitation costs for property and infrastructure. As such the average cost of damage associated with a natural disaster is considerably higher today than in the past (see below for further discussion).

Figure A.3.2. Value of Losses due to Natural Disasters from 1989 to 2008 (VND Billion)



Source: World Bank analysis of CCFSC damage data in VND Billion

Figure A.3.3. Value of Losses due to Natural Disasters from 1989 to 2008 (US$ Million)



Source: World Bank analysis of CCFSC damage data in VND Billion

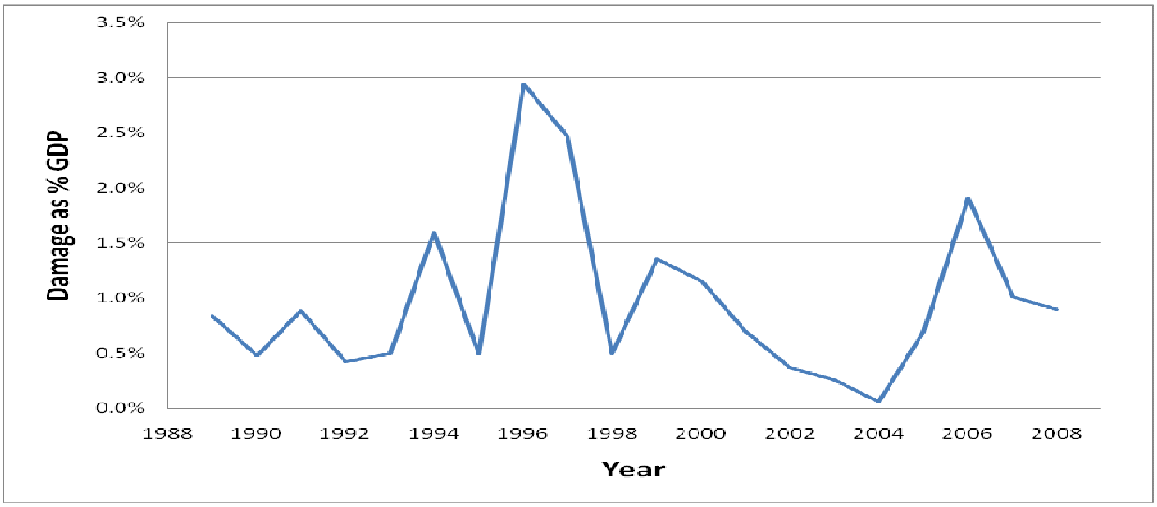
3.3. Natural Disasters: Value of Damage as a percentage of GDP

Over the past 20 years, the average annual value of natural disaster losses has been equivalent to 1.0% of Gross Domestic Product (GDP) with the worst losses occurring in 1996, equivalent to 2.9% of GDP. (Figure A.3.4.). Over the past 15 years 1994 to 2008 the value of damage has

been slightly higher or an average of 1.1. of GDP: however in the past decade the average damage has been lower at 0.8% of GDP.

The pattern of natural disaster losses expressed as a percentage of GDP shows that there is no trend towards increased damage in recent years. There have been 4 very severe loss years when natural disaster losses have exceeded 1.5% of GDP namely 1994, 1996 1997 and 2006. The losses in 2006 were caused by a large number of mainly flood related events as opposed to major single catastrophe events (discussed further below).

Figure A.3.4. Value of Natural Disasters as % of Gross Domestic Product (1998 to 2008)



Source: World Bank analysis of CCFSC damage data in VND.
Note: The analysis is based on the actual VND value of losses and actual GDP value in each year

3.4. Causes of Loss

Flood has been the major cause of loss accounting for 49% of the total value of assessed losses declared to CCFSC, followed by Storm (tropical storms and typhoons) equivalent to 46% of all losses. *(* See Table A.3.2. and Figure A.3.5.). Other perils such as flash floods & landslide, tornado and cold wave account for less than 5% of the total value of damage over the 20 year period.

Between 1989 and 2008 period an average of nearly 10 natural disaster events per year has been reported to CCFSC with an average value of estimated damage of VND 6,437 billion per event (US$ 40 million per event). The average size of loss per event for storm has been US$ 53 million and for flood, US$ 49 million. Conversely the average value of damage per event associated with flash flooding/landslide and tornado has been much lower.

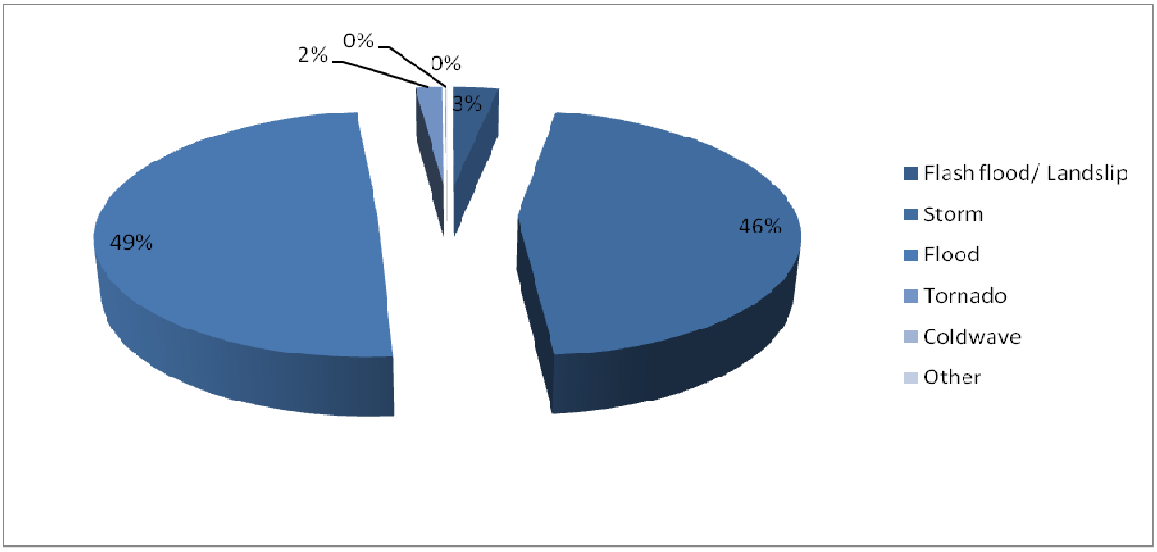
Full details of the 193 loss events including date, cause of damage and value of damage in VND Billion and US$ Million are presented in Annex 3, Appendix 1.

Table A.3.2. Vietnam: Estimated Value of Damage by Cause of Loss, 1989 to 2008

Peril (Hazard)	No Events	No. events with recorded Value of Damage*	Total Value of Damage (VND Million)	Total Value of Damage (US$ Million)	% of total value of damage	Avge. Value of damage/ event (VND Mio)*	Avge. Value of damage/ event (US$ Mio)*
Flash flood/ Landslip	23	21	2,789,808	196	3%	132,848	9.3
Storm	70	57	41,505,430	2,996	46%	728,165	52.6
Flood	77	64	44,908,054	3,120	49%	701,688	48.7
Tornado	20	18	1,625,676	118	2%	90,315	6.5
Cold wave	2	1	20,402	2	0%	20,402	2.1
Other	1	1	92,370	6	0%	92,370	6.3
Total	**193**	**162**	**90,941,740**	**6,437**	**100%**	**561,369**	**39.7**

Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008
(*) The CCFSC data do not record the total value of damages for 21 events. The average size of loss is calculated only for those events with reported loss values.

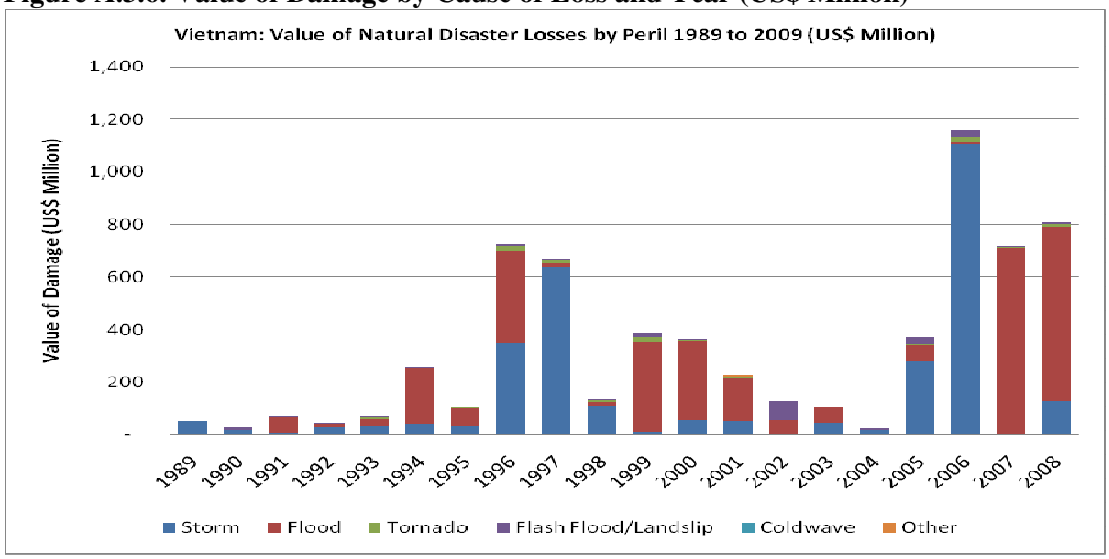
Figure A.3.5. Percentage Value of Damage by Cause of loss 1989 to 2008



Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008.

The relative importance of storm and or flood damage varies significantly from year to year as shown by the analysis in Figure A.3.6. In 2006 practically all damage was caused by typhoons, but then in 2007 all losses were caused by flooding and 2008 was also a severe flood loss year. In 1996 which was the worst loss year with damage equivalent of 2.9% of GDP, these losses were due to a combination of several large storms and an above average number of major flood events.

