Weathering the Storm: Options for Disaster Risk Financing in Vietnam

June 2010

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Global Facility for Disaster Reduction and Recovery

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ACRONYMS AND ABBREVIATIONS

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	Vietnamese Dong

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EXECUTIVE SUMMARY

Vietnam is one of the world's most exposed countries to multiple natural disasters, including tropical cyclones (typhoons), tornados, landslides and droughts. An estimated 59 percent of its total land area and 71 percent of its population are prone to cyclones and floods.

The human and economic impacts of natural disasters are significant and could increase further in the future due to climate change. Over the past 20 years, natural disasters have resulted in the loss of over 13,000 lives and annual damage equivalent to an average 1 percent of GDP, including to residential housing and public-sector property, agriculture, and infrastructure. 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 (World Bank 2005a).

The GoV has developed a strategy and institutional framework to strengthen Vietnam's resilience to disasters. Strengthening disaster management remains a priority for the GoV. 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 management measures.

In this context, the Ministry of Finance of GoV 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 disaster risk financing and to identify financial options which are affordable and effective to the GoV, including both sovereign risk financing and private insurance instruments. The study builds on four principal 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 cost of disaster-related damage to private and public assets in Vietnam.
- *Review of Government's budgetary process for financing natural disasters,* including sources of funding and changes in funding levels over the past decade.
- *Dynamic Government funding gap analysis* to assess the impact of natural disasters on the Government's fiscal balance and to identify potential funding gaps during the post-disaster phases.
- *Options for sovereign financial protection against natural disasters,* drawing on relevant international experience. Options presented for GoV's consideration include a combination of ex ante and post-disaster financial and insurance instruments. They also include the promotion of private residential catastrophe property insurance and agricultural insurance.

The study draws heavily on international experience. It 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 (for instance, in Mexico and the Caribbean island states) and in setting up property catastrophe risk insurance programs (for instance, in Turkey and Romania). This experience is tailored to the social and economic characteristics of Vietnam.

FINANCIAL RISK ASSESSMENT

Between 1989 and 2008, the CCFSC reported total natural disaster losses in Vietnam of VND 91 trillion (US$ 6.4 billion) in nominal terms or an annual average of VND 4,547 billion (US$ 332 million), equivalent to 1 percent of GDP.[1] The estimated damage of natural disasters was much higher in the final three years of the analysis, peaking at VND 18.6 trillion (US$ 1.2 billion) in 2006.

These figures may under-estimate the true cost of natural disasters in Vietnam. The Government has formally conducted post-disaster damage assessments to measure physical and financial losses to human life, property, infrastructure, production and industry for over 25 years. However, there are a number of issues with the data collected, including that they focus largely on direct damage and ignore indirect and secondary losses; that direct losses to private sector property, commercial businesses and industry may be underreported; that estimates of damage may not be entirely accurate; that there is often no breakdown of damage in value terms by sector; that data on losses in monetary terms is not available at all for a relatively high percentage of events; and that the assessments do not cover drought or frost. The assessment procedure was upgraded in 2006 with the introduction of the Damage Assessment and Needs Assessment (DANA) system but the new system is only now being pilot tested.

Even higher disaster losses could be experienced in the future due to an increase in the concentration of assets at risk and, possibly, an increase in the frequency and/or intensity of major hazard events linked to climate change. Preliminary catastrophe risk simulation analysis based on a statistical analysis of historical data indicates that once every 100 years, Vietnam may expect damage in excess of US$ 3.8 billion or 4.1 percent of current 2008 GDP.

GOVERNMENT BUDGETARY PROCESS FOR FINANCING NATURAL DISASTERS

Post-disaster relief and recovery expenditures are mainly funded out of central and local contingency budgets in Vietnam, while public reconstruction expenditure is primarily funded through the capital expenditure budget in future years. 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 budgets 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"[2]. Between 2006 and 2008, the combined central and local government contingency budgets amounted to between 2.5 percent (in 2007) and 3.8 percent of total budgeted annual

[1] For each of the 20 years, 1989 to 2008, the CCFSC reported value of natural disaster losses were calculated as a percentage of annual GDP. The average is 1 percent of GDP per annum over the last 20 years, ranging from 0.1 percent of GDP in 2004 to a high of 2.9 percent of GDP in 1996.

[2] 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.

expenditures. It is estimated that, on average, about 40 percent of the central contingency budget and 20 percent of the local contingency budget are available to finance post-disaster recovery activities.

DYNAMIC GOVERNMENT FUNDING GAP ANALYSIS

No short-term recovery funding gap was identified in Vietnam for the period 2000-2008. The short term fiscal resources available from central and local contingency budgets and from other public resources are estimated to be adequate to meet the government's contingent liability for short-term natural disaster recovery needs. The analysis shows that even in the very severe loss years of 2006 to 2008, government finances have been adequate to cover recovery costs.

However, reconstruction funding gaps were identified in some years. In particular, major deficits in public resources available to meet government contingent liability reconstruction costs were observed for the period 2006 to 2008. These gaps were estimated at 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. Moreover, it is likely that these gaps are under-estimated because they are based on CCFSC damage data, which may undervalue the full reconstruction costs of many public and private buildings and infrastructure.

Future recovery funding gaps could be more significant. The as-if analysis conducted for the purpose of this study indicates that there is likely to be adequate government funding to cover the expected recovery costs in most years. However for major loss years occurring once every ten years or less frequently, there is likely to be a government recovery funding gap. The preliminary PML analysis shows that, once every 10 years, the total cost of damage could be in the order of VND 33,000 billion in real (2008) terms. With related recovery costs estimated at VND 8,300 billion (US$505 million), there would be a government recovery funding gap of around 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.

There is likely to be an annual average reconstruction funding gap in future years. The as-if analysis indicates that, in an average year, the GoV can expect to face reconstruction costs of around VND 4,900 billion (US$296 million) in real (2008) terms, of which only around VND 1,500 billion could be financed through the short-term reallocation of capital expenditure. The 1-in 10-year government reconstruction funding gap is estimated at about VND 8,500 billion (US$ 516 million). This funding gap would rise to about VND14,500 billion (US$ 880 million) for a major natural disaster loss year occurring once every in 50 years for less frequently.

OPTIONS FOR SOVEREIGN FINANCIAL PROTECTION AGAINST NATURAL DISASTERS

A cost-effective disaster risk financing strategy should be developed for Vietnam, relying on an optimal combination of financial instruments including, but not limited to, contingency budgets. Contingency budgets give the GoV some flexibility in financing post-disaster recovery needs, but this source of financing is likely to be insufficient for major disaster events.

Major disaster losses should be layered and financed through a combination of financial instruments to cover sovereign risk including contingency budgets, national disaster (multi-year) reserves, contingent credit and risk transfer instruments (including insurance):

- *The GoV 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, the GoV could allocate a fixed percentage of its contingency budget for post-disaster recovery expenditures.
- *The GoV could also build up (multi-year) reserves dedicated to natural disasters from an annual budget allocation into the existing 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 arrangement.* Should the contingency budgets and/or the national reserves be insufficient to cover the recovery needs in the aftermath of a disaster, the GoV could access additional financial resources through a contingent credit arrangement, for instance via the World Bank's Development Policy Loan (DPL) with a Catastrophe Risk Deferred Drawdown Option (CAT DDO).
- *Sovereign parametric disaster insurance could be further explored* to provide protection against the fiscal impact of major events occurring every ten years or less frequently. This would provide the Government with incremental budget support in case of major disasters.
- *The GoV could set up a dedicated reserve fund 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 GoV's role in encouraging the development of private disaster insurance should also be considered in the medium term. The development of private insurance markets could contribute to transferring disaster risks from the households and farmers to the private sector, thus ultimately reducing the government's contingent liability.

- The GoV could promote the development of the local property catastrophe insurance market, particularly for private urban dwellings of middle- and high-income households.
- Agricultural insurance could also be promoted through public-private partnerships.

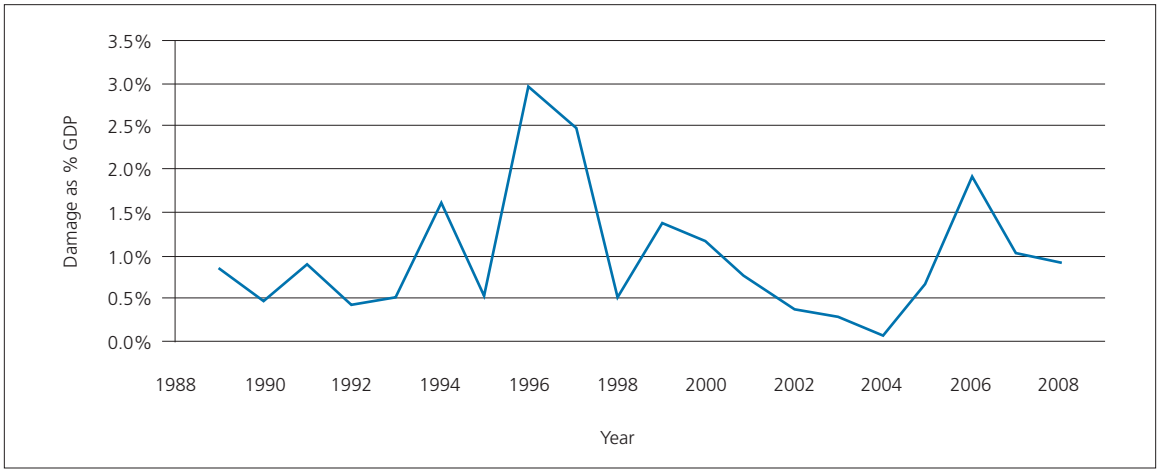
Any disaster risk financing strategy should be designed to complement and encourage ex ante disaster risk reduction and preparedness activities, and to facilitate a rapid response once a disaster occurs. Disaster risk financing should complement and encourage disaster risk reduction and focus on major events that cannot be efficiently mitigated through risk reduction activities. ■

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 (typhoons), tornados, landslides and droughts. A very high proportion of the population lives in the coastal areas of the country and is adversely affected by seasonal floods and storms. (World Bank 2005a; GoV 2004).

Over the past 20 years, natural hazards have resulted in a total loss of life of 13,035 persons, on average equivalent to 652 mortalities per annum. Damage to residential housing and public-sector property, agriculture and infrastructure (irrigation, transport, power and telecommunications) has been valued at VND 91 trillion (US$ 6.4 billion), averaging VND 4,547 billion (US$ 322 million) per annum in current prices. Over the same period the average annual cost of natural hazards has been equivalent to 1 percent of GDP, with a peak loss of nearly 3 percent 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 Percentage of Gross Domestic Product (1998 to 2008)



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

The Government of Vietnam (GoV) uses a range of budgetary resources for post-disaster relief, recovery and reconstruction purposes. In particular, Vietnam has a very efficient relief system, operating from com-

mune to national level, which is capable of mobilizing major human, financial and emergency relief resources in the aftermath of a major catastrophe. Previous studies have shown that the GoV can normally fully finance short-term emergency relief and recovery operations out of its central and local contingency funds.

However, despite the fact that the GoV together with the private sector and development partners absorb some disaster losses, there is a major funding gap for reconstruction expenditure. An earlier study identified an overall funding gap between disaster relief and reconstruction requirements and available financial resources from central and local government, local voluntary donations and the international aid community of US$130 million in 2000, a year of severe typhoon and flood losses, and of US$ 46 million in 2001, a low loss year. (World Bank 2005b).

The identification and planning of a catastrophe risk financing strategy could help the GoV to address potential resource gaps in the aftermath of disaster events more efficiently. A formal risk assessment to quantify the natural hazard exposure and associated financial costs of damage to public and private assets could enhance the GoV's understanding of the magnitude of its fiscal liability to natural disasters. A complementary review of the GoV's existing budgetary resources and arrangements for post-disaster response (including the scope for post-disaster budgetary reallocations) and public and private risk transfer options could support the GoV in planning more effectively for catastrophe events by developing 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 GoV manages the fiscal impact of natural disasters and (ii) to identify financial options for improving the ability of the GoV to access immediate liquidity in the event 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 for the GoV which are affordable and effective, 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, the study includes an assessment of existing government-funded relief, recovery and reconstruction efforts and the private insurance industry's capacity to cope with the adverse financial impacts of disasters. 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 and policy options on further enhancing the existing disaster risk financing framework. The study has four principal 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 cost of disaster-related damage to private and public assets in Vietnam in order to quantify more clearly the GoV's fiscal liability. This assessment also includes some preliminary modeling of catastrophe losses which might be expected to occur in the future;
- *Review of Government budgetary process for financing natural disasters,* including sources of funding and changes in funding levels over the past decade;
- *Dynamic Government Funding Gap Analysis* 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 re-

lief, (ii) recovery and (iii) medium-term reconstruction.

- *Options for sovereign financial protection against natural disasters,* drawing on relevant international experience. Options presented for GoV consideration include a combination of post-disaster (unplanned) and ex-ante (planned) financial and insurance instruments. They also include the promotion of private residential catastrophe property insurance and agricultural insurance.

This report consists of five chapters including this introduction. Chapter 2 presents a natural disaster financial risk assessment aimed at quantifying the costs to government of natural disasters in Vietnam. It includes a detailed 20-year analysis of 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, distinguishing between the short-term recovery gap and medium-term reconstruction funding gap. Chapter 4 is devoted to a review of options for the future financing of natural disaster recovery and reconstruction expenditure in Vietnam, including options for sovereign risk financing and for promoting commercial catastrophe insurance for the private property and agricultural sectors. Conclusions to the report are presented in Chapter 5. The report is complemented by 10 technical annexes which provide further analyses and results.

CHAPTER 2: 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, landslides and droughts. An estimated 59 percent of the total area of the country and 71 percent of the population are exposed to cyclones and floods (World Bank 2005a, 2009).

To date, most of the studies into the risks associated with floods and tropical cyclones in Vietnam have been conducted for physical risk reduction and flood control purposes, rather than from a financial risk assessment perspective. As such, much flood risk mapping and engineering risk assessment work is being conducted in Vietnam, both by government and with the support of development partners. There is, however, limited work currently being undertaken on 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, with a focus on floods and tropical cyclones. It then presents an analysis of the physical and financial damage associated with these natural hazards to public sector property and infrastructure and, to some extent, to rural and agricultural households, drawing on available published data for Vietnam. The chapter concludes with a preliminary analysis of catastrophe risk exposure. In the absence of underlying exposure data (namely, the value of public and private assets), financial losses are compared to the current Gross Domestic Product (GDP).

It is recognized that this is a preliminary risk assessment with limited objectives. It is intended to stimulate debate amongst 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 worth of earthquake, flood and tropical cyclone data. The National Hydro-Meteorological Services (NHMS) of the Ministry of Natural Resources and Environment (MONRE) 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, other institutes under the Ministry of Science and Technologies (MOST) and universities.

A summary of the main peril hazard exposures is presented below. 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 storms or typhoons (cyclones)[3].

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 moving south to affect southern Vietnam in November. In the north, the peak cyclone activity occurs in June/July. The central regions are typically affected in August and September. Cyclonic activity in the south 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 1961-2008, Quang Ninh – Thanh Hoa, the most northerly region of Vietnam, experienced an average of 1.7 tropical cyclones per year while Binh Thuan – Ca Mau in the far south only experienced one tropical cyclone landfall every three years. There are also marked differences from north to south in terms of exposure to severe wind storm events of Beaufort Scale 10 and above (severe tropical storm and typhoon). Quang Ninh experienced 32 Category 10 and greater storm events between 1961 and 2008, or an average of 0.7 events per year, while Binh Thuan in the south experienced only 3 major events over this period, implying a return period of 1-in-16 years. See Annex 1.2.

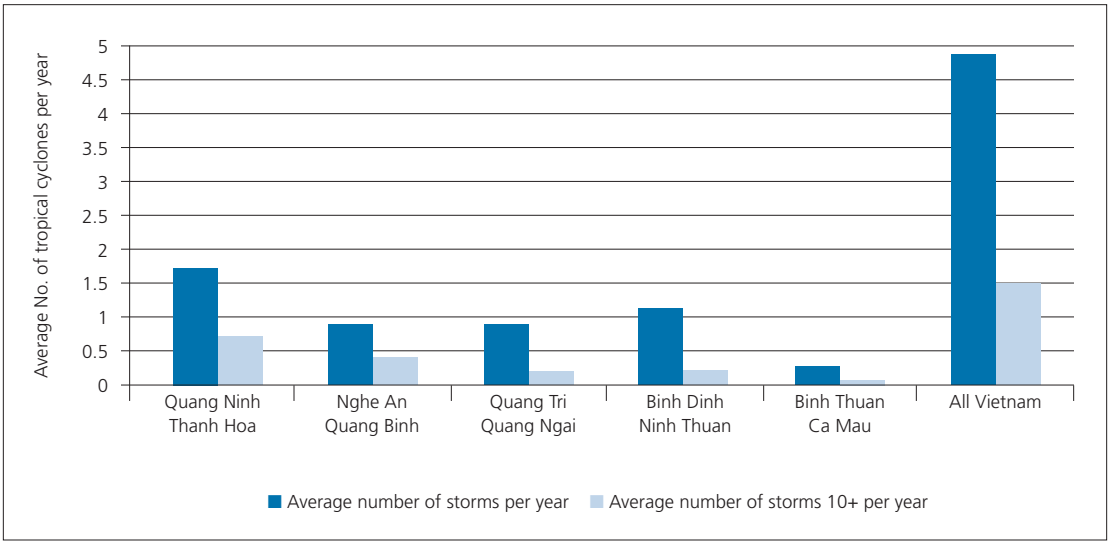
Table 2.1. Average Number of Tropical Cyclones* by Region (1961 to 2008)

Region (North to South)	Number of storm events	Average number of storms per year	Number of storms reaching Scale 10+	Average number of storms reaching Scale 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 (wind speeds>39 km/hr) up to category 13 typhoons (wind speeds > 133 km/hr)

[3] See Annex 1.2. for a full description of tropical cyclone naming conventions and the 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). The year 2006 was the worst on record with 3 category 13 typhoons, including Typhoon Xangsane which caused major damage to 15 provinces in central Vietnam. (See Annex 1.2 for further details.)

Flood

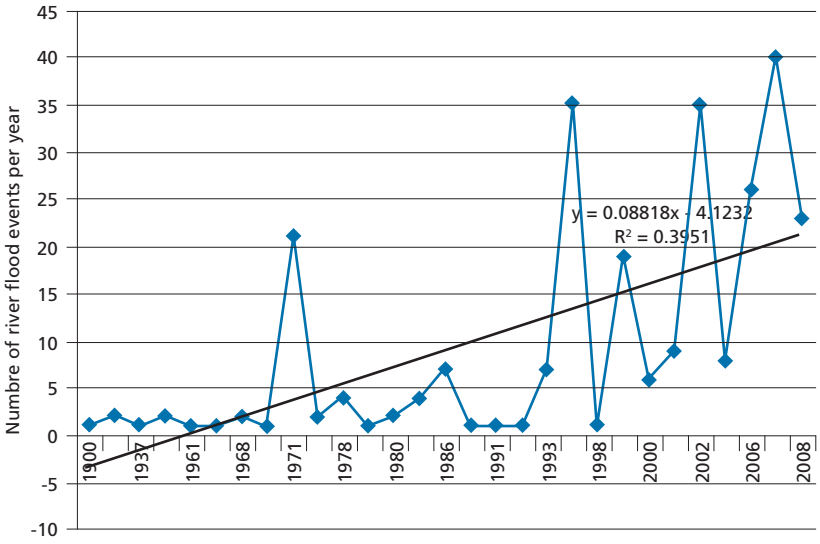
Vietnam is highly exposed in the monsoon rainy season to a combination of river plain flooding and flash floods and associated landslides. River plain flooding is a major problem in the low-lying southern Mekong Delta region of Ho Chi Minh City and in the northern Red River basin surrounding Hanoi. These regions have major concentrations of population, housing, industry, commercial business and infrastructure and are also important agricultural crop and livestock producing areas[4]. Flash flooding is a major problem in the Central Highlands and Central Coastal regions of Binh Thuan to Than Hoa provinces. T he rivers here are mainly short and steep and heavy rainfall, usually related to tropical cyclones, results in flash flooding and landslides.

NHMS maintains a historical database on flood events covering the period 1900 to 2008. The reported data include the province, 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 presented 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 upgrad-

[4] 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.

ed. Therefore, although the data suggest a significant 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 for the period 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 and 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 exposure values (GoV 2004; Axco 2009).[5,6] An earthquake in the Red River Valley area could, however, lead to very high economic losses because of the high concentration of people, infrastructure, industry and residential housing in the vicinity of Hanoi. The lack of enforcement of earthquake provisions in building codes implies 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 in its National Strategy for Natural Disaster Prevention, Response and Mitigation (NSNDPRM) to 2020 (GoV, 2007).[7]

Although Vietnam is considered to face a low risk exposure to locally-sourced tsunamis, the

[5] 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.

[6] AXCO (2009): Insurance market Report Vietnam: Non-Life (P&C).

[7] GoV (2007) National Strategy for Natural Disaster Prevention, Response and Mitigation (NSNDPRM) to 2020, Hanoi, November 2007.

2004 catastrophe tsunami triggered by an undersea 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).[8] Further information on the earthquake and tsunami exposures in Vietnam is contained in Annex 1.4.

Other Natural Perils

According to the GoV's classification of the relative frequency of natural perils, drought and tornado are high frequency natural hazards in Vietnam; hail, forest fire and salt water intrusion are medium frequency hazards; and frost and earthquake are low frequency hazards. 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 of up to one meter in sea level would affect 39 of the country's 64 provinces and 6 of its 8 economic regions. About 20 percent of communes could be totally or partially flooded, with communes located in the Mekong River Delta most seriously affected. A one-meter rise in sea-level would affect approximately 5 percent of Vietnam's land area, 11 percent of the population and 7 percent of agriculture.

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

It is understood that the property insurers in Vietnam are not conducting any formal studies into the impact of climatic change on their flood risk exposure currently. This may be an important topic for 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 assessments to measure physical and financial losses to human life, property, infrastructure, production and industry for over 25 years. Published data is available on the DDMFSC website for each event by province. Data on annual total damage by province is also available.

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. This 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 proposed system. In 2009 MARD recruited an international consultant to conduct an independent review of ways to further strengthen and improve the damage assessment system in Vietnam under the World Bank-supported Natural Disaster Risk Management Project[9].

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 comprise: (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 and (13) Clean Water and Environment (see Annex 2). Currently the new system and proforma is being trialed in three provinces, with UNDP support: Lao Cai, Dong Thap and Quang Tri. The other provinces continue to use earlier versions of the damage assessment form.

Physical damage assessment is mainly conducted by commune-level committees and the results 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 after a disaster as the commune and district-level committees update their initial damage assessments and transmit these to the provincial committees[10].

The estimation of financial damages is conducted at a provincial level. Provincial People's Committees estimate total financial damage in collaboration with affected districts using their own valuation criteria for each partially damaged or totally destroyed good/asset. Some provinces publish the standard "unit values" which they used to value the physical losses. These valuations are likely to be based on the estimated replacement cost of the damaged items. A second assessment is latterly conducted to draw up detailed lists of specific public sector repair/reconstruction needs and related costs.

The damage assessment reports are submitted by each affected province to the Prime Minister's Office for authorization and approval of the release of central government funds (see Chapter 3)**.** 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 (Table 2.2). Further details are presented in Scawthorn (2009) and in Annex 2.

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 that data are consolidated at

[9] 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.

[10] 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. It is used to transmit disaster damage and needs data to SOCCSFC, to issue disaster prevention and mitigation directives to field staff and to coordinate disaster relief activities between the SOCCSFC and disaster-affected provinces.