Figure A.3.6. Value of Damage by Cause of Loss and Year (US$ Million)

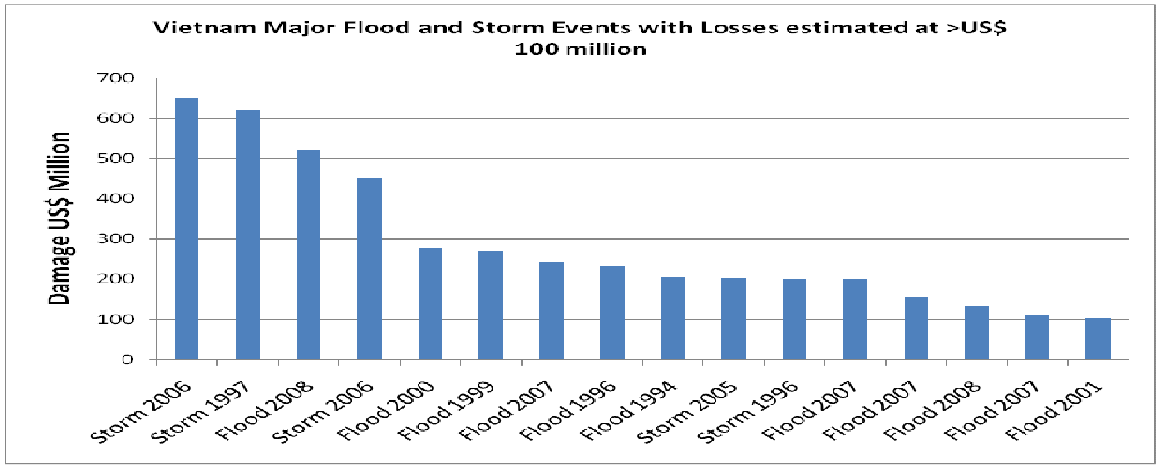


Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008.

3.5. Major Loss Events

Flood and storm have the potential to cause catastrophic/systemic losses in Vietnam as evidenced by the losses associated with Typhoon Xangsane 2006 which were estimated at VND 10,402 billion (US$ 649 million). Over the past 20 years there have been 16 storm and flood events with estimated damage of greater than US$ 100 million (see Figure A.3.7.). The largest recorded single storm was Storm No 6 of October 2006; Typhoon Xangsane which was a category 13 Typhoon (sustained wind speeds > 133 Km/Hr) and which affected 15 Provinces in central Vietnam with total assessed damage reported to CCFSC of VND 10,402 billion or US$ 649 million. The second largest recorded storm was Storm no. 5 of 2007 with estimated losses of US$ 619 million. The largest flood loss event occurred in the Red River Basin between 21 October and 3 November 2008 and caused major damages to property, infrastructure and agriculture in the Hanoi region, valued at US$ 522 million.

Figure A.3.7. Major Flood and Storm Events with Damage estimated at > US$ 100 million



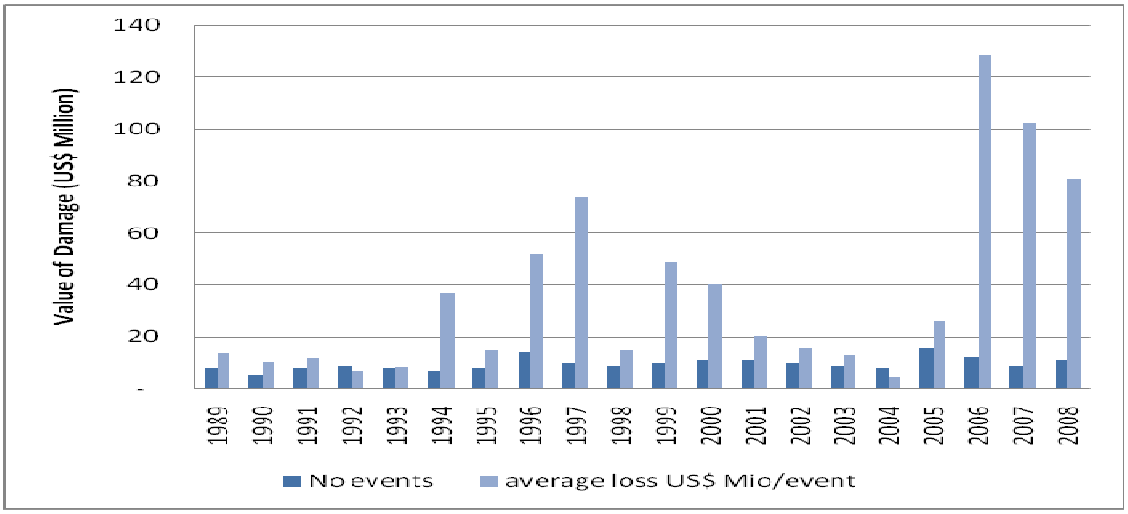
Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

3.6. Average size of loss per event

There is no clear trend in overall damage (as percentage of GDP) patterns over time, but the average value of assessed damage per natural disaster event has increased significantly in recent years. Reference to Figure A.3.8. shows that the number of declared disaster events is relatively stable with an average of 10 events per year, with a minimum of 5 events in 1990 and a maximum of 16 events in 2005.

The analysis shows, however, that there has been a major increase in the average value of assessed damage per event over the past three years. Over the full 20 year period the average value of assessed damage has been US$ 40 million per event, but over the period 2006 to 2008 the average size of losses per event was between 2 to 3 times higher than the average or US$ 129 million, US$ 102 million and US$ 81 million respectively per event.

Figure A.3.8. Average size of Natural Disaster losses in USD per Event (1989-2008)



Note: Average size of loss is estimated only for those events with a reported value of the damages
Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

Further research is required to explain the major increase in average size of losses in recent years, but this is likely to be a combination of (a) increased values of property and infrastructure assets exposed to risk and (b) in the case of storm damage the fact that Vietnam has experienced four severe typhoons of Category 13 wind speeds in the past 3 years. In 2006, US$ 1.1 billion, or 95% of all reported damage in 2006, was associated with typhoons of which 3 typhoons, Durian, Xangsane and Cimaron were category 13 typhoons.

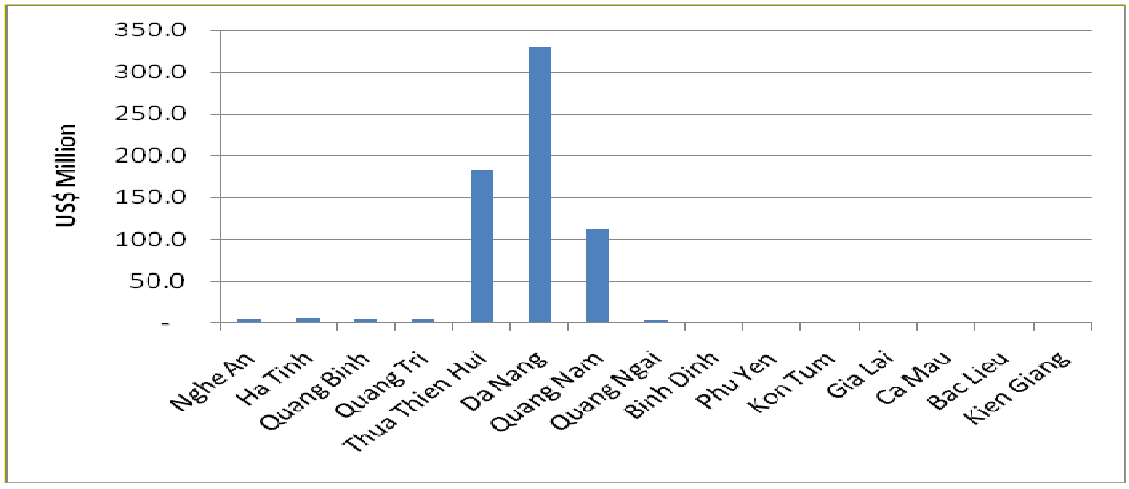
3.7. Analysis of Damage by Sub-Sector

A major drawback of the CCFSC 20-year national natural disasters' damage database is that with very few exceptions, the value of the assessed damage is NOT reported separately for each sub-sector of the economy, but only as a single consolidated total damage value for each event. As noted previously there appears to have been no standardized reporting by provinces of the estimated values of damage for each of the 15 categories or sub-sectors included in the damage assessment reports. Of the 193 separate events analyzed under this study less than 5% of the reports contain complete valuation data for all categories of damage. This means that it is nearly

impossible to conduct a formal analysis of the relative value of damage to residential property or agriculture or public sector property (schools, hospitals, etc) and to public infrastructure (roads, bridges, etc) caused by flood and by wind storm over the past 20 years. For Typhoon Xangsane, however, it has been possible to obtain a detailed breakdown of the damages by sub-sector and this analysis is reported below.

Typhoon Xangsane was a Category 13 Beaufort scale Typhoon when it hit the central region coastline of Vietnam on 1st October 2006 near the city of Hue in Thua Thien Hue Province killing 72 people and causing major flooding and storm damage to property and infrastructure in the three provinces of TT Hue, and Da Nang and Quang Nam immediately to the south. According to CCFSC data, Xangsane affected 15 provinces in Central Vietnam with total estimated damaged of VND 10.402 billion or US$ 649 million of which nearly 96% of the damages were located in Da Nang, T.T. Hue and in Quang Nam Provinces with the highest losses in Da Nang of US$ 330 million. The reported value of damage in other provinces was very small and in all cases less than US$ 7.5 million (Figure A.3.9.).

Figure A.3.9. Typhoon Xangsane Estimated Damage by Province (US$ Million)



Source: World Bank analysis of CCFSC Typhoon Xangsane Provincial damage estimates

Under Typhoon Xangsane the highest losses were recorded in agriculture (crops, livestock, forestry and aquaculture) accounting for 36% of the total value of losses, followed by damage to housing (27% of total). For four provinces affected by Xangsane (Quang Binh, Quang Tri, TT Hui and Kon Tum), it has been possible to access a breakdown of the estimated damage value by sub-sector (see Table A.3.3. and Figure A.3.10.). The total estimated damage in these four provinces was US$ 188 million of which the highest damage was in agriculture (crops, forestry and livestock) equivalent to 27% of total value of losses and if damage to aquaculture is included this rises to 36% of total. This was followed by damage to housing (totally collapsed and damaged) equivalent to 25% of the total estimated value of damage, damage to industry and enterprises[30] (15% of total), damage to water resources including dykes, dams, canals (9%), transportation damage (7%) and minor damage to schools, hospitals and telecommunications.

These findings tend to suggest that under a catastrophic typhoon event, approximately one third of all damage is incurred by the agricultural sector (including crops, forestry, livestock

[30] It is not possible to report whether the recorded damage to industry-enterprises applies to private-sector or public sector industry.

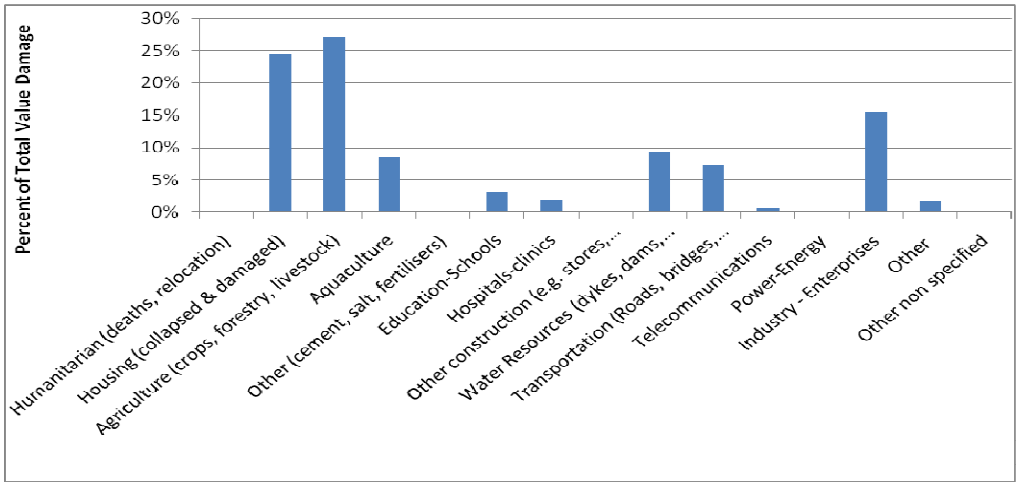
and aquaculture), a quarter of the damages occur in private residential property and the remaining forty percent of damages are incurred in public-sector property (schools, hospitals other buildings) and infrastructure (dykes, dams, bridges, roads, power lines, telecommunications etc). However, there is some uncertainty whether the reported damage to industry / enterprises in T.T. Hui is to public sector or private sector industry and if the damage is to private industry then the damages to public-sector property and infrastructure would be reduced to between 25% and 30% of the total value of damage. Finally, comparable damage data for major flood events are not available to be able to provide a breakdown of the damages associated with flooding.

Table A.3.3. Typhoon Xangsane 2006: Damage by Sub-Sector for 4 Provinces (VND Bio)

No.	Sub-Sector Damaged	Quang Binh	Quang Tri	Thua Thien Hui	Kon Tum	Total	% of Total
1	Humanitarian (deaths, relocation)		3,748			3,748	0%
2	Housing (collapsed & damaged)	5,464	18,520	720,000	1,890	740,410	25%
3	Agriculture (crops, forestry, livestock)	9,020	24,664	790,000	2,135	816,799	27%
4	Aquaculture	8,883	1,689	255,000	66	256,755	9%
5	Other (cement, salt, fertilisers)					0	0%
6	Education-Schools	114	241	95,000	600	95,841	3%
7	Hospitals-clinics	280	30	55,000		55,030	2%
8	Other construction (e.g. stores, offices)					0	0%
9	Water Resources (dykes, dams, canals)	13,685	24,407	250,000	4,868	279,275	9%
10	Transportation (Roads, bridges, ships)	7,017	6,175	210,000	5,519	221,694	7%
11	Telecommunications		379	20,000	10	20,389	1%
12	Power-Energy	212	680			680	0%
13	Industry – Enterprises			465,000		465,000	15%
14	Other		881	50,000	250	51,131	2%
15	Other non specified					0	0%
	Total Value Damage VND Billion	**44,675**	**81,414**	**2,910,000**	**15,337**	**3,006,751**	**100%**
	US Dollars (Million)	**2.8**	**5.1**	**181.7**	**1.0**	**187.7**	
*CCFSC Web: Estim. Damage VND Billion		66,966	81,400	2,910,000	15,340	3,006,740	

Source: CCFSC Sept. 2009: Provincial Disaster Relief Requests to Prime Minister's office

Figure A.3.10. Distribution of Typhoon Xangsane Damage by Sub-Sector (4 Provinces)



Source: CCFSC Sept. 2009: Provincial Disaster Relief Requests to Prime Minister's office

3.8. Simulation Analysis (Probable Maximum Loss Analysis)

Under this study a simple simulation analysis was applied to the CCFSC reported damage data to assess the possible maximum losses which might be expected to occur in Vietnam for return periods of between say 1 in 10 years, 1 in 50 years and 1 in a 100 years. The PML is defined as an estimate of the maximum loss that is likely to arise on the occurrence of an event or series of events considered to be within the realms of probability, remote coincidences and possible but unlikely catastrophes being ignored. For example, a PML with a 100 year return period is the estimated loss cause by an event occurring once every 100 years on average (or with a 1% chance on average).

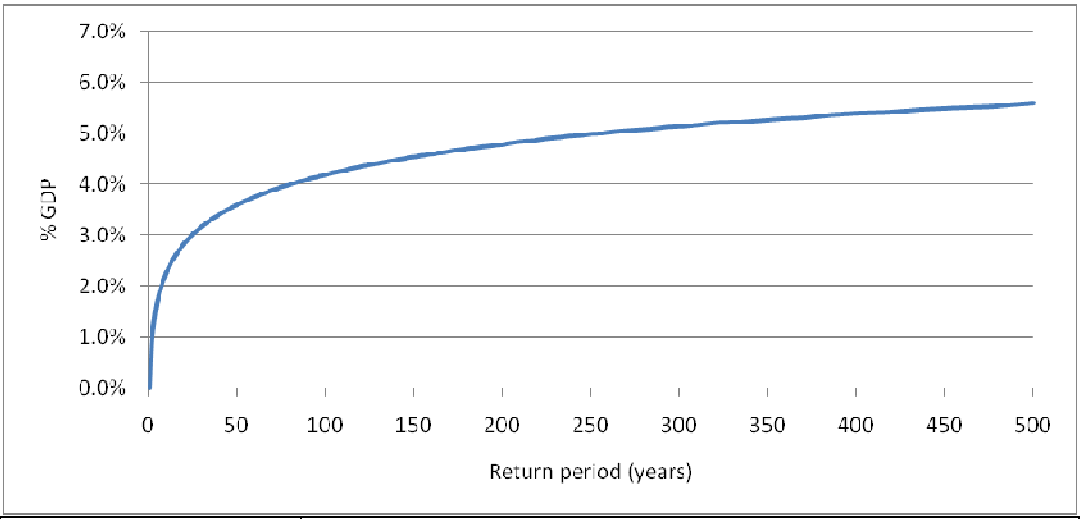
1) **Annual Aggregate PML Analysis**

This PML analysis was applied to the annual aggregate CCFSC reported damage value data expressed as a percentage of GDP for the 15-year period 1994 to 2008. The reason that the full 20 year data set was not used for this PML analysis was that the earlier years contain several events with missing damage values. The procedure involved the initial fitting of a parametric distribution to the 15-years of percent of GDP damage value data and selected the "best-fit" distribution using Chi-Square and Anderson-Darling tests for goodness of fit: in this case the Inverse Gaussian distribution provided the best fit. Monte Carlo simulation analysis was then applied to this loss distribution using 10,000 iterations to establish the expected losses as a percentage of GDP for return period of 1 year to 250 years. The results of this annual aggregate PML analysis are presented in Figure A.3.11.

The preliminary catastrophe risk analysis presented in Figure A.3.11, suggests that once every 100 years on average, Vietnam may expect losses which exceed US$ 3.8 billion[31], or about three times the worst losses experienced over the past 20 years. This finding has major financial implications for GoV because it shows that under extremely severe loss years, it would face post-disaster emergency relief, recovery/rehabilitation and reconstruction costs in excess of US$ 3.8 billion or 4.1% of current 2008 GDP. There is a clear need for an adequate strategy to finance extreme natural disaster loss years.

[31] Note that this value is calculated by applying the simulated 1 in 100 year expected percentage of GDP loss to the current 2008 GDP value.

Figure A.3.11. Indicative Annual Aggregate Probable Maximum Losses due to Natural Disasters (% of GDP)



Return period	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)
10 years	2,024
50 years	3,239
100 years	3,770
150 years	4,088

Source: World Bank Simulation analysis of CCFSC annual loss data 1994 to 2008

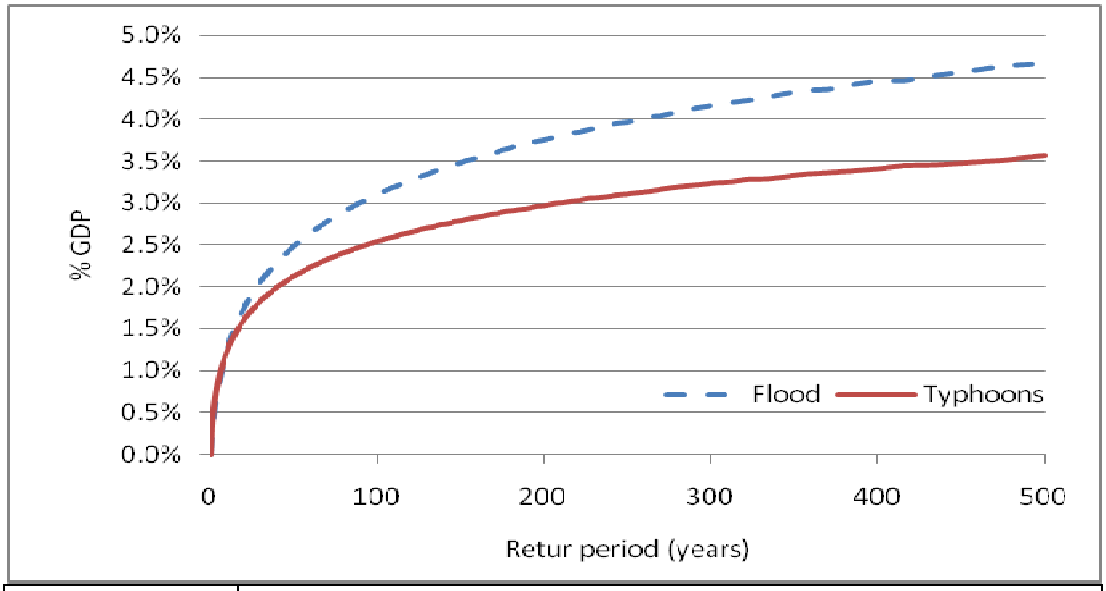
2) Per Event Analysis for Flood and Typhoon

Natural Disaster Managers, Insurers and Reinsurers are not only interested in the total annual value of damages caused by natural disasters, but also in planning for the maximum losses which might be expected under a single catastrophe event. This study has shows that over the past 20 years there have been 16 events where the value of losses has exceeded US$ 100 million: in the case of windstorm the maximum loss and one event occurred under Typhoon Xangsane in 2006 valued at US$ 649 million; in the case of flood the October 2008 flooding of the Red River Delta caused damage of US$ 522 million.

A separate PML analysis was therefore carried out for wind storm (Typhoon) and Flood using the per event damage value data reported by CCFSC. In the case of flood, the data set included 77 separate loss events with a reported value of damage and in the case of windstorm 70 separate events. The same analytical approach described above was used to apply the best fit distributions to the per event damage values: in both cases Inverse Gaussian provided the best fit. The expected value of the per event losses were then estimated by Monte Carlo simulation with 100,000 iterations and these values were then expressed as a percentage of 2008 GDP. The results of this per event PML analysis are presented for flood and storm in Figure A.3.12.