Table 2.2. DANA Needs Assessment Reports

Time after a Natural Disaster	DANA terminology used in Vietnam*	ECLAC terminology	Terminology 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.*

provincial level by the Provincial Peoples' Committees and a written report, together with a request for central government support, prepared for submission to the Prime Minister's Office.

A sample post-disaster relief and recovery funding request, prepared by Quang Tri Province following Storm No. 6 (Typhoon Xangsane) in 2006 is presented in Box 2.1 and Annex 2, Table A.2.4. In this case, the Provincial Government's request to Central Government for short-term disaster relief and recovery funding amounted to VND 30 billion or 37 percent 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 in response to 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*** covering human losses and 11 sectoral categories of damage, in turn detailing the scale of physical losses, the unit cost of damage and total estimated value of damage. Total damage was estimated at VND 81 billion. The highest damage was incurred to the agriculture sector (including aquaculture), valued at VND 26.4 billion (32 percent of total). Damage to housing was reported at VND 18.5 billion (23 percent of total) and damage to irrigation dams, dykes and canals at VND 17.2 billion (21 percent of total).

Short-term Funding Request to Central Government totaling 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) to Central Government to upgrade small irrigation structures, provide disaster mitigation equipment for fisheries and construct dykes to protect residential areas, dams and roads.

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) secondary or consequential losses, including business interruption to agriculture, commercial businesses and industry; or (iii) the wider costs to the economy[11].

The system does not estimate the impact on people's lives and livelihoods and appears to under-estimate the damage to private sector property, commercial businesses and 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; or (ii) systematically record damage to private commercial businesses or private-urban property.[12] It is likely, therefore, that the true economic value of damage arising from natural disasters is under-reported, at least for private residential property, commercial business and industry.

The extent to which the total provincial-level cost estimates of damages may under- or over- estimate the true value of losses is unknown. The provincial governments are responsible for consolidating 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, as already noted. In the case of housing, the GoV specifies a maximum disaster relief payment of VND 5 million (about US$ 300) for totally damaged housing. This may be adequate to repair or reconstruct simple timber houses in the south of Vietnam, but does not reflect the reconstruction costs of housing in the north, 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 undertake a comprehensive sub-sectoral analysis of losses, although the limited data that does exist suggests that agriculture and fisheries, irrigation infrastructure and residential housing usually experience the heaviest losses.

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

Data on the value of damage is missing for a relatively high percentage of historical natu-

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

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

ral disasters. For example, loss data for Storm No. 6 (1989), which registered the highest number of houses damaged from a single event over the past 20 years, do not include a monetary valuation of damage. 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 CCFSC data from 1989 to 2008 is presented in this section, both in current Vietnamese dong (VND) and in US dollars (US$), using official VND: US$ annual average exchange rates.[13] The full results of this analysis are provided in Annex 3. The analysis is conducted on the annual aggregate losses for all provinces and events. A complementary, provincial-level analysis of the impact of Typhoon Xangsane, which caused major losses across 15 provinces in 2006, is also 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, there are no financial damage estimates for 31 of these events, many of which occurred during the earlier part of the period of analysis. It is thus recognized that the values presented below probably under-estimate the true level of losses.

Total Assessed Value of Damage

Between 1989 and 2008, the CCFSC reported total natural disaster losses in Vietnam of VND 91 trillion (US$ 6.4 billion) or an annual average of VND 4,547 billion (US$ 332 million) in nominal terms. Tornados, tropical cyclones (including tropical storms and typhoon), floods, flash floods and landslides resulted in 13,035 deaths or an average of 652 lives per annum. Damage to residential housing, public sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) totaled US$ 6.4 billion or an annual average of US$ 322 million.[14]

The estimated value of damage from natural disasters was much higher in the final three years of analysis. Over the 20-year period of analysis, 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 (Figure 2.3). During the final three years (2006-08) the total value of natural disaster losses ranged between two and three times higher than the long-term average, with peak losses of VND 18,566 billion (US$ 1.2 billion) in 2006 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 major growth in the Vietnamese economy in recent years, a related increase in capital assets and a rise in construction and reconstruction 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.

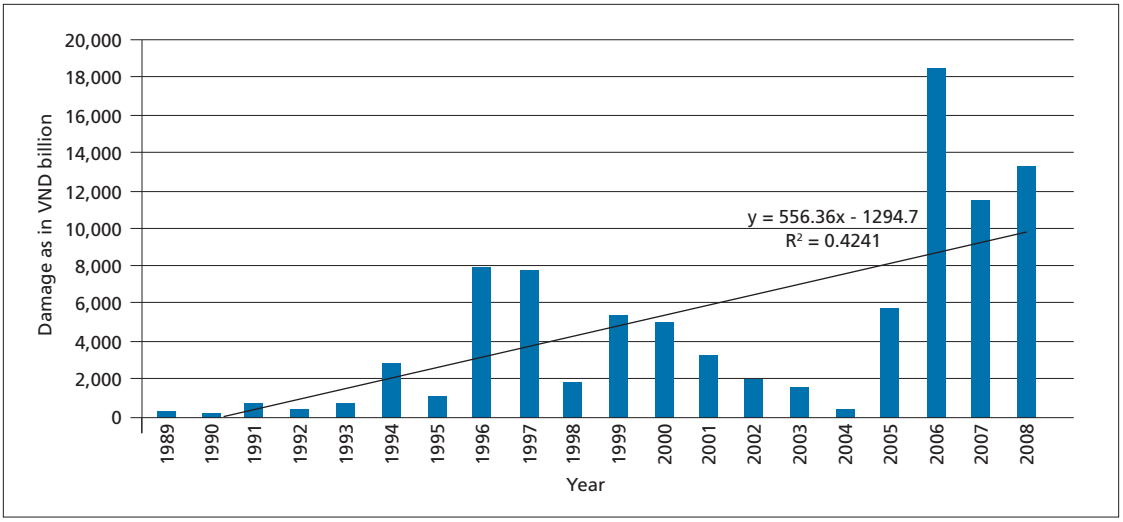
The average annual value of direct losses over the period 1989-2008 was equivalent to 1.0 percent of Gross Domestic Product (GDP), rising to 2.9 percent in 1996 (Figure 2.4). The pattern of natural disaster losses expressed as a percentage of GDP shows that there is no trend towards increased losses in recent years. Disaster

[13] The VND:US$ Exchange rates are presented in Annex 6 General Statistics of Vietnam.

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

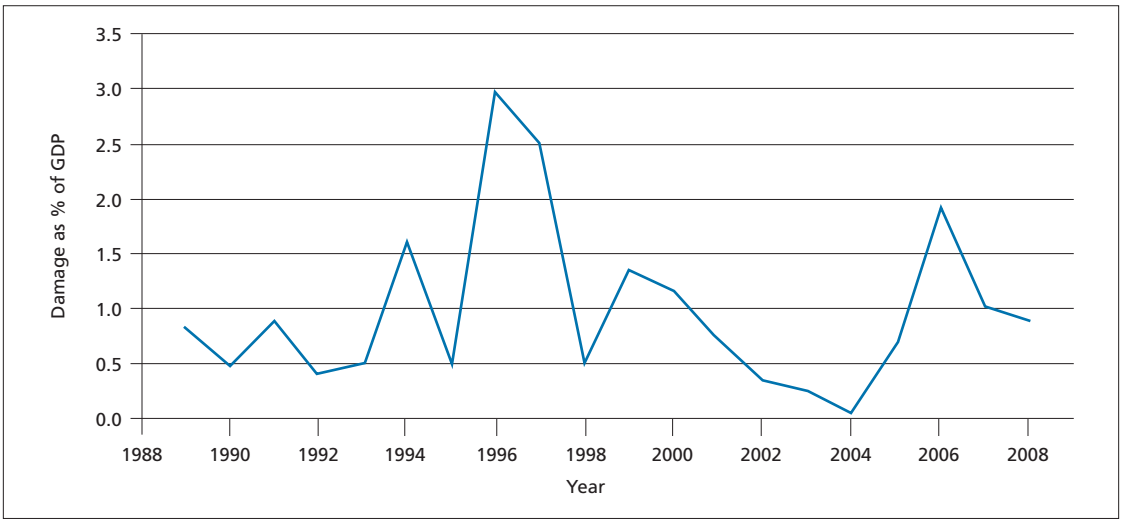
Figure 2.3. Value of Losses due to Natural Disasters from 1989 to 2008

(Current VND billion)



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

Figure 2.4. Vietnam: Value of Natural Disaster Losses as a Percentage of current GDP, 1998 to 2008



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

losses exceeded 1.5 percent of GDP in four years: 1994, 1996 1997 and 2006. The high losses experienced in 2006 reflected a large number of mainly flood-related events rather than a single major catastrophe. In 2008 GDP terms, the annual average value of natural disaster losses to the Vietnamese economy would be equivalent to nearly US$ 900 million 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. These indirect and secondary costs may exceed the value of direct losses by several fold.

Causes of Loss

Floods have been the single most important cause of loss, accounting for 49 percent of the total value of CCFSC reported losses, followed by storms (tropical storms and typhoons), which have accounted for 46 percent of losses (Table 2.3 and Figure 2.5). Other perils such as flash floods, landslides, tornados and cold waves, account for less than 5 percent of the total value of damage over the period of analysis.

Over the period 1989-2008 an average of nearly ten natural hazard events has been reported by CCFSC each year, each causing estimated damage of VND 6,437 billion (US$ 40 million) on average. The value of losses per event has averaged US$ 53 million for storms and US$ 49 million for flood. The average value of damage per event associated with flash flooding/landslides and tornados has been much lower.

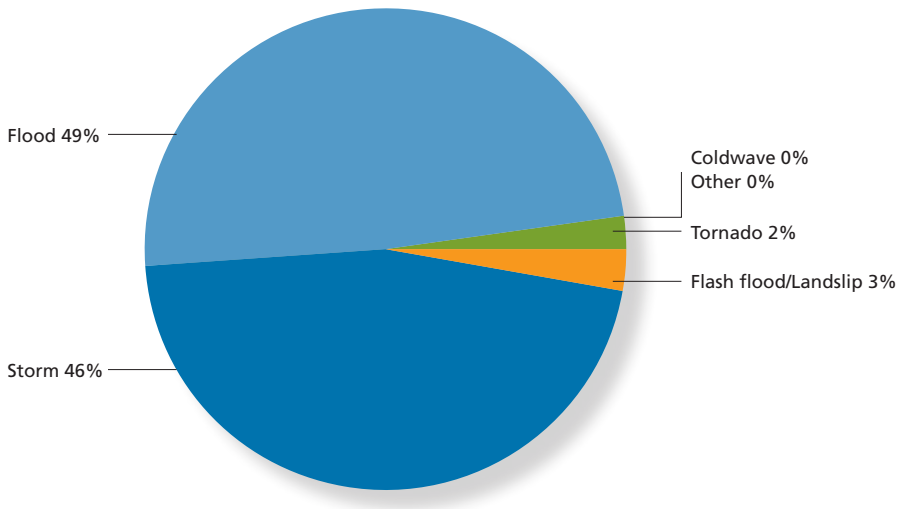
Table 2.3. Vietnam: Estimated Value of Damage by Type of Hazard, 1989 to 2008

Peril (Hazard)	Number of events	Number of events with recorded value of damage*	Total value of damage (VND million)	Total value of damage (US$ million)	% of total value of damage	Average value of damage/ event (VND Mio)*	Average 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 31 events. The average size of loss is calculated only for those events with reported loss values.

Figure 2.5. Vietnam: Percentage Value of Damage by Type of Hazard, 1989 to 2008



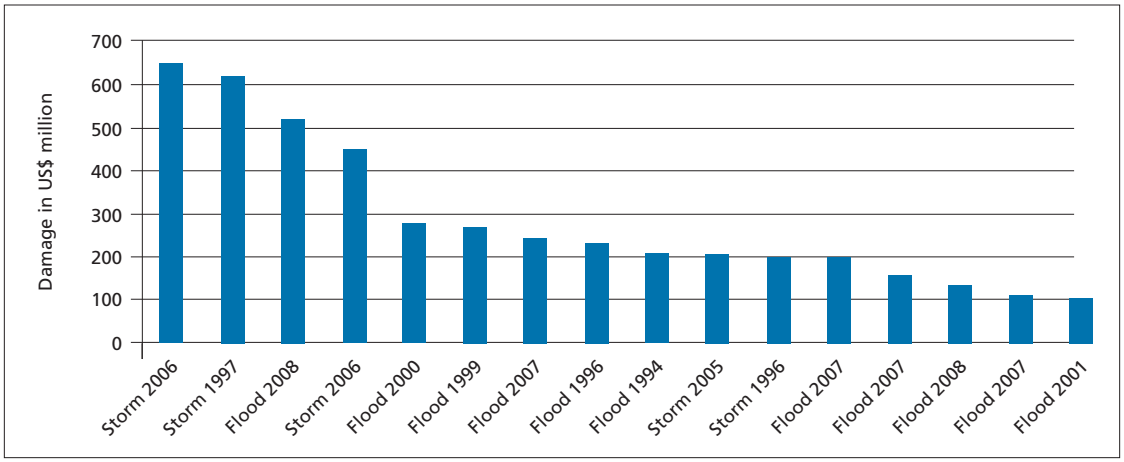
Source: World Bank analysis of CCFSC damage data, 1989 to 2008

Major Loss Events

Floods and storms have the potential to cause catastrophic losses in Vietnam, as evidenced by the losses associated with Typhoon Xangsane in 2006. Over the period 1989 to 2008, 16 storm and flood events each caused estimated damage in excess of US$ 100 million (Figure 2.6). Storm No. 6 (Typhoon Xangsane) in October 2006 was the single most costly event on record, resulting in total estimated damage of VND 10,402 billion (US$ 649 million) (see below). Storm No. 5 of 2007 was the second largest event on record, causing estimated losses of US$ 619 million. The largest flood loss event occurred in the Red River Basin between 21 October and 3 November 2008, causing major damage valued at US$ 522 million to property, infrastructure and agriculture in the Hanoi region.

Figure 2.6. Vietnam: Major Flood and Storm Events Incurring Damage in Excess of US$100 million

(1989 to 2008)



Source: World Bank analysis of CCFSC damage data, 1989 to 2008

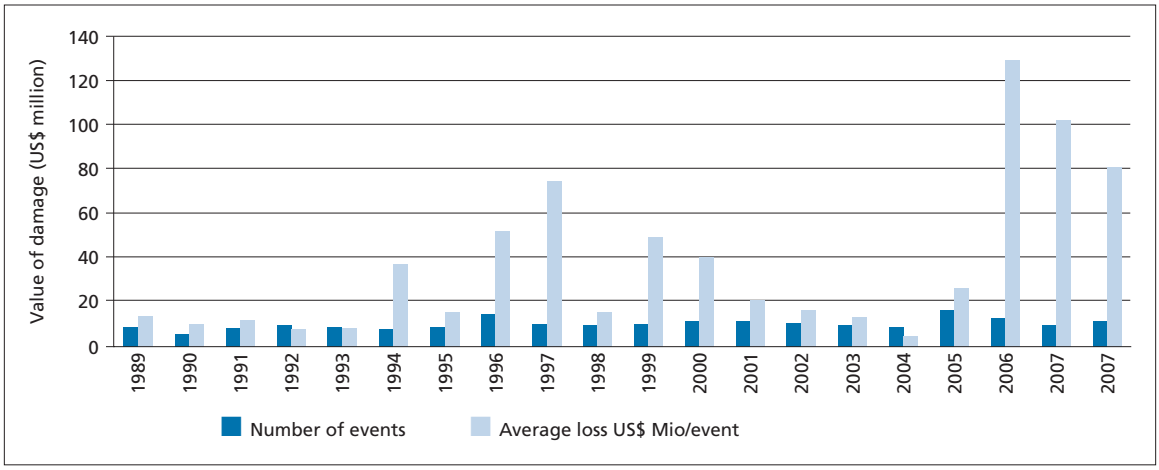
Average size of loss per event

The average value of assessed damage per natural hazard event has increased significantly in nominal terms in recent years. The number of declared disaster events has been relatively stable, with an average of 10 events per year, a minimum of 5 events in 1990 and a maximum of 16 events in 2005 (Figure 2.7). There has, however, been a major increase in average losses per event in recent years. The value of assessed damage averaged US$ 40 million per event over the period 1989-2008 but was 2 to 3 times higher than this in each of the years 2006, 2007 and 2008, averaging US$ 129 million, US$ 102 million and US$ 81 million per event respectively for each of these three later years.

Further research is required to explain the major increase in the average size of losses in recent years, but it is likely to be a combination of (i) major increases in the scale 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 percent of total re-

Figure 2.7. Vietnam: Average size of Natural Disaster Losses per Event, 1989 -2008

(in US$ 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

ported damage for the year, was associated with typhoons of which 3 typhoons – Durian, Xangsane and Cimaron – were Category 13 typhoons[15].

Analysis of Damage by Sub-Sector

A major drawback of the CCFSC data is that it does not include a sectoral breakdown of the value of losses for most disaster events. There appears to have been no standardized reporting by provinces of the estimated value of damage for each of the 15 categories or sub-sectors included in the damage assessment reports. Complete valuation data for all categories of damage is available for less than 5 percent of the 193 events analyzed in this study. This means that it is very difficult to conduct a formal analysis of the relative value of damage to residential property, agriculture, public sector property (schools, hospitals, etc) or public infrastructure (roads, bridges, etc) caused by floods and wind storms. For Typhoon Xangsane, however, it has been possible to obtain a detailed breakdown of damage by sub-sector.

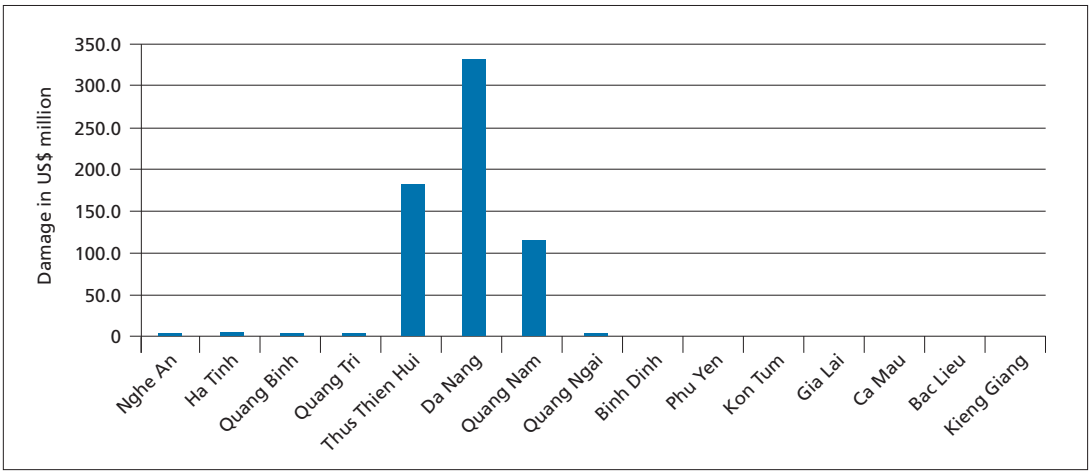
Case Study: Typhoon Xangsane, October 2006

Typhoon Xangsane was a Category 13 Beaufort scale typhoon (with sustained wind speeds exceeding 133 km/hour) 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 resulted in total estimated damaged of VND 10.4 billion (US$ 649 million), according to CCFSC data. The typhoon caused major flooding and storm damage to property and infrastructure in the three provinces/cities of TT Hue and Da Nang and Quang Nam immediately to the south, together accounting for nearly 96 percent of total damage. Da Nang suffered the highest losses, totaling US$ 330 million. Twelve other provinces were also affected but losses were relatively small, standing at less than US$ 7.5 million in each province (Figure 2.8 and Annex 3.7).

The highest losses were recorded in agriculture (36 percent of the total value, including

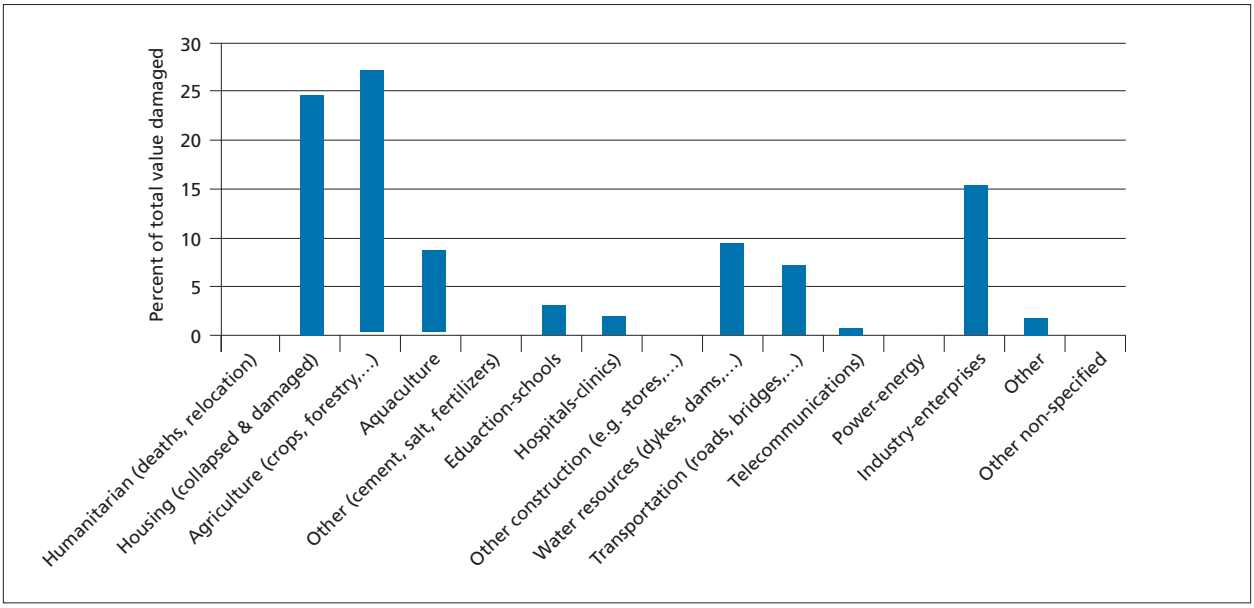
[15] It is not possible to report whether changes under the improved DANA system for assessing and valuing natural disaster damages may also have contributed towards the increased average value of loss events reported over the past three years.

Figure 2.8. Typhoon Xangsane, 2006: Estimated Damage by Province (US$ million)



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

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



Sources: CCFSC damage database, Provincial Damage Reports

damage to crops, livestock forestry and aquaculture) and housing (25 percent of total). It has been possible to access a sectoral breakdown of the estimated value of damage for four of the affected provinces (Quang Binh, Quang Tri, TT Hue and Kon Tum) (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 percent of the total value of losses or 36 percent including aquaculture. The housing sector suffered

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

the second highest losses, equivalent to 25 percent of total estimated damage. Damage to industry and enterprises[16] accounted for a further 15 percent, damage to water resources including dykes, dams, canals for 9 percent and damage to transportation for 7 percent of total losses. Schools, hospitals and telecommunications only incurred minor damage. (See Annex 3.7)

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 by private residential property and the remaining forty percent by public sector property (schools, hospitals other buildings) ***and infrastructure*** (dykes, dams, bridges, roads, power lines, telecommunications etc). Comparable data providing a breakdown of damage associated with major flood events are not available.