Major flood events are estimated to generate larger losses than major typhoon events. Preliminary per event catastrophe risk analysis has also been conducted for floods and typhoons. A one in 100 year flood event is expected to generate damage estimated at 3.1% of GDP, while a one in 100 year typhoon event would generate damage estimated at 2.5%.

Figure A.3.11. Indicative Probable Maximum Losses per Event for Flood and Typhoon (% of GDP)



Return period	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)	
	Flood	Typhoon
10 years	1,093	1,095
50 years	2,225	1,913
100 years	2,781	2,290
150 years	3,124	2,513

Source: World Bank Simulation analysis of CCFSC per event losses for flood and storm 1989- 2008

Annex 3, Appendix 1. Value of Natural Disasters by Year and Event and by Cause of Loss

Year	Peril	VND Million	US$ Million	Year	Peril	VND Million	US$ Million	Year	Peril	VND Million	US$ Million
2008	Flash flood/Landslip	96,000	5.8	2,002	Flash Flood/Landslip	1,082,052	70.8	1,996	Flash Flood/Landslip	81,647	7.4
2008	Storm	0	0.0	2,002	Flood	79,443	5.2	1,996	Storm	581,367	52.7
2008	Flood	2,193,000	133.2	2,002	Flood	57,000	3.7	1,996	Flood	124,958	11.3
2008	Tornado	193,000	11.7	2,002	Flood	199,961	13.1	1,996	Flood	565,757	51.3
2008	Flood	14,000	0.9	2,002	Flood	0	0.0	1,996	Flood	204,785	18.6
2008	Storm	8,000	0.5	2,002	Flood	456,831	29.9	1,996	Flood	46,080	4.2
2008	Storm	1,536,000	93.3	2,002	Flood	0	0.0	1,996	Flood	25,622	2.3
2008	Storm	141,000	8.6	2,002	Flood	3,100	0.2	1,996	Flood	2,571,223	233.0
2008	Flood	127,000	7.7	2,002	Flood	36,779	2.4	1,995	Tornado	35,510	3.2
2008	Flood	8,590,000	521.6	2,001	Tornado	26,461	1.8	1,995	Flash Flood/Landslip	21,634	2.0
2008	Storm	402,000	24.4	2,001	Flash Flood/Landslip	67,503	4.6	1,995	Flood	145,876	13.3
2,007	Tornado	67,614	4.2	2,001	Flood	14,000	0.9	1,995	Flood	183,017	16.6
2,007	Flood	4,188	0.3	2,001	Flood	33,000	2.2	1,995	Storm	0	0.0
2,007	Flash flood/Landslip	29,188	1.8	2,001	Other	92,370	6.3	1,995	Storm	132,532	12.0
2,007	Storm	0	0.0	2,001	Flood	634,590	43.1	1,995	Storm	227,113	20.6
2,007	Flood	2,519,298	156.6	2,001	Storm	66,824	4.5	1,995	Flood	383,752	34.9
2,007	Flood	3,215,508	199.8	2,001	Flood	1,535,910	104.2	1,994	Tornado	25,896	2.3
2,007	Flood	1,786,220	111.0	2,001	Flood	196,702	13.3	1,994	Flash Flood/Landslip	51,565	4.7
2,007	Flood	3,891,900	241.9	2,001	Storm	691,643	46.9	1,994	Flood	2,283,858	206.6
2,007	Storm	0	0.0	2,001	Storm	11,220	0.8	1,994	Storm	1,500	0.1
2,006	Tornado	362,910	22.7	2,000	Tornado	13,816	1.0	1,994	Storm	37,650	3.4
2,006	Flood	21,100	1.3	2,000	Flash Flood/Landslip	51,997	3.7	1,994	Storm	36,436	3.3

2,006	Flash flood/Landslip	405,315	25.3	2,000	Flood	15,372	1.1	1,994	Storm	413,175	37.4
2,006	Storm	26,360	1.6	2,000	Coldwave	0	0.0	1,993	Tornado	67,145	6.3
2,006	Flood	0	0.0	2,000	Flood	6,000	0.4	1,993	Flash Flood/Landslip	4,982	0.5
2,006	Flood	21,700	1.4	2,000	Flood	3,911,249	276.4	1,993	Flood	50,000	4.7
2,006	Storm	22,352	1.4	2,000	Storm	156,050	11.0	1,993	Flood	180,525	17.0
2,006	Flood	70,000	4.4	2,000	Storm	362,974	25.6	1,993	Flood	58,000	5.5
2,006	Storm	10,401,624	649.4	2,000	Storm	254,629	18.0	1,993	Storm	2,000	0.2
2,006	Flood	0	0.0	2,000	Flood	326,284	23.1	1,993	Storm	153,554	14.5
2,006	Flood	0	0.0	2,000	Flood	0	0.0	1,993	Storm	181,299	17.1
2,006	Storm	7,234,300	451.7	1,999	Tornado	222,231	16.0	1,992	Tornado	2,155	0.2
2,005	Tornado	72,785	4.6	1,999	Flash Flood/Landslip	305,323	21.9	1,992	Flood	0	0.0
2,005	Flood	30,519	1.9	1,999	Storm	20,050	1.4	1,992	Flash Flood/Landslip	6,500	0.6
2,005	Flash flood/Landslip	336,559	21.3	1,999	Storm	0	0.0	1,992	Storm	30,374	2.7
2,005	Flood	0	0.0	1,999	Flash Flood/Landslip	0	0.0	1,992	Flood	0	0.0
2,005	Storm	365,066	23.1	1,999	Flood	20,700	1.5	1,992	Storm	32,520	2.9
2,005	Storm	230,000	14.6	1,999	Storm	62,224	4.5	1,992	Flood	130,496	11.7
2,005	Storm	0	0.0	1,999	Flood	40,551	2.9	1,992	Storm	266,773	24.0
2,005	Storm	58,800	3.7	1,999	Flood	3,773,799	271.0	1,992	Storm	0	0.0
2,005	Storm	353,417	22.4	1,999	Flood	982,261	70.5	1,991	Tornado	581	0.1
2,005	Storm	3,202,150	202.6	1,998	Tornado	108,527	8.2	1,991	Flash Flood/Landslip	35,139	3.7
2,005	Flood	311,516	19.7	1,998	Flash Flood/Landslip	23,386	1.8	1,991	Flood	590,000	61.5
2,005	Flood	186,920	11.8	1,998	Flood	800	0.1	1,991	Storm	29,285	3.1
2,005	Storm	177,808	11.3	1,998	Flood	31,461	2.4	1,991	Storm	0	0.0
2,005	Flood	12,017	0.8	1,998	Flood	189,437	14.3	1,991	Storm	0	0.0
2,005	Flood	463,277	29.3	1,998	Storm	145,973	11.0	1,991	Flood	5,000	0.5
2,005	Flash	8,500	0.5	1,998	Storm	923,117	69.7	1,991	Coldwave	20,402	2.1

	flood/Landslip										
2,004	Tornado	30,735	1.9	1,998	Storm	57,493	4.3	1,990	Tornado	0	0.0
2,004	Flood	3,070	0.2	1,998	Storm	317,055	23.9	1,990	Flash Flood/Landslip	78,920	12.2
2,004	Flash Flood/Landslip	64,994	4.1	1,997	Tornado	136,692	11.8	1,990	Storm	7,520	1.2
2,004	Storm	298,199	18.9	1,997	Flash Flood/Landslip	21,724	1.9	1,990	Storm	113,322	17.5
2,004	Storm	0	0.0	1,997	Flood	19,769	1.7	1,990	Flood	0	0.0
2,004	Storm	9,000	0.6	1,997	Flood	67,496	5.8	1,989	Tornado	0	0.0
2,004	Flash Flood/Landslip	680	0.0	1,997	Storm	61,500	5.3	1,989	Flash Flood/Landslip	0	0.0
2,004	Flood	0	0.0	1,997	Flood	0	0.0	1,989	Storm	300,000	46.3
2,003	Tornado	22,296	1.4	1,997	Flood	87,100	7.5	1,989	Storm	0	0.0
2,003	Flash Flood/Landslip	16,200	1.1	1,997	Storm	136,694	11.8	1,989	Storm	0	0.0
2,003	Storm	36,303	2.4	1,997	Flood	19,880	1.7	1,989	Storm	0	0.0
2,003	Storm	20,520	1.3	1,997	Storm	7,179,615	619.2	1,989	Storm	10,677	1.6
2,003	Storm	682,304	44.3	1,996	Storm	2,211,630	200.4	1,989	Storm	39,500	6.1
2,003	Flood	12,076	0.8	1,996	Storm	536,886	48.7	Total		90,941,740	6,437.1
2,003	Flood	367,558	23.8	1,996	Storm	124,153	11.3	Average		471,201	33.4
2,003	Flood	432,471	28.1	1,996	Storm	383,900	34.8	Sdev		1,357,189	91.9
2,003	Flood	0	0.0	1,996	Flood	346,292	31.4	Min		0	0.0
2,002	Tornado	43,212	2.8	1,996	Tornado	194,110	17.6	Max		10,401,624	649.4

Source. CCFSC website

Annex 4. Law on State Budget

Law on State Budget (Law No. 01/2002/QH11), Article 9 dealing with Natural Disaster Funding

Article 9

1. The draft expenditures of the central budget and of local budgets at various levels shall include 2% to 5% of the total estimated spending to meet contingent spending on preventing, combating, and overcoming consequences of the acts of god and fires, important tasks of national defense and security, and other urgent tasks. The Government shall decide the use of the provisions in the central budget, regularly report to the National Assembly's Standing Committee, and report to the National Assembly at the latter's nearest session. People's Committees shall decide the use of the provisions in the local budgets, regularly report to the Standing Committee of the People's Councils, and report to the People's Councils at the latter's nearest session. For commune level, the People's Committees shall decide the use of the provisions in the commune budget, regularly report to the Chairman or a Vice Chairman of the [commune] People's Councils, and report to the [commune] People's Councils at the latter's nearest session.

The Government shall decide the decentralization of the authority to decide the use of the provisions in the central budget and the local budgets.

2. The Government and provincial People's Committees shall be entitled to establish the financial reserve fund from sources such as revenue increases, budget closing balance, and other financial sources as stipulated by laws. The financial reserve fund shall be used to meet spending needs when the revenues have not been collected in time, and such spending must be reimbursed immediately within the budget year. Where provisions in the budget have been used up, the financial reserve fund shall be used for spending in accordance with the Government's regulations and shall in no case exceed 30% of the fund's closing balance.

The maximum limit the financial reserve fund at each level shall be stipulated by the Government.

Annex 5. Government Support for Social Protection Beneficiaries

DECREE No. 67/2007/ND-CP OF APRIL 13, 2007, ON SUPPORT POLICIES FOR SOCIAL PROTECTION BENEFICIARIES

THE GOVERNMENT

DECREES:

Chapter I - GENERAL PROVISIONS

Article 1.- This Decree provides for support policies and regimes for disadvantaged persons, referred to as social protection beneficiaries.

Article 2.- Allowance and support regimes for social protection beneficiaries shall be implemented in a fair, open, transparent and prompt manner to proper beneficiaries for proper purposes. Allowances and supports shall be granted mainly in families and communities where social protection beneficiaries reside. Allowance and support levels are subject to change depending on the people's minimum living standards.

Article 3.- The State encourages and creates conditions for political, socio-political, economic, socio-political and professional, social, and socio-professional organizations; Vietnamese individuals; foreign organizations and individuals; and overseas Vietnamese to voluntarily assist social protection beneficiaries.

Chapter II - SOCIAL PROTECTION BENEFICIARIES

Chapter III - REGULAR SUPPORTS

Chapter IV - EXTRAORDINARY SUPPORT REGIME

Article 12.- The lowest extraordinary support level for beneficiaries specified in Article 6 of this Decree are as follows:

1. For households:

a/ Having dead or missing person (s): VND 3,000,000 per person;

b/ Having seriously injured person (s): VND 1,000,000 per person;

c/ Having their houses fallen, collapsed, drifted, burnt or seriously destroyed: VND 5,000,000 per household;

d/ Subject to urgent relocation due to landslide or inundation risks: VND 5,000,000 per household.

2. Individuals:

a/ Food allowance: 15 kg of rice per person per month for between one and three months;

b/ Persons who are seriously injured due to incidents occurring outside their residential places, which is unknown to their families: VND 1,000,000 per person;

c/ Collected beggars awaiting to be sent back to their residential places: VND 10,000 per person per day, but for no more than 30 days. In special cases where extension is required, the allowance granting period must not exceed three months and the allowance level is equal to the monthly food allowance level at social protection establishments.

3. Persons dying in incidents occurring outside their residential places, which is unknown to their families and whose burial is arranged by commune-level People's Committees, hospitals, agencies or units, these agencies or units are entitled to burial cost support of VND 2,000,000 at least.

Article 13.- Households whose main laborer (s) is (are) dead or missing; households losing production equipment; households whose houses are fallen, collapsed, drifted, burnt or seriously destroyed, thereby suffering hunger due to food shortage, apart from the allowances specified in Article 12 of this Decree, may be considered and granted the following supports till they escape from poverty:

1. Exemption or reduction of school fees for persons who are following general education or vocational training.

2. Health insurance cards or free medical examination and treatment at public health establishments.

3. Preferential loans for production development.

Article 14.- For the cases specified at Item d, Clause 1 of Article 6, presidents of provincial/municipal People's Committees shall decide on specific allowance levels suitable to local resource mobilization capacity and realities. The State encourages localities to adopt allowance and support levels higher than the lowest levels set in Article 12 of this Decree.

Chapter V- FUNDS FOR IMPLEMENTATION

Article 15. and Article 16.- Funds for regular supports

Article 17.- **Funds for extraordinary support include:**

1. Local budget balanced by localities.

2. Donations given by domestic and foreign organizations and individuals to localities directly or via the Government or social organizations.

3. When the above sources of funds are insufficient for providing extraordinary supports, presidents of provincial/municipal People's Committees shall report to the Ministry of Labor, War Invalids and Social Affairs and the Ministry of Finance which shall sum up local proposals and submit them to the Prime Minister for consideration and decision on central budget allocations.

Article 18.- Estimation, allocation, payment and settlement of funds for implementation of social support policies must comply with the Law on State Budget and guiding documents.

Chapter VI - ORGANIZATION OF IMPLEMENTATION

Chapter VII - COMMENDATION, AND HANDLING OF VIOLATIONS

Chapter VIII - IMPLEMENTATION PROVISIONS

On behalf of the Government
Prime Minister

NGUYEN TAN DUNG

Annex 6. General Statistics of Vietnam

Table A.6.1. Vietnam: Gross Domestic Product in VND and USD, 1990 to 2008

Year	Growth of GDP (%)	GDP (billion of VND, current price)	GDP per capital (thousand of VND per capital, current price)	GDP per capita (USD)	Exchange rate (Annual average)	GDP (USD billion)
1990	5.1	41,955	636	98	6,485	6.5
1991	5.8	76,707	1,141	119	9,586	8.0
1992	8.7	110,532	1,615	145	11,136	9.9
1993	8.1	140,258	2,014	190	10,600	13.2
1994	8.8	178,534	2,521	228	11,056	16.1
1995	9.5	228,892	3,179	289	11,001	20.8
1996	9.3	272,036	3,719	337	11,034	24.7
1997	8.2	313,623	4,221	364	11,595	27.0
1998	5.8	361,017	4,784	361	13,253	27.2
1999	4.8	399,942	5,221	375	13,924	28.7
2000	6.8	441,646	5,689	402	14,151	31.2
2001	6.9	481,295	6,117	415	14,739	32.7
2002	7.1	535,762	6,724	440	15,282	35.1
2003	7.3	613,443	7,583	492	15,413	39.8
2004	7.8	715,307	8,720	553	15,769	45.4
2005	8.4	839,211	10,098	639	15,803	53.1
2006	8.2	974,266	11,580	723	16,017	60.8
2007	8.5	1,144,015	13,435	835	16,090	71.1
2008	6.7	1,477,700			16,468	89.7

Source: General Statistics Office (GSO), Vietnam

Table A.6.2. Government Revenue of Vietnam 2005-2008 (US$ Billion)

Item	2005	2006	2007	2008
GDP (billion USD, current price)	**53.1**	**60.8**	**71.1**	**89.7**
Growth	8.4%	8.2%	8.5%	6.2%
Total Government Revenue in % of GDP	27.2%	28.7%	28.7%	28.2%
Government Revenue Excluding Revenue from oil and grants in % of GDP	18.8%	19.3%	21.3%	21.7%
Tax Revenue in % of GDP	9.6%	10.4%	10.9%	11.7%
Total Government Revenue in billion USD	**14.4**	**17.4**	**20.4**	**25.3**
Interior Government Revenue in USD, excluding Revenue from oil	7.6	9.1	11.4	14.0
Revenue from export/import tax, excluding oil	2.4	2.7	3.7	5.5
Revenue from Oil	4.2	5.2	4.9	5.4
Grant	0.2	0.5	0.4	0.4

Source: MOF

Table A.6.3. Vietnam: State Budgeted Expenditure 2005 to 2008 (US$ Billion)

		2005	2006	2007	2008
1.	Capital expenditures	5.0	5.5	6.5	8.3
2.	Repayment of debt and provision of aids	2.6	3.0	3.6	3.1
3.	Recurrent expenditures	8.4	10.1	12.7	15.7
	Total of three main budget line (1,2,3)	**15.9**	**18.6**	**22.8**	**27.1**
4.	Other expenditures	3.9	5.4	6.4	3.0
	Total of budget expenditures (upper-line)	**19.8**	**24.1**	**29.2**	**30.0**
	upper-line in % of GDP	37.4%	39.6%	41.0%	33.5%
5.	Under-line of budget expenditures (under-line)	2.5	2.0	3.4	3.7
	Total of expenditures (under and upper line)	**22.4**	**26.1**	**32.6**	**33.7**
	under-line in % of GDP	42.1%	42.9%	45.8%	37.6%

Source: MOF

Table A.6.4. Vietnam: Actual Government Revenue & Expenditure 1991 to 2008 (US$ Billion)

Year	Growth of GDP (%)	GDP	GDP per capital (USD)	Total Governmen t Revenues	Total Government Revenues (% GDP)	Total Expenditures	Total Expenditures (%GDP)	Surplus/ Deficit (%GDP)
1991	5.8	8.0	119	1.1	13.5%	1.3	15.9%	-2.4%
1992	8.7	9.9	145	1.9	19.0%	2.2	22.0%	-3.0%
1993	8.1	13.2	190	3.0	23.0%	3.9	29.3%	-6.4%
1994	8.8	16.1	228	3.7	23.2%	4.5	27.9%	-4.7%
1995	9.5	20.8	289	4.9	23.3%	5.7	27.4%	-4.1%
1996	9.3	24.7	337	5.7	22.9%	6.4	25.8%	-2.8%
1997	8.2	27.0	364	5.6	20.8%	6.7	24.9%	-4.1%
1998	5.8	27.2	361	5.3	19.6%	6.1	22.5%	-2.9%
1999	4.8	28.7	375	5.6	19.6%	6.9	24.0%	-4.3%
2000	6.8	31.2	402	6.4	20.5%	7.7	24.6%	-4.1%
2001	6.9	32.7	415	7.0	21.4%	8.7	26.6%	-5.2%
2002	7.1	35.1	440	8.1	23.1%	9.7	27.8%	-4.6%
2003	7.3	39.8	492	9.9	24.8%	12.8	32.2%	-7.4%
2004	7.8	45.4	553	12.1	26.7%	15.8	34.8%	-8.1%
2005	8.4	53.1	639	14.4	27.2%	19.8	37.4%	-10.2%
2006	8.2	60.8	723	17.4	28.7%	24.1	39.6%	-10.9%
2007	8.5	71.1	835	20.4	28.7%	29.2	41.0%	-12.3%
2008	6.2	89.7	1,041	25.3	28.2%	30.0	33.5%	-5.3%

Source: MOF

Annex 7. World Bank 2005 Natural Disaster Financial Resource Gap Analysis

The World Bank 2005 Project Appraisal Document for a Natural Disaster Risk Management Project in Vietnam conducted an analysis for the years 2000, 2002 and 2003 of actual post-disaster expenditure from all sources including central and provincial contingency budgets, national government Financial Reserve Fund and budget surpluses and also local donations and funding from international aid donors. Key features of the project and findings of the natural disasters financial resource gap analysis are summarized in Box A.7.1.

The 2005 study identified an overall funding gap for all natural disaster relief and reconstruction requirements of between US$130 million in 2000 which was a severe year for typhoon and flood losses and US$ 46 million in 2001 which was a low loss year[32] (See Table A.7.1. for details). The financial resource gap was defined as the difference between the CCFSC reported total annual value of storm and flood damage and the total actual expenditure by central and provincial governments, and through local donations and international aid donors. Key features of the 2000 to 2003 analysis include:

(a) The state contingency budget in 2003 was VND 1,600 billion (US$ 113 million) divided 40%:60% between central and local government. In 2008, the contingency budget has been increased to US$ 650 million and the central government's share has increased to 55%.