PRELIMINARY CATASTROPHE RISK ANALYSIS

The analysis of the CCFSC natural hazards damage data for the period 1989-2008 has indicated that Typhoon Xangsane in 2006 was the single largest loss event in value terms, causing total estimated damage of US$ 649 million. The highest annual losses were also incurred in 2006, with total losses valued at US$1.16 billion.

Although 2006 was a severe loss year for Vietnam, even worse natural hazard events could occur in future. During the drafting of this report, central Vietnam was hit by Typhoon Ketsana, causing estimated damage 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 and, possibly, an increase of the frequency and/or intensity of major hazard events 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) have 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, ignoring remote coincidences and possible but unlikely catastrophes. 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 percent chance per year on average).

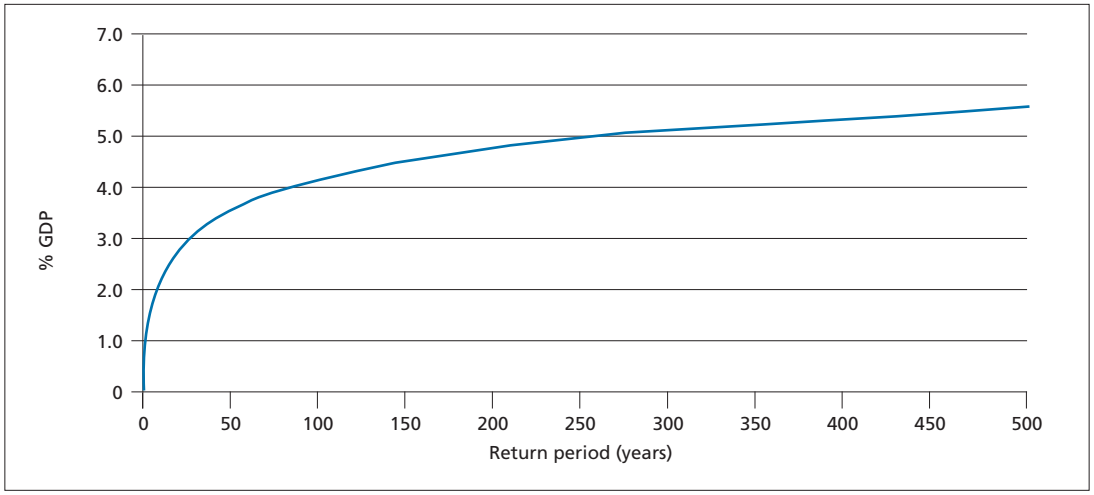
A preliminary simulation analysis, using historical data, has been conducted to assess the expected losses that might occur 1 in 100 years for wind storm and flood events and then for total expected losses from all events in a single year. A summary of the Probable Maximum Loss is presented in Figure 2.10.[17] Full details of the analysis are presented in Annex 3.8. It should be noted that this analysis is based on historical data and does not capture the possible impact of climate change. As such, it 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. This preliminary finding has major financial implications for the GoV because it shows that under extremely severe loss years, it would face post-disaster emergency relief, recovery/re-

[17] 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 the 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 2.10. Indicative Annual Aggregate Probable Maximum Losses due to Natural Disasters

(percent of 2008 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.

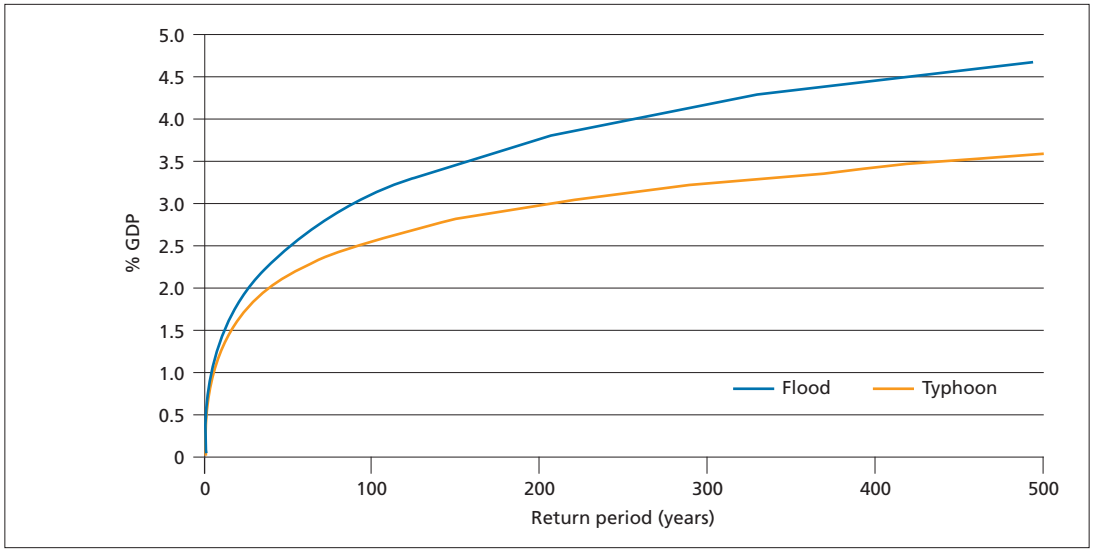
habilitation and reconstruction losses in excess of US$ 3.8 billion or 4.1 percent of current 2008 GDP (Figure 2.10). There is a clear need for an adequate strategy to finance extreme natural disaster loss years.

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 equivalent to 3.1 percent of GDP, while a one-in-100 year typhoon event would generate damage estimated equivalent to 2.5 percent (Figure 2.11).

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 increasingly used for other applications in disaster risk management, such as emergency preparedness and risk reduction investment. Such probabilistic catastrophe risk models, incorporating the impact of climate change, could be developed in the future. They would allow the GoV 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.

Figure 2.11. Indicative Probable Maximum Losses per Storm and Flood Event

(percentage of GDP)



	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)	
Return period	**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

CHAPTER 3: 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 disaster event. This comparison leads to the concept of a government funding gap, describing situations where fiscal resources are insufficient to cover 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 recovery and then on medium term reconstruction are not systematically recorded at a central level by either the MoF or 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 donations post disaster; and (iii) international assistance. In addition, it is understood that the GoV can reallocate a small proportion of its capital expenditure for the 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) Governments' 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 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"[18]. Although the law does not specify the actual categories of post-disaster expenditure which the contingency funds may be utilized for, in practice the funds are only used for immediate emergency relief and recovery expenditure and specifically exclude reconstruction expenditure, which has to be financed out of central and local government capital investment plans in future years and other sources.

[18] 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.

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 government can also reallocate part of its planned recurrent budget to fund disaster relief and recovery efforts.

Between 2006 and 2008, the combined central and local government contingency budgets amounted to between 2.5 percent (in 2007) and 3.8 percent (in 2008) of total budgeted expenditure (Table 3.1). These budgets are substantial but, as indicated above, are intended for a range of purposes in addition to post-disaster relief and recovery.

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

	million US$			% of total expenditures		
Total expenditure of State budget (including central and local budget)	**Plan 2006**	**Plan 2007**	**Plan 2008**	**Plan 2006**	**Plan 2007**	**Plan 2008**
	18,380	**22,213**	**24,228**	**100.0%**	**100.0%**	**100.0%**
Capital expenditure	5,093	6,181	6,056	27.7%	27.8%	25.0%
Recurrent expenditure	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 expenditure	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

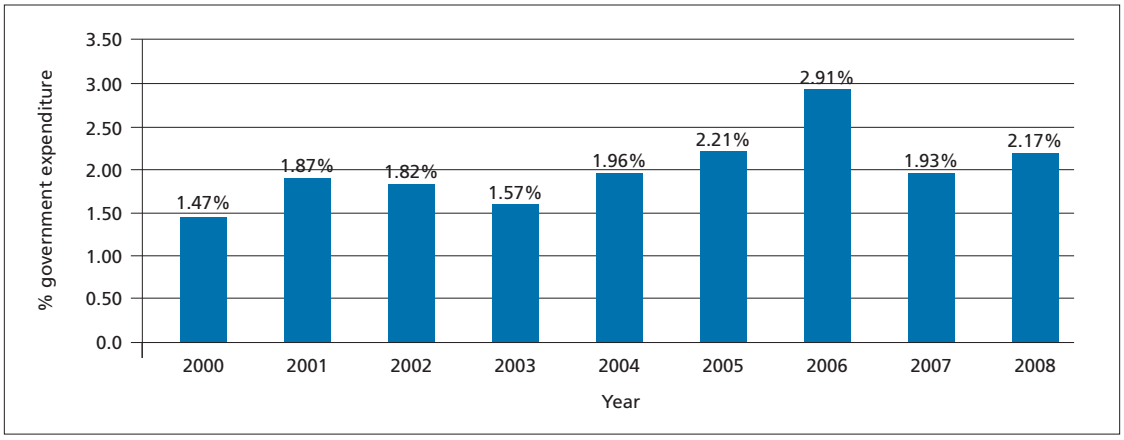
The actual central contingency budget varied between 1.5 and 2.9 percent of actual government expenditures over the period 2000-2008, with an average value of 2.0 percent (Figure 3.1).

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 percent in nominal terms, or by over 50 percent per year on average.

Financial Reserve Fund

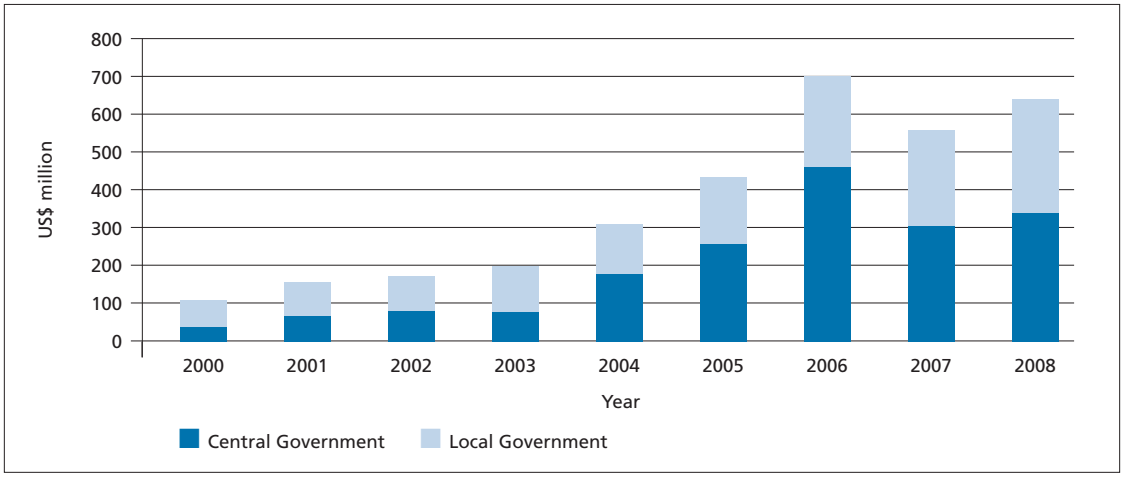
The Financial Reserve Funds (FRF) are held at Central and Provincial levels and may be used to pay for post-disaster activities when the contingency funds are exhausted. The districts and communes do not have reserve funds for natural disasters. The sources of funding for the FRF include 50 percent of 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 as the government has incurred annual budget deficits in excess of 10 percent of GDP. Therefore any surplus revenue allocation to disaster-related purposes is understood to have been very restricted. (See Annex 6.4 for full details of the budget surplus/deficit between 1991 and 2008.)

Figure 3.1. Central contingency budget as percentage of government expenditure



Source: MoF 2009

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



Source: SBD/MoF 2009

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 in response to 8 natural disaster events. The SRF is managed by the MoF. In recent years the fund has had very limited resources, in part because crude oil prices have been lower than forecast implying 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 percent 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. All Vietnamese citizens are required to contribute towards this fund, with contributions ranging between 1 and 2 kg of rice per household. Businesses are required to contribute 0.02 percent 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 in Vietnam, including via the provision of food and drinking water, tents, blankets and medicines. It is not possible to conduct a methodical, historical analysis of this expenditure as related data is not systematically, centrally reported. However, it is understood that the standing office of the CCFSC, the Disaster Management Center (DMC), has recently starting collecting this information.