(b) Over the 3 years central government allocated an average of only 19% of the contingency budget to post-disaster relief, recovery and reconstruction expenditure, and local government allocated an even lower average of 16% of their contingency budget to post-disaster financing.

(c) During this period the major source of finance for post-disaster response was through the National Financial Reserves and surplus income in the budget and on average 46% of actual expenditure came from these 2 funding sources between 2000 to 2003. It is noted that between 2005 and 2008 Vietnam has incurred budget expenditure deficits of greater than 10% of GDP and it is understood that the National Financial Reserve Fund and budget surplus can no longer contribute significantly to the financing of post-disaster response.

(d) Over the 3-year period, total expenditure from all source on post-disaster recovery averaged NVD 1,295 billion of which central government contributed 60% of funding, local government 20% of funding and other sources including local donors and international aid donors contributed 20% of the funding.

(e) Over the 3-year period, total actual expenditure on disaster response averaged only 45% of the total assessed damage advised by the provinces. The corresponding difference

[32] At the time of preparation of the 2005 report the 2000 total damage was advised by DMC (MARD) as VND 3,911. However, in 2009, the CCFSC website reports total 2000 damage as VND 5,098 billion thereby increasing the post-disaster financing gap from US$ 130 million (rounded up from US$ 128 million) to US$ 220 million.

between actual expenditure and total estimated damage equates to the financing gap established by the World Bank in 2005.

The World Bank's 2005 financial resource gap analysis noted that it was not possible to quantify the breakdown of post-disaster actual expenditure into short-term emergency relief and recovery spending and medium term reconstruction expenditure because this data was not available from GoV. Similarly the DMC was unable to provide a breakdown of the assessed damage data by category (sub-sector) because some provinces only reported total losses to the DMC.

The study noted, however, that GoV's priority was to finance post disaster humanitarian needs including payments for loss of life and for temporary repairs to rural housing and also to finance early recovery of agricultural production through provision of seeds and fertilizers and replacement livestock. The study concluded that GoV would always meet short-term emergency relief and early recovery needs, and that any financing gap was likely to have particularly detrimental implications for the availability of funds for reconstruction of public infrastructure.

Box A.7.1. Vietnam: Natural Disaster Risk Management Project (US$86 million)

Project Objectives
The project development objective is the establishment and implementation of a comprehensive natural disaster risk management framework for natural disaster prevention, preparedness, mitigation and recovery. This objective is achieved by: (a) reducing vulnerability to flood and storm hazards in project areas; (b) increasing the efficiency o f post-disaster recovery and reconstruction efforts; and (c) strengthening the capacity o f national and local disaster risk management institutions.

The Project has four proposed components:
Component 1: Prevention and Mitigation Investment; Component 2: Community-based Disaster Risk Management; Component 3: Post-Disaster Reconstruction Support (US$20 million); Component 4: Project Management and Institutional Strengthening.

Quote from the Project Appraisal Document (PAD) on Natural Disasters Financing Gap for Reconstruction.
According t o Article 9(1) of the Government's 2002 Law on State Budget, 2-5 percent o f the central budget and o f local budgets at various levels should be allocated to a contingency budget "to meet contingent spending on preventing, combating, and overcoming consequences o f the acts of God and fires, important tasks o f national defense and security". In practice, Contingency Budgets have been set near the minimum statutory requirement of 2 percent in recent years reflecting heavy demands on public resources, and have been inadequate in meeting costs of disasters even in years of lower losses. **The overall annual funding gap for all disaster relief and reconstruction requirements ranged between an estimated US$46 million and US$130 million over the period 2000 to 2003**. Priority in the allocation o f available resources is awarded to humanitarian relief, related social welfare support, and temporary repairs while, because of funding shortfalls, reconstruction activities can take up to four or five years to complete. Delays in reconstruction can have significant impacts on the local economy and livelihoods in the affected community, as w e l l as on the provision o f education, health care and other services. The Contingency Budgets have also been used for extreme events such as the control of the 2004and 2005 Highly Pathogenic Avian Influenza (HPAI) epidemics.

Component 3 has two objectives: (a) To help address the ***recurrent financing gap,*** ensuring more rapid post-disaster reconstruction and limiting poverty-exacerbating and economic growth-dampening impacts of disasters; and (ii) to strengthen government speed and efficiency in the allocation and disbursement of post-disaster resources and enhance effectiveness of use.

It could also lever additional funds from other donors in response to disasters and improve coordination, harmonization and overall efficiency in the use of combined Government and aid resources by encouraging channeling of all post-disaster assistance through government channels.

Component 3 entails the provision of funding for ***post-disaster reconstruction of eligible public infrastructure***, helping to address a ***recurrent annual financing gap in the availability of funds***. The component will operate to the extent possible in accordance with existing government procedures for allocation and disbursement of its State Contingency Budget. The Government will determine allocations and use of Bank funding based on information contained in post-disaster damage assessment reports and related requests for assistance and on eligibility criteria as specified in the Operations Manual. Specifically, Component 3 would finance the following activities: (a) public infrastructure reconstruction; and (b) institutional strengthening.

Reconstruction activities. The component would finance post-disaster reconstruction of public infrastructure, including schools, health facilities, roads, bridges, water and sewerage infrastructure, pumping stations, canals and dykes, at any level o f government and across the country. Reconstruction activities would: (i) incorporate appropriate hazard-proofing features but no other major upgrades or enlargements; (ii) comply with Bank safeguard requirements; and (iii) be completed within a period of 12 months (including procurement) from the date of release of funds to the relevant provinces or line ministries.

Source: World Bank 2005b

Table A.7.1. Vietnam: Estimated Financial Resource Gap for Post-Disaster Response 2000, 2002 and 2003

Item	2000		2002		2003		3-year average	
Allocation to State Contingency budget	1,600		2,700		3,100		2,467	
Central Contingency Budget	640	40%	1,200	44%	1,300	42%	1,047	42%
Local Contingency Budget	960	60%	1,500	56%	1,800	58%	1,420	58%
Actual Expenditure on Natural Disasters		% of expenditure		% of expenditure		% of expenditure		Avge % of expenditure
Central Contingency budget	102	5%	228	23%	267	30%	199	15%
Other central government sources	1,050	53%					599	46%
National Financial Reserves			419	42%	240	27%		
Surplus income in national budget			62	6%	25	3%		
Provincial/District/Commune Contingency budgets *	40	2%	285	29%	370	41%	232	18%
Local Donations	109	5%					36	3%
Other sources (according to MOLISA)	495	25%					165	13%
International Assistance	197	10%					66	5%
Total Actual Expenditure on natural disasters	**1,991**	**100%**	**994**	**100%**	**901**	**100%**	**1,295**	100%
Reported Value of Losses from Natural Disasters**	**5,098**		**1,958**		**1,589**		**2,882**	
Actual expenditure as a % of total reported losses	39%		51%		57%		45%	
Financing Gap (billion VND)**	**3,107**		**964**		**688**		**1,586**	
Financing Gap (US$ million)***	**220**		**63**		**45**		**109**	

Source: World Bank 2005b based on original data from SBD(MoF), DMU (MARD.UNDP), DMC (MARD)

* World Bank 2005 assumption in 2002 and 2003 that the ratio of province, district and commune actual expenditure on disaster response relative to their total Contingency Budgets is equal to the equivalent ratio for central government

** 2000 total losses reported by DMC(MARD) as VND 3,911 billion. However, CCFSC website reports 2000 losses as VND 5,098 billion which increases the 2000 financing Gap from VND 1,920 to VND 3,107 billion and from US$ 128 million to US$ 220 million.

*** The VND:US$ exchange rates used in the current report produce slightly lower US$ financial gap values for 2002 and 2003.

Annex 8. Analysis of Typhoon Xangsane 2006, Post-Disaster Recovery and Reconstruction Expenditure

Table 8.1. Analysis of Typhoon Xangsane 2006 Assessed Damage by Sub-Sector, Provincial Requests for Central Government Post-Disaster Finance and Actual Payments made by Government (VND Billion)

DAMAGE ASSESSMENT REPORT	Nghệ An	Hà Tĩnh	Quảng Bình	Quảng Trị	Thừa Thiên Huế	Đà Nẵng	Quảng Nam	Quảng Ngãi	Bình Định	Phú Yên	Kon Tum	Total	US$ Mio
Housing	4.2		5.5	28.7							4.7	43.1	2.7
Relevant Household				0.8	720.0	2,037.0		16.0				2,773.8	**173.2**
Emergency Relief (Humanitarian)	**4.2**	**0.0**	**5.5**	**29.4**	**720.0**	**2,037.0**	**0.0**	**16.0**	**0.0**	**0.0**	**4.7**	**2,816.8**	175.9
Productive (private sector)					385.0	1,980.0		18.0				2,383.0	148.8
Agriculture	26.8	30.8	9.0	114.5	790.0		30.0					1,001.0	62.5
Fisheries		8.0	8.9	4.7	255.0		22.0					298.6	18.6
Early Recovery (Agricultural Production)	**26.8**	**38.7**	**17.9**	**119.2**	**1,430.0**	**1,980.0**	**52.0**	**18.0**	**0.0**	**0.0**	**0.0**	**3,682.6**	**229.9**
Relevant public works						1,273.2		6.0				1,279.2	79.9
School		43.8	0.1		95.0		180.0					318.9	19.9
Hospital			0.3	0.8	55.0		35.0					91.1	5.7
Other public buildings				0.6	50.0							50.6	3.2
Irrigation	25.3	6.9	13.7	33.2	250.0							329.1	20.5
Transpor-tation	31.3	10.8	7.0	9.8	210.0		45.0				5.5	319.4	19.9
Communi-cation		0.3		0.5	100.0							100.9	6.3
Electricity		0.2	0.2	1.6			35.0					37.1	2.3
Clean water and Environment				7.3							5.1	12.4	0.8
Rehabilitation / Reconstruction	56.6	62.1	21.3	53.9	760.0	1,273.2	295.0	6.0	0.0	0.0	10.6	**2,538.7**	**158.5**
Total Damage	**87.6**	**100.8**	**44.7**	**195.2**	**2,910.0**	**5,290.2**	**347.0**	**40.0**	**1.1**	**0.0**	**10.2**	**9,026.7**	**563.6**
Percent Damage Distribution:													
Emergency Relief (Humanitarian)	**5%**	**0%**	**12%**	**15%**	**25%**	**39%**	**0%**	**40%**	**0%**		**46%**	**31%**	
Early Recovery (Agricultural Production)	**31%**	**38%**	**40%**	**61%**	**49%**	**37%**	**15%**	**45%**	**0%**		**0%**	**41%**	
Rehabilitation / Reconstruction	**65%**	**62%**	**48%**	**28%**	**26%**	**24%**	**85%**	**15%**	**0%**		**104%**	**28%**	
REQUEST TO PRIME MINISTER'S OFFICE FOR CENTRAL GOVERNMENT FINANCING	**Nghệ An**	**Hà Tĩnh**	**Quảng Bình**	**Quảng Trị**	**Thừa Thiên Huế**	**Đà Nẵng**	**Quảng Nam**	**Quảng Ngãi**	**Bình Định**	**Phú Yên**	**Kon Tum**	**Total**	
Emergency reliefs	10.0	6.0	2.0	1.0	130.0	200.0		12.0			5.0	366.0	22.9
Early Recovery	10.0	20.0	3.0	4.0	90.0	250.0	70.0				5.0	452.0	28.2
Re-construction		24.0	10.0	35.0	50.0	450.0	80.0	8.0			5.0	662.0	41.3
Total Funding Request by Province	**20.0**	**50.0**	**15.0**	**40.0**	**270.0**	**900.0**	**150.0**	**20.0**	**0.0**	**0.0**	**9.9**	**1,474.9**	**92.1**
Funding Request as % of total estimated Damage	23%	50%	34%	20%	9%	17%	43%	50%	0%		97%	16%	
ACTUAL CENTRAL GOVERNMENT PAYMENT	**Nghệ An**	**Hà Tĩnh**	**Quảng Bình**	**Quảng Trị**	**Thừa Thiên Huế**	**Đà Nẵng**	**Quảng Nam**	**Quảng Ngãi**	**Bình Định**	**Phú Yên**	**Kon Tum**	**Total**	
Funds paid by Central Govt	14.0	27.0	16.5	15.0	80.0	201.0	215.0	12.0	3.0	2.0	8.0	593.5	**37.1**
% to Requested Amount	70%	54%	110%	38%	30%	22%	143%	60%			81%	**40%**	
% of Total Estimated damages	16%	27%	37%	8%	3%	4%	62%	30%	286%		78%	**7%**	
Tons of rice	100	100	200	200	800	600	1000	100	0	0	100	3200	

Sources: CCFSC 2009, Provincial Damage Reports and Payment Requests Typhoon Xangsane

Annex 9. World Bank 2009 Analysis of Natural Disaster Financial Resource Gaps for Post-disaster Recovery and Reconstruction

This Annex presents the assumptions made and results of the World Bank's 2009 Financial Resource Gap analysis.

Government of Vietnam Contingency Budget for Natural Disasters

Table A.9.1. presents details in VND and US dollars of the actual Central and Local Contingency Budgets for the years 2000 to 2008. Under the State Budget Law 2002, central and local governments are committed to allocate between 2% and 5% of their annual expenditure budget to the contingency budgets and in turn to allocate a proportion of the contingency budget to ex-post disaster emergency relief, recovery and rehabilitation and reconstruction expenditure.

Table A.9.1. Vietnam: State Contingency Budget for Natural Disasters, 2000 to 2008

Year	VND Billion			US$ Million			%	%
	Central	Local	Total	Central	Local	Total	Central	Local
2000	640	960	1,600	45	68	113	40%	60%
2001	1,000	1,400	2,400	68	95	163	42%	58%
2002	1,200	1,500	2,700	79	98	177	44%	56%
2003	1,300	1,800	3,100	84	117	201	42%	58%
2004	2,885	2,000	4,885	183	127	310	59%	41%
2005	4,200	2,700	6,900	266	171	437	61%	39%
2006	7,450	3,800	11,250	465	237	702	66%	34%
2007	5,000	4,050	9,050	310	252	562	55%	45%
2008	5,680	5,020	10,700	345	305	650	53%	47%
Average	3,262	2,581	5,843	205	163	368	56%	44%

Source SBD (MoF)
Central = Central Government Contingency Budget
Local = Provincial, District and Commune Contingency Budgets

Assumptions made in World Bank Financial Resource Gap Analysis

Under this study an attempt has been made to distinguish clearly between a potential financial resource gap for government of Vietnam in:

(a) The immediate post-disaster or short-term recovery phase and
(b) The medium term reconstruction phase.

A series of assumptions were made in order to conduct this analysis and these assumptions are summarized in Box A.9.1. Chapter 3 of the Main Report provides full details of the assumptions made for the purposes of the financial resource gap analysis.

Box A.9.1. Assumption used in Natural Disaster Financial Resource Gap Analysis

1) **Sources of Funding for Natural Disaster Recovery and Reconstruction**

It is assumed that Emergency Relief is financed by local organisation and aid donors and that food aid is also provided by central government. Emergency relief does not enter the calculations of the Natural Disasters Financial Resource Gap Analysis.

It is assumed that 40% of Central Government Budget is actually spent on financing post-disaster recovery and reconstruction costs; that 20% of the local (provincial/district/commune) contingency budget is actually allocated to post disaster recovery and reconstruction, and finally that other government sources of post-disaster relief finance are made available by government equivalent to a further 10% of the state (central + local) contingency budget.

Source of Natural Disaster Financing	Expenditure as a % Contingency Budget
from Central Contingency budget	40%
from Local Contingency budget	20%
Other government resources (surplus income, national reserves, etc.) [Percent of State+local Contingency budget]	10%

It is also assumed that government, in the aftermath of a disaster, government can reallocate up to 1 percent of the planned investment expenditures of the fiscal year for the reconstruction of key lifeline infrastructure (e.g., hospitals, main bridges).

2) **Actual Government Expenditure on Post-Disaster Recovery and Reconstruction**

The analysis of CCFSC damage assessment reports suggests that on average 70% of the reported value of damage falls under short-term Recovery Expenditure and the remaining 30% of total estimated damage falls under Reconstruction expenditure for public assets.

It is assumed that actual expenditure on recovery is equivalent to 25% of total estimated damage and that the 30% reconstruction costs are financed in full.

CCFSC Damage Assessment Data	% of Total Estimated Value of Damage	Actual Natural Disaster Expenditure as % of Total Estimated Value of Damage
Recovery expenditure: (housing/agriculture + emergency repairs/reconstruction of infrastructure	**70%**	**25%**
Reconstruction Expenditure: (Public Assets including schools, hospitals, irrigation networks, transport, communications, power etc)	**30%**	**30%**
	100%	**55%**

Finally, it is assumed that Government expenditure is first used to finance Recovery costs and then any surplus is allocated to reconstruction costs.

Source: World Bank 2009

Table A.9.2. Natural Disaster Financial Resource Gap Analysis (VND Values)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
GDP (VND Billion)	441,646	481,295	535,762	613,443	715,307	839,211	974,266	1,144,015	1,477,700
Government Revenues	90,567	103,173	123,785	152,585	190,799	227,561	278,689	328,232	416,639
Government expenditures	108,963	128,229	148,237	197,281	249,143	312,896	386,000	469,823	494,038
Capital expenditures									
Recurrent expenditures									
State Contingency Budget	**1,600**	**2,400**	**2,700**	**3,100**	**4,885**	**6,900**	**11,250**	**9,050**	**10,700**
Central Contingency Budget	640	1,000	1,200	1,300	2,885	4,200	7,450	5,000	5,680
Local Contingency Budget	960	1,400	1,500	1,800	2,000	2,700	3,800	4,050	5,020
CB/GE	0	0	0	0	0	0	0	0	0
Government budget resources for Natural Disasters	**1,993**	**920**	**994**	**902**	**2,043**	**2,910**	**4,865**	**3,715**	**4,346**
Central Contingency Budget	102	400	228	267	1,154	1,680	2,980	2,000	2,272
Local Contingency Budget	40	280	285	370	400	540	760	810	1,004
Other govt. resources (surplus income, national reserves, etc.)	1,050	240	481	265	489	690	1,125	905	1,070
In-country Donations	604								
International Assistance	197								
Expenditure as % State Contingency Budget	125%	38%	37%	29%	42%	42%	43%	41%	41%
Reported natural disaster damage (CCFSC)	5,094	3,375	1,956	1,587	410	5,815	18,563	11,520	13,306
CCFSC Damage settled by Government:	**2,802**	**1,856**	**1,076**	**873**	**225**	**3,198**	**10,210**	**6,336**	**7,318**
Recovery costs	1,274	844	489	397	102	1,454	4,641	2,880	3,327
Costs of reconstruction of public assets	1,528	1,013	587	476	123	1,745	5,569	3,456	3,992
Government Recovery Funding Gap	**720**	**76**	**505**	**505**	**1,940**	**1,456**	**224**	**835**	**1,019**
Government Reconstruction Funding Gap	**-1,201**	**-628**	**-142**	**116**	**624**	**-806**	**-4,411**	**-2,047**	**-2,510**

Source: World Bank analysis of MOF and CCFSC data

Table A.9.3. Natural Disaster Financial Resource Gap Analysis (USD Values)

USD million	2000	2001	2002	2003	2004	2005	2006	2007	2008
Exchange rate	14,151	14,739	15,282	15,413	15,769	15,803	16,017	16,090	16,468
GDP	31,209	32,655	35,058	39,801	45,363	53,105	60,829	71,102	89,732
Government Revenues	6,400	7,000	8,100	9,900	12,100	14,400	17,400	20,400	25,300
Government expenditures	7,700	8,700	9,700	12,800	15,800	19,800	24,100	29,200	30,000
Capital expenditures									
Recurrent expenditures									
State Contingency Budget	113	163	177	201	310	437	702	562	650
Central Contingency Budget	45	68	79	84	183	266	465	311	345
Local Contingency Budget	68	95	98	117	127	171	237	252	305
CB/GE	1.47%	1.87%	1.82%	1.57%	1.96%	2.21%	2.91%	1.93%	2.17%
Estimated Government Budget Expenditures for Natural Disasters	141	62	65	59	130	184	304	231	264
Central Contingency Budget	7	27	15	17	73	106	186	124	138
Local Contingency Budget	3	19	19	24	25	34	47	50	61
Other gvt resources (surplus income, national reserves, etc.)	74	16	31	17	31	44	70	56	65
In-country Donations	43								
International Assistance	14								
Reported natural disaster damage (CCFSC)	360	229	128	103	26	368	1,159	716	808
CCFSC Damage settled by Government:									
Recovery costs	90	57	32	26	7	92	290	179	202
Costs of reconstruction of public assets	108	69	38	31	8	110	348	215	242
Short term post-disaster capital expenditures reallocation	23	26	29	38	47	59	72	88	90
Government Recovery Funding Gap	**51**	**5**	**33**	**33**	**123**	**92**	**14**	**52**	**62**
Government Reconstruction Funding Gap	**(85)**	**(43)**	**(9)**	**8**	**40**	**(51)**	**(275)**	**(127)**	**(152)**