In 2000 international donors provided VND 197 billion assistance for post-disaster response, accounting for nearly 10 percent of total annual natural disaster expenditure of VND 1,991 billion (World Bank 2005). The international assistance falls outside the budget. According to the Insurance Supervisory Authority of the MoF, international assistance for post-disaster recovery purposes averaged US$ 9.5 million per year during the period 2000 to 2003.

Post-disaster Reallocation of Capital Expenditures

It is understood that the GoV's capital expenditures 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 in 2009 reported outstanding disaster reconstruction needs dating back to 2006.

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

The GoV can also access post-disaster reconstruction loans from international financial institutions, such as the World Bank and Asian Development Bank. The World Bank provided a US$20 million contingency loan to support reconstruction efforts in 2005. This loan was subsequently used in support of eight provinces which were heavily hit by Storm Xangsane (October 2006) and Storm Lekima (October 2007). With the request from the GOV, the World Bank has prepared an additional finance project with US$75 million to support 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 GoV some liquidity to start the reconstruction process pending the allocation of additional resources under the next investment plan.

GoV's Extraordinary Support to Households prone to Natural Disasters

A large proportion of the 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 per 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 required, for relocation following landslides or floods (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 available for implementation of this extraordinary support program include:

1. Local budgets balanced by localities;
2. Donations given by domestic and foreign organizations and individuals either directly to localities or via the GoV or social organizations;
3. When the above sources of funds are insufficient for providing extraordinary support, the presidents of Provincial/Municipal People's Committees shall report to the Ministry of Labour, War Invalids and Social Affairs and the MoF 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 central and local contingency budgets provide the primary source of funding for extraordinary financial support 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 GoV also provides post-disaster compensation to rural households for loss or damage to their enterprises, including crops, livestock, forestry and aquaculture and other forms of rural enterprises. This study has identified compensation for agricultural losses as a major funding requirement under selected natural disasters. These payments are made out of the contingency budget.

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

NATURAL DISASTER FUNDING GAP: PRELIMINARY ANALYSIS

The occurrence of a natural disaster forces the GoV to review its budget and mobilize additional resources for response purposes, 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 (Box 3.1). The funding gap is defined as the residual between total annual losses incurred as a consequence of disasters and available funding to meet those losses.

The CCFSC reported natural disaster losses are compared with the total central and local contingency budgets for the 9-year period 2000 to 2008. This provides a preliminary analysis of the fiscal funding gap for post-disaster response and expands the Word Bank 2005 analysis. During major disaster years (2000, 2006, 2007 and 2008), natural disaster losses (as reported by CCFSC) exceed the government contingency budget significantly (Table 3.2).

However, this preliminary analysis cannot be precisely considered as a funding gap because (i) only a proportion of the CCFSC reported estimated losses fall under the direct responsibility of the central and local government; (ii) only a fraction (and never in excess of 50 percent) of the central contingency budget is available for post-disaster response; and (iii) almost all of the activities for reconstructing pubic assets and infrastructure are financed through the planned capital expenditures of future years.

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 was defined as the difference between the CCFSC reported total annual value of storm and flood damage and total actual expenditure by central and provincial governments, local donations and international assistance. It identified an overall funding gap for all natural disaster relief and reconstruction requirements of between US$130 million in 2000, a year of severe typhoon and flood losses, and US$ 46 million in 2001, a low loss year. During the period 2000 to 2003 the National Financial Reserves and surplus income in the budget were the most important source of funding for post-disaster response, on average providing 46 percent of actual expenditure.

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 the data was not available from the 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 the GoV's priority was to finance post disaster humanitarian needs, including compensation for loss of life and support for temporary repairs to rural housing, and also to finance early recovery of agricultural production through the provision of seeds, fertilizers and replacement livestock. The study concluded that the 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 the reconstruction of public infrastructure.

Source: World Bank (2005b)

Table 3.2. Comparison of Estimated Natural Disasters Losses and Contingency 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.

CASE STUDIES

Typhoon Xangsane (2006)

The quality of records on the value of disaster-related losses by category of damage is very inconsistent between provinces in Vietnam. As noted in Chapter 2, disaggregated historical time-series data by province, disaster event and class of damage is not available. However, a detailed case study was conducted for Typhoon Xangsane (2006), 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 analyzed for the purposes of this study. The damage valuation estimates were reclassified according to the three main phases of post-disaster response: (a) ***emergency relief,*** including food aid (b) ***recovery,*** including damage to housing and to agricultural crops, livestock, forestry, 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 provided in Annex 8. The provincial damage valuation reports do not include data on emergency relief as this is not a damage item per se.

In this case study more than two thirds of the value of reported damage was incurred to private residential property and agriculture and that less than a third to public infrastructure. The analysis shows that 72 percent of the total estimated value of damage fell under the recovery

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 of public Infrastructure	Total damage assessment**	Recovery as % of total estimated damage
Nghe An	4.2	26.8	31.0	56.6	87.6	35%
Ha Tinh	0.0	38.7	38.7	62.1	100.8	38%
Quang Binh	5.5	17.9	23.4	21.3	44.7	52%
Quang Tri	29.4	119.2	148.6	53.9	195.2	76%
Thua Thien Hue	720.0	1,430.0	2,150.0	760.0	2,910.0	74%
Da Nang	2,037.0	1,980.0	4,017.0	1,273.2	5,290.2	76%
Quang Nam	0.0	52.0	52.0	295.0	347.0	15%
Quang Ngai	16.0	18.0	34.0	6.0	40.0	85%
Binh Dịnh	0.0	0.0	0.0	0.0	1.1	0%
Phu Yen	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$ million	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.

category, including damage to housing, agriculture, private enterprises and business, while the remaining 28 percent was incurred to public infrastructure, falling under the classification of reconstruction. It is noted that a proportion of damage to certain types of public infrastructure to restore power, transport, communications and so forth should, in fact, fall under recovery operations but it is not possible to make this distinction from the damage reports.

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 People's Committees' requests to the Prime Minister's Office for central government support for (a) emergency relief and (b) financial assistance listed under the post-disaster phases of recovery and reconstruction, together with the actual amount of funding allocated by Central Government. Provincial funding requests totaled VND 1,475 billion (US$ 92 million), equivalent to only 16 percent of the total estimated value of damage. Funding requests ranged from 9 percent of estimated damage in the case of TT Hue Province to a maximum 50 percent of estimated damage in the cases of Quang Ngai and Ha Tinh provinces. Central Government also authorized the distribution of 3,200 metric tons of rice to 11 provinces. ***Overall, the funding request was divided into 55 percent recovery finance for housing and agriculture and 45 percent for the 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 percent of the total amount of funding requested by the provinces; and to only 7 percent of total estimated damage, according to CCFSC data (Table 3.4)***.*** The reasons why only 40 percent of funding requests were met are not known. However, possible explanations could be that (i) there were only limited funds left in the contingency budget as Typhoon Xangsane occurred in October, towards the end of the fiscal year; (ii) Central Government considered the provincial funding requests to be excessively high; and (iii) the funding request for reconstruction would be covered under future year investment plans.

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

Several tentative conclusions can be drawn from this analysis of the Typhoon Xangsane losses: (a) a high proportion (around 70 percent) of estimated damage and requests for funding fell under short-term recovery operations, while the remaining 30 percent of estimated damage was to medium and long term reconstruction of public infrastructure; (b) the provinces' requests for central government funding represented a small proportion (less than 20 percent overall) of the total estimated damage; and (c) for this event, central government only released 40 percent of the total disaster recovery funds requested by the provinces.[19]

Typhoon Ketsana (Storm No. 9) (2009)

Following Typhoon Ketsana, which hit Vietnam in September 2009, damage and needs assessments were conducted and the 15 affected provinces and one city submitted funding requests to the Central Government for post-disaster assistance. Total 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 percent of the CCFSC reported damage, with an average of 20 percent. It is understood that these funding requests were mostly for the financing of short-term

[19] 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.

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 reconstruction of 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 damage
Nghe An	100	10.0	10.0		20.0	23%	14.0	70%	16%
Ha Tinh	100	6.0	20.0	24.0	50.0	50%	27.0	54%	27%
Quang Binh	200	2.0	3.0	10.0	15.0	34%	16.5	110%	37%
Quang Tri	200	1.0	4.0	35.0	40.0	20%	15.0	38%	8%
Thua Thien Hue	800	130.0	90.0	50.0	270.0	9%	80.0	30%	3%
Da Nang	600	200.0	250.0	450.0	900.0	17%	201.0	22%	4%
Quang Nam	1000		70.0	80.0	150.0	43%	215.0	143%	62%
Quang Ngai	100	12.0		8.0	20.0	50%	12.0	60%	30%
Binh Dinh	0				n.a.	0%	3.0	n.a.	n.a.
Phu Yen	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 billion	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.

emergency relief and recovery expenditures. The Central Government funded between 10 percent and 50 percent of the provincial funding requests, with an average of 18 percent (Table 3.5).

The provinces complemented the Central post-disaster financial assistance with their own resources, usually out of their contingency budgets. These provincial resources are estimated to represent 10-15 percent of the central post-disaster financial assistance. The overall central and provincial post-disaster resources were 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

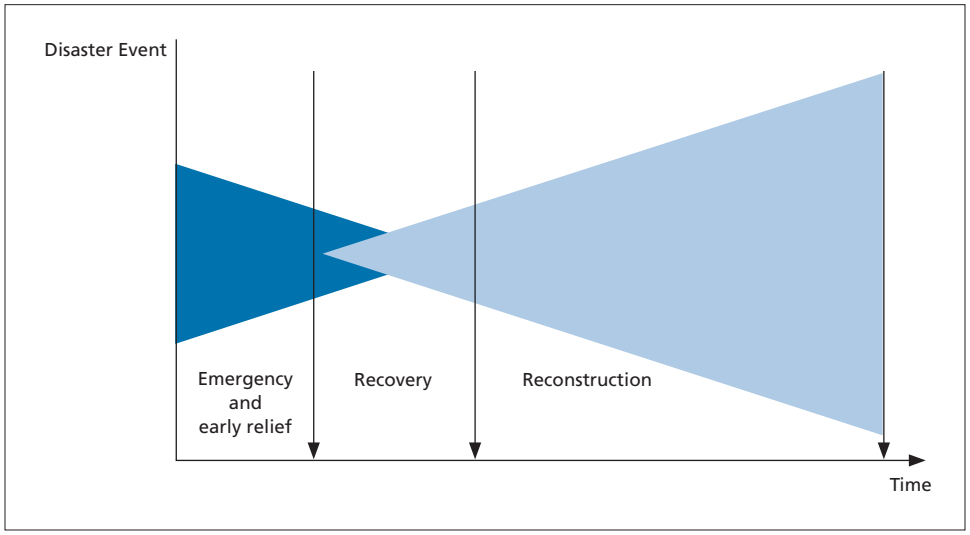
The funding gap analysis is reconsidered with the introduction of a ***time dimension*** and the decomposition of the post-disaster period into three successive phases: (i) emergency and early relief; (ii) recovery; and (iii) reconstruction (Box 3.2). The simple comparison of CCFSC reported value of losses and government contingency budget in Table 3.4 does not provide a true picture of the potential funding gap for natural disasters. 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 emergency and early relief needs. Then additional resources are necessary for the recovery phase and even more for

Table 3.5. Typhoon Ketsana (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%
Kon Tum	2026	1000	100	49%	5%	10%
Dak Lak	196	115	20	59%	10%	17%
Dac Nong	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.

Figure 3.3. Post-disaster Phases and Financing needs



Source: Ghesquiere and Mahul (2007).

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, time of the year (winter or summer), time of 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 as soon as possible. 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, the financing of basic safety nets, and the provision of basis inputs (e.g., seeds, fertilizers) to restart agricultural activities. It is also during this phase that engineering firms can be mobilized to start the design of infrastructure works that will 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 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 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.

n the context of Vietnam, as already discussed, 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.

The task of comparing post-disaster financing needs at each stage (phase) with actual expenditure is complicated because although damage estimates are available at a national level for each event through CCFSC, there is no organization in Vietnam which is charged with monitoring and recording post-disaster central government and local government funding and actual expenditure in each province, district and 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.

Despite these caveats, a more realistic analysis of post-disaster government expenditures and resources is conducted in a dynamic framework. This analysis identifies the post-disaster losses 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. Further 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. It is assumed that, on average, about 40 percent of the central contingency budget and 20 percent of the local contingency budget are available to finance post-disaster recovery activities.

The state contingent liability due to natural disasters is estimated at 55 percent of the total CCFSC damage estimates. It is assumed that the government recovery and reconstruction expenditure requirements represent 25 percent and 30 percent 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 best estimates based on extensive consultations with the GoV, public finance experts in Vietnam and the above case studies. The assumptions are detailed in Box 3.3. A sensitivity analysis is conducted below to explore how the results vary with changes in these assumptions.

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.

Box 3.3. Natural Disaster Funding Gap Analysis: Assumptions

1) Sources of Funding for Natural Disaster Recovery and Reconstruction

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

Source of Natural Disaster Financing	Expenditure as a % of 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, in the aftermath of a disaster, government can reallocate up to 1 percent of planned investment expenditures for the current 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 percent of the reported value of damage falls under short-term recovery expenditure requirements and the remaining 30 percent falls under medium-term reconstruction expenditure requirements for public assets.

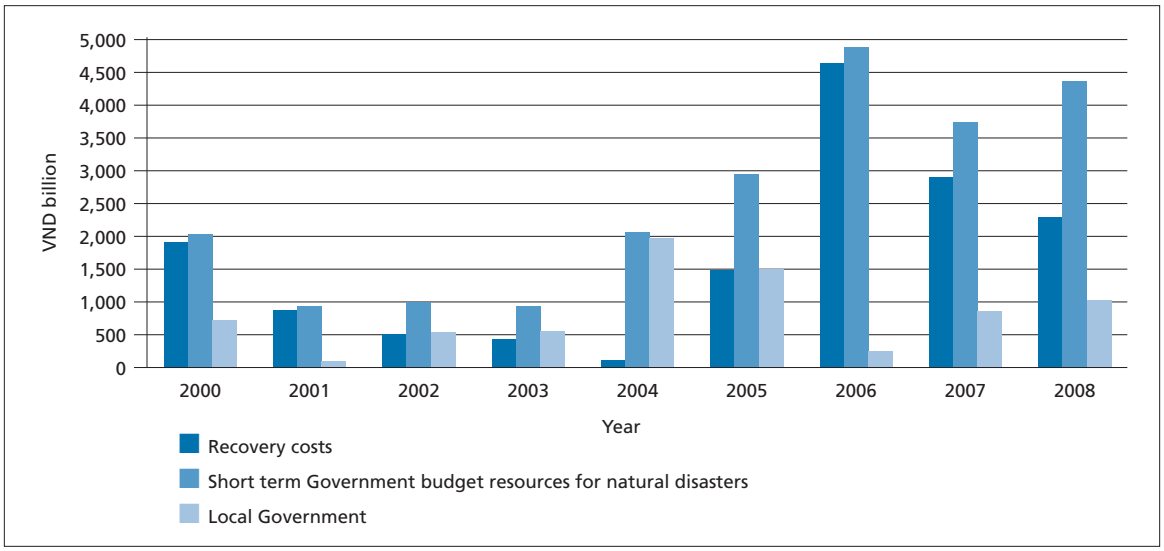
It is assumed that actual expenditure on recovery is equivalent to 25 percent of total estimated damage and that 30 percent reconstruction costs are financed in full.

CCFSC Damage Assessment	% of Total Value	Actual Natural Expenditures as % of Total Estimated Value Damage
Recovery: (housing/agriculture/emergency repairs/reconstruction of infrastructure)	70%	25%
Reconstruction: UPublic assets including shhools, hospitals, irrigation, transport, communications, power)	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

Figure 3.4. Estimated Recovery Funding Gap, 2000-2008



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

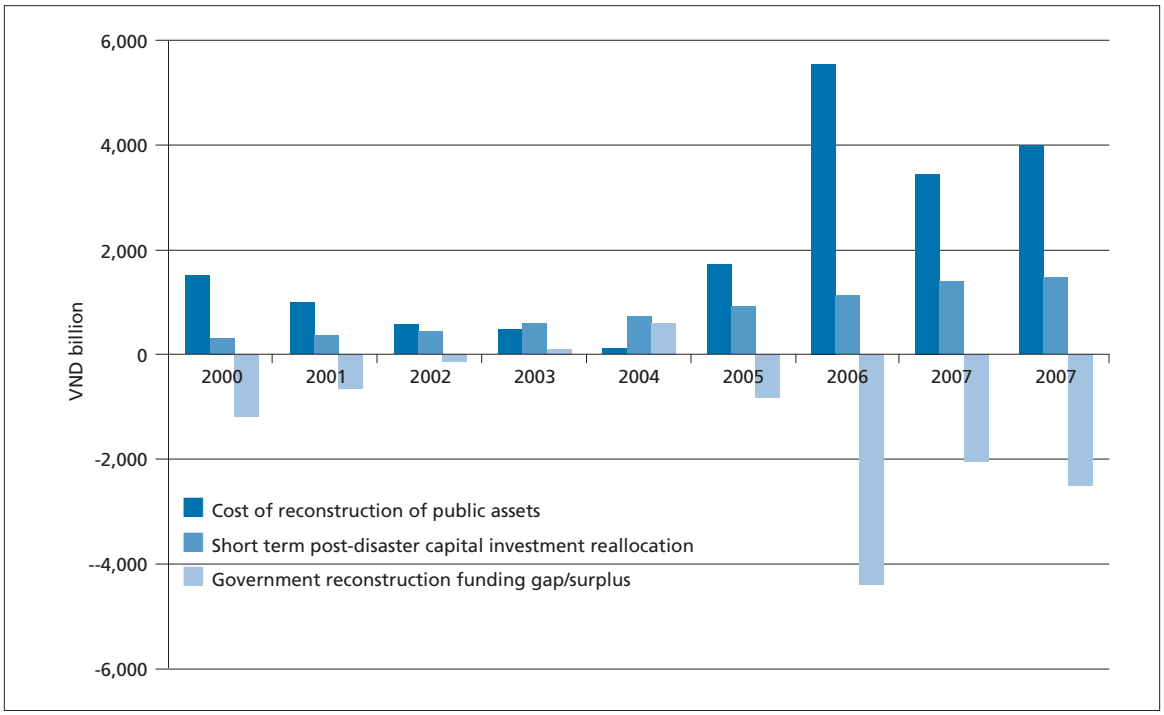
Using the assumptions in Box 3.3, Figure 3.4 depicts the estimated short-term recovery costs, the estimated short term budget resources, and the estimated short-term recovery funding gap over the period 2000-2008. Full details of this analysis are contained in Annex 9.

No short-term recovery funding gap is 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 needs. 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 costs. The highest recovery expenditure requirement of VND 4,641 billion (US$ 290 million) was incurred in 2006, when the country suffered major damage as a consequence of Typhoon Xangsane and three other typhoons. Over the nine year period the annual surplus of government resources over recovery costs ranged between a low of VND 76 billion (US$ 5 million) in 2001 and a maximum of VND 1,940 billion (US$ 123 million) in 2004.

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 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.

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)

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

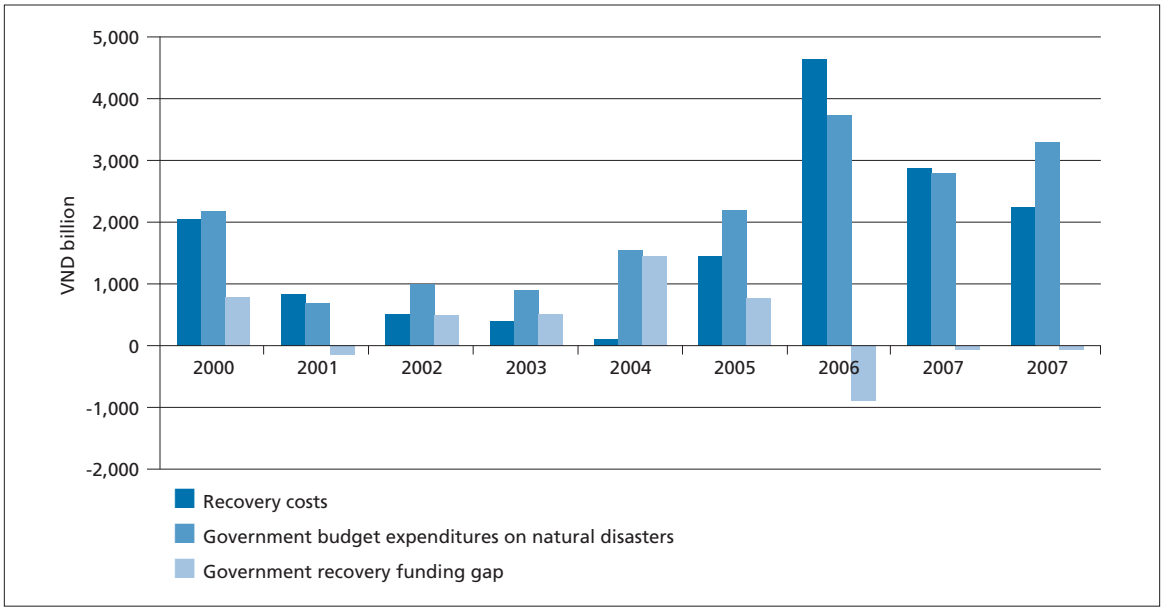
Major reconstruction funding gaps are identified for the period 2006-08. Between 2000 and 2004, the average value of losses due to natural disasters was below the long-term average and the short-term capital investment reallocations were either adequate to fully cover reconstruction costs (2003 and 2004) or to ensure that only small reconstruction expenditure funding gaps of less than VND one billion were incurred (2000 and 2001) (Figure 3.5). However, major reconstruction funding gaps are observed for the period 2006 to 2008, estimated at VND 4,411 billion (US$275 million) for 2006, VND 2,047 billion (US$127 million) for 2007 and VND 2,510 billion (US$152 million) for 2008. Moreover, it is likely that these gaps are under-estimates because they are based on CCFSC damage data, which may undervalue the full reconstruction costs of many public and private buildings and infrastructure.

Any outstanding reconstruction expenditures are met from the capital investment budget in future years, drawing on future fiscal resources (including loans). These options are discussed further in Chapter 4.

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 concerning short-term government fiscal resources. A sensitivity analysis is presented in Figure 3.6, which shows that in order to cover the average

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



Note: Sensitivity analysis assuming that only short-term government recovery expenditure is met from the contingency budget (40 percent central contingency budget; 20 percent local contingency budget).

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

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 percent of its contingency budget and local government about 20 percent of its contingency budget to recovery expenditure just to break even. Under the assumption of a 10 percent reduction in total government resources for recovery purposes, there would have been a small recovery funding gap or deficit in 2001 and a much larger one 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.

As if Analysis of Natural Disasters Funding Gap for Catastrophe Years

The analysis presented above is based on actual damage over the 9-year period 2000 to 2008 (in current VND), including 2006, the highest loss year over a wider 20-year period.

Much greater losses could be experienced in the future for two reasons: the growing concentration of population and assets at risk and a possible increase in the severity and/or frequency of natural hazards due to climate change. 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 implies an increase in assets exposed to natural hazards. A natural hazard of a given intensity would thus create more damage (in VND terms) today than yesterday, although recent risk reduction projects and higher building standards could offset greater exposure to some degree.