Source: World Bank analysis of MOF and CCFSC data

Table A.9.4. Natural Disaster Financial Resource Gap Analysis (% of GDP)

	2000	2001	2002	2003	2004	2005	2006	2007	2008
GDP (VND Billion)	441,646	481,295	535,762	613,443	715,307	839,211	974,266	1,144,015	1477700
Government Revenues	20.51%	21.44%	23.10%	24.87%	26.67%	27.12%	28.61%	28.69%	28.20%
Government expenditures	24.67%	26.64%	27.67%	32.16%	34.83%	37.28%	39.62%	41.07%	33.43%
Capital expenditures									
Recurrent expenditures									
State Contingency Budget	0.36%	0.50%	0.50%	0.51%	0.68%	0.82%	1.15%	0.79%	0.72%
Central Contingency Budget	0.14%	0.21%	0.22%	0.21%	0.40%	0.50%	0.76%	0.44%	0.38%
Local Contingency Budget	0.22%	0.29%	0.28%	0.29%	0.28%	0.32%	0.39%	0.35%	0.34%
CB/GE	1.47%	1.87%	1.82%	1.57%	1.96%	2.21%	2.91%	1.93%	2.17%
Government Budget Expenditures on Natural Disasters	0.45%	0.19%	0.19%	0.15%	0.29%	0.35%	0.50%	0.32%	0.29%
Central Contingency Budget	0.02%	0.08%	0.04%	0.04%	0.16%	0.20%	0.31%	0.17%	0.15%
Local Contingency Budget	0.01%	0.06%	0.05%	0.06%	0.06%	0.06%	0.08%	0.07%	0.07%
Other gvt resources (surplus income, national reserves, e	0.24%	0.05%	0.09%	0.04%	0.07%	0.08%	0.12%	0.08%	0.07%
In-country Donations	0.14%								
International Assistance	0.04%								
Reported natural disaster damage (CCFSC)	1.15%	0.70%	0.37%	0.26%	0.06%	0.69%	1.91%	1.01%	0.90%
CCFSC Damage settled by Government:									
Recovery costs	0.29%	0.18%	0.09%	0.06%	0.01%	0.17%	0.48%	0.25%	0.23%
Costs of reconstruction of public assets	0.35%	0.21%	0.11%	0.08%	0.02%	0.21%	0.57%	0.30%	0.27%
Government Recovery Funding Gap	**0.16%**	**0.02%**	**0.09%**	**0.08%**	**0.27%**	**0.17%**	**0.02%**	**0.07%**	**0.07%**
Government Reconstruction Funding Gap	**-0.27%**	**-0.13%**	**-0.03%**	**0.02%**	**0.09%**	**-0.10%**	**-0.45%**	**-0.18%**	**-0.17%**
Short term post-disaster capital expenditures reallocation	0.07%	0.08%	0.08%	0.10%	0.10%	0.11%	0.12%	0.12%	0.10%

Table A.9.5. Natural Disaster Financial Resource Gap Analysis in 2008 Constant GDP Values – Actual and As If PML Analysis

VND billion	2000	2001	2002	2003	2004	2005	2006	2007	2008		AEL	PML(10 yrs)	PML(25 yrs)	PML(50 yrs)	PML(100 yrs)	PML(150 yrs)	PML(250yrs)
Government Budget Resources on Natural Disasters	6,669	2,825	2,742	2,173	4,219	5,124	7,379	4,799	4,346		4,346	4,346	4,346	4,346	4,346	4,346	4,346
Reported natural disaster damage (CCFSC)	17,045	10,363	5,395	3,824	847	10,240	28,155	14,881	13,306		16,255	33,248	44,479	53,197	60,586	65,019	70,930
Recovery costs	4,261	2,591	1,349	956	212	2,560	7,039	3,720	3,327		4,064	8,312	11,120	13,299	15,146	16,255	17,732
Costs of reconstruction of public assets	5,114	3,109	1,619	1,147	254	3,072	8,447	4,464	3,992		4,876	9,974	13,344	15,959	18,176	19,506	21,279
Government Recovery Funding Gap/Surplus	**2,408**	**234**	**1,393**	**1,217**	**4,008**	**2,564**	**340**	**1,078**	**1,019**		**282**	**(3,966)**	**(6,774)**	**(8,953)**	**(10,800)**	**(11,909)**	**(13,386)**
Government Reconstruction Funding Gap/Surplus	**(4,020)**	**(1,928)**	**(392)**	**278**	**1,290**	**(1,419)**	**(6,690)**	**(2,644)**	**(2,510)**		**(3,394)**	**(8,492)**	**(11,862)**	**(14,477)**	**(16,694)**	**(18,024)**	**(19,797)**
Short term post-disaster capital investment reallocation	**1,094**	**1,181**	**1,227**	**1,426**	**1,544**	**1,653**	**1,756**	**1,821**	**1,482**		**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**	**1,482**
											2008 GDP						
US$ million	2000	2001	2002	2003	2004	2005	2006	2007	2008		AEL	PML(10 yrs)	PML(25 yrs)	PML(50 yrs)	PML(100 yrs)	PML(150 yrs)	PML(250yrs)
Government Budget Expenditures on Natural Disasters	404.97	171.52	166.48	131.94	256.22	311.15	448.08	291.39	263.91		263.91	263.91	263.91	263.91	263.91	263.91	263.91
Reported natural disaster damage (CCFSC)	1,035.06	629.27	327.62	232.21	51.43	621.81	1,709.71	903.61	808.00		987.05	2,018.97	2,700.93	3,230.35	3,679.01	3,948.21	4,307.13
CCFSC Damage settled by Government:																	
Recovery costs	258.76	157.32	81.90	58.05	12.86	155.45	427.43	225.90	202.00		246.76	504.74	675.23	807.59	919.75	987.05	1,076.78
Costs of reconstruction of public assets	310.52	188.78	98.29	69.66	15.43	186.54	512.91	271.08	242.40		296.12	605.69	810.28	969.11	1,103.70	1,184.46	1,292.14
Government Recovery Funding Gap	**146**	**14**	**85**	**74**	**243**	**156**	**21**	**65**	**62**		**17**	**(241)**	**(411)**	**(544)**	**(656)**	**(723)**	**(813)**
Government Reconstruction Funding Gap	**(244)**	**(117)**	**(24)**	**17**	**78**	**(86)**	**(406)**	**(161)**	**(152)**		**(206)**	**(516)**	**(720)**	**(879)**	**(1,014)**	**(1,094)**	**(1,202)**
Short term post-disaster capital expenditures reallocation	100.37	106.65	110.55	90.00	-	90.00	90.00	90.00	90.00		90.00	90.00	90.00	90.00	90.00	90.00	90.00

Annex 10. Vietnam Non-Life Insurance Market Premium 2008 (VND Million)

Company	Health PA	Cargo	Aviation	Motor	PAR	BI	Hull and PI	Public liability	Agri	Financial risks	P&C	Total VNDm	Total US$m	Claims Ratio
ACE*	490	520			2,115	203		5,735			6,444	15,507	0.9	1.2%
AIG*	44,181	13,327	0	669						21,056	14,004	93,237	5.6	19.1%
Bao long	19,142	99,019		90,544	11,494		5,340	5,543			34,350	265,432	16.0	41.5%
Bao minh	325,421	133,713	167,763	561,919	242,811	307	210,929	36,407	4	1,277	446,689	2,127,240	128.3	44.7%
Bao ngan	1,083	3,802		3,777		389	100	872			9,040	19,063	1.1	40.5%
ABIC	2,922	16,500		38,893	9,360	308	14,094	1,699			55,897	139,673	8.4	20.2%
Bao tin	1,063	1,910		2,672	1,211	40	44	516	2		2,170	9,628	0.6	3.8%
Bao viet	782,653	267,183	308,922	960,463	270,166	8,622	403,854	52,456	1,658		527,243	3,583,220	216.2	44.5%
BIC	15,351	17,686		72,670	24,707	1,292	23,149	1,162			131,944	287,961	17.4	25.0%
AAA	49,149	792	7,361	104,403	10,100		7,086	1,331			30,733	210,955	12.7	28.2%
UIC*	15,293	42,300		4,719	71,556	3,672	3,059	5,101		72	97,725	243,497	14.7	12.1%
FUBON*	91	14			334						334	773	0.0	0.0%
Groupama*	464				1,998	108		887	19		2,390	5,866	0.4	7.7%
Aviation	873	17,965	46,627	3,854	877		85	122		659	2,085	73,147	4.4	0.4%
Hung Vuong	102	353		945	1,190			75			5,334	7,999	0.5	0.5%
LIBERTY*	19,053	455		19,685	1,413			372			3,358	44,336	2.7	14.1%
MIC	9,181	13,375		64,210	9,036	2,886	11,156	666		4,812	36,899	152,221	9.2	11.5%
PJICO	101,452	137,444		506,858	113,681		118,207	11,816			185,011	1,174,469	70.8	34.0%
PTI	24,604	30,137		139,648	13,101		7,145				241,840	456,475	27.5	32.7%
PVI	97,901	89,946		402,229	124,947	412	407,784	31,943			982,316	2,137,478	128.9	41.0%
QBE*	2,304	1,290		957	5,667	2,473	23	14,702			13,437	40,853	2.5	8.4%
Samsung Vina*	11,344	10,129		2,497	6,140			1,497		656	61,475	93,738	5.7	16.1%
SHB												0		#DIV/0!
Global	13,367	9,236	38,675	52,897	8,149	26	38,250	1,750			32,012	194,362	11.7	18.8%
VIA*	19,806	46,574		35,027	36,895	3,940	3,722	6,928			52,792	205,684	12.4	19.2%
VASS	40,398	19,145		113,272	11,348		12,262	4,103			29,769	230,297	13.9	41.5%
Total	**1,597,688**	**972,815**	**569,348**	**3,182,808**	**978,296**	**24,678**	**1,266,289**	**185,683**	**1,683**	**28,532**	**3,005,291**	**11,813,111**	**712.6**	**38.2%**

* Foreign companies – 100% foreign owned and joint ventures between a domestic and a foreign company.

Source: Association of Vietnamese Insurers, Statistical Data, Q4/2008.

BI Business Interruption
PL Public Liability
P&C Property & Casualty, in this statistics, including Electronic Equipment, Machinery, Oil and Gas, Construction/Erection All Risks and Miscellaneous.
PA Property All Risks, including compulsory Fire and Explosion Insurance