Future recovery and reconstruction funding gaps have been estimated assuming 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

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

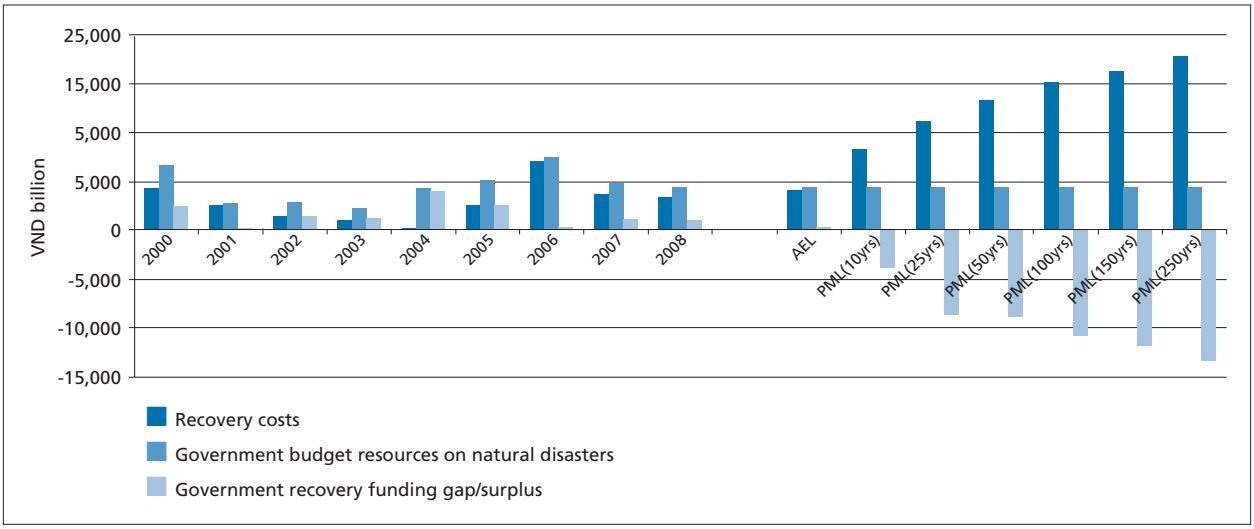
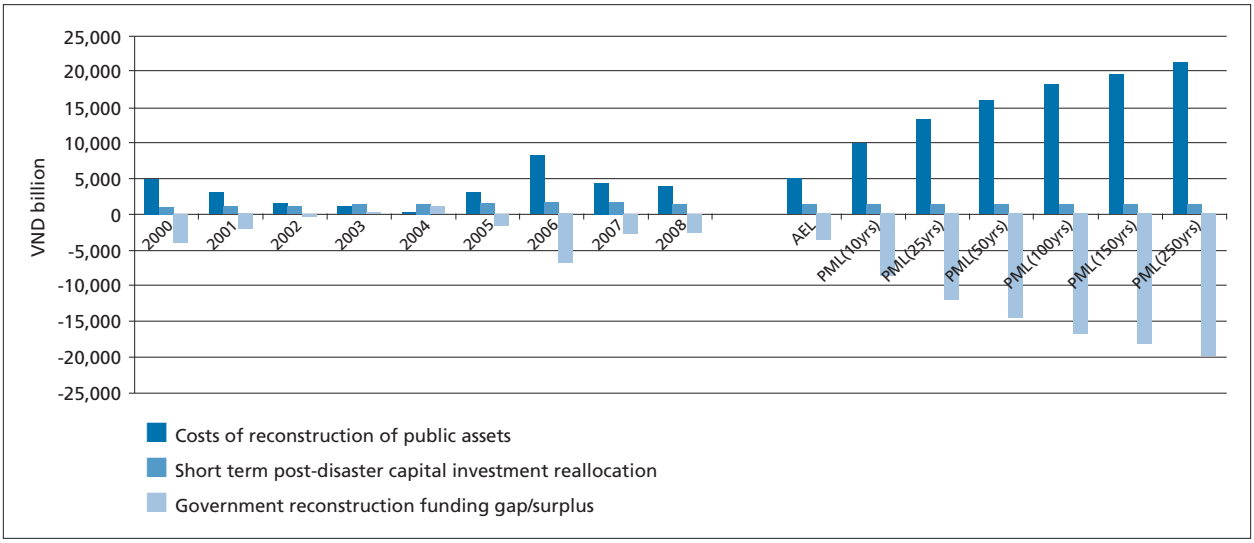


Figure 3.8. Estimated As If Reconstruction Funding Gap Analysis at 2008 GDP Values



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

a percentage of GDP for various return periods (10 years, 50 years, and 100 years) (Figures 3.7 and 3.8). Full details are provided in Annex 9. For purposes of comparison, historical data on recovery costs and budgetary resources are presented in real (2008) terms.

There is likely to be an annual average government recovery funding surplus in the future. At 2008 GDP values, the average annual expected value of total natural disaster damages is estimated at VND 16,255 billion (US$987 million). The average expected recovery costs faced by government are estimated at around VND 4,000 billion (nearly US$247 million) per year. The average annual government resources available for post-disaster expenditure are estimated at around VND 4,346 billion (US$264 million). Available resources

are thus sufficient to meet average expected government recovery costs 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 could be in the order of VND 33,000 billion in real (2008) terms. With recovery costs estimated at VND 8,300 billion (US$ 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.

There is likely to be an annual average reconstruction funding gap. The As If analysis shows that in an average year the GoV can expect to face reconstruction costs of around VND 4,900 billion (US$296 million) per year in real (2008) terms, of which about VND 1,500 billion could be financed through the short-term reallocation of capital expenditure. The 1-in 10-year government reconstruction funding gap is estimated at about VND 8,500 billion (US$ 516 million). This funding gap would rise to about VND14,500 billion (US$ 880 million) once in every 50 years.

Further modeling and analysis should be conducted in the future to refine these preliminary estimates. This analysis relies on a preliminary catastrophe risk modeling. State-of-the-art catastrophe risk models should be developed for the major perils in Vietnam (e.g., typhoons, floods and earthquakes) which, combined with a detailed database of assets (buildings, infrastructure and crops) and population at risk, would allow for a more accurate estimated of disaster losses. A thorough review of the budget expenditures process, particularly in the aftermath of a disaster, would also allow for a better assessment of the public resources available after a disaster. Nevertheless, the current analysis offers, for the first time, an assessment of the possible post-disaster recovery and reconstruction gaps, which can guide the decision maker towards a cost-effective financial management of natural disasters.

CHAPTER 4: OPTIONS FOR DISASTER RISK FINANCING IN VIETNAM

This section describes options for disaster risk financing to improve the capacity of the GoV 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 the event 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 risk reduction, 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 reduction; and (iv) institutional capacity building. Catastrophe risk financing aims to complement other disaster risk management activities and particularly to protect against extreme events that cannot be efficiently mitigated. It can also provide incentives for prevention and preparedness activities and allow rapid response once a disaster 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 hazards 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 to Vietnam below. Options for the financial protection of the GoV against natural disasters are discussed.

SOVEREIGN RISK FINANCING IN VIETNAM

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

The dynamic funding gap analysis conducted in Chapter 3 has identified possible post-disaster funding gaps both medium-term reconstruction and, in the future for short term recovery. This time-sensitive analysis supports the design of a cost-effective disaster risk financing strategy, as different financial instruments are available at different periods after a disaster (Figure 4.1).

Among the ex post (post-disaster) financing tools, contingency budget is the first to be immediately available after a disaster. The GoV relies heavily on its contingency budget to finance post-disaster recovery costs. Other ex-post financing tools usually take more time to mobilize and are mainly available for the reconstruction phase. These include emergency recovery loans and post-disaster reconstruction loans from international financial institutions, such as the World Bank.

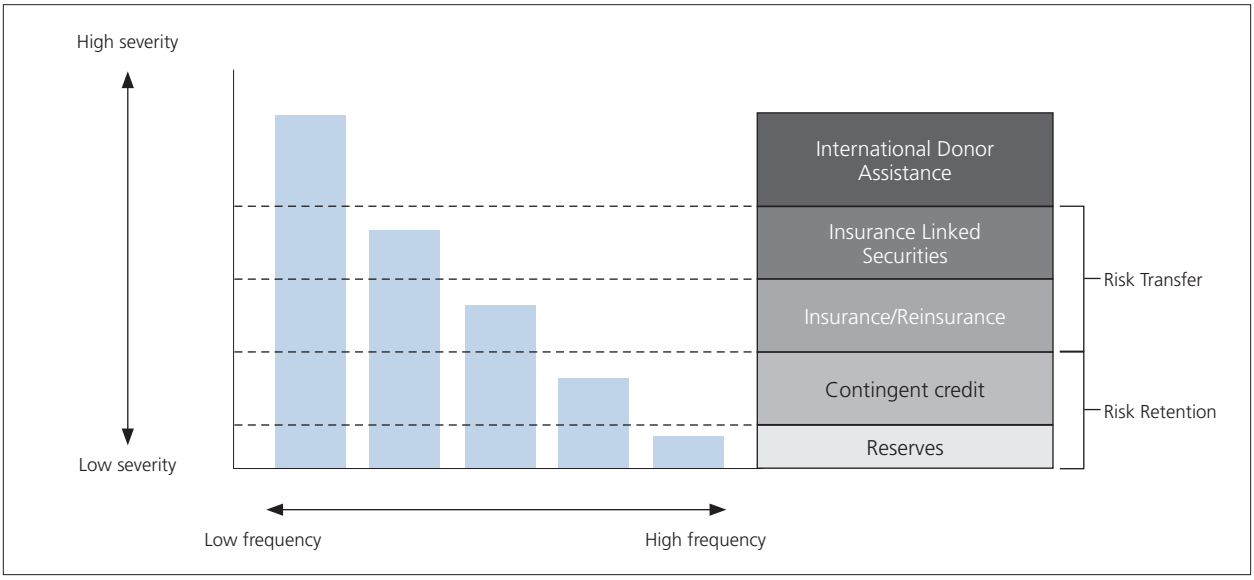
Ex ante financing instruments can provide immediate liquidity after a natural disaster. These instruments are designed and implemented *before* a disaster occurs. These instruments include national disaster reserve funds, contingent credit and insurance. An optimal combination of these instruments relies on disaster risk layering, as shown in Figure 4.2. 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, internation-

Figure 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).

Figure 4.2. Catastrophe Risk Layering



Source: Cummins and Mahul (2009).

al post-disaster donor assistance plays a central role after the occurrence of an extreme natural disaster.

Financing of the Recovery Funding Gap: Options for the GoV

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

The GoV 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 central and local contingency budgets (and some additional marginal resources) have allowed the GoV to finance estimated recovery expenditures over the period 2000-2008.

The contingency budget may not be sufficient to cover higher post-disaster recovery expenditures in the future. Should the GoV want to increase its contribution to 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 the GoV to reallocate planned recurrent expenditures or even planned capital expenditures in future years, with a negative impact on the country's long-term development agenda. Post-disaster budget reallocations may create major disruptions to planned development goals and initiatives, particularly where planned capital expenditure is affected.

The GoV could formally allocate a fraction of the planned contingency budget for natural disasters. This would avoid potential situations whereby contingency funds are almost exhausted at the point in time a disaster occurs. Over the period 2001-08, government-funded recovery expenditure has represented 45 percent of the annual contingency budget on average or an average 1 percent of total annual government expenditure.

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

The GoV 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 (Box 4.1).

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

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

% of 2008 government expenditure	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 US$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; and a US$85 million one for *Guatemala* in March 2009. The Colombian loan replaced the prior contingent IBRD investment loan contracted in 2005. DPLs with CAT DDO are currently under preparation in *Albania*, and *Croatia* as well.

The DPL with CAT DDO had the same lending base rate as regular IBRD loans. The front-end-fee, payable upon effectiveness, is 0.5 percent 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 percent). Repayment terms may be determined either upon commitment, or upon drawdown within prevailing maturity policy limits. The repayment schedule would commence from the date of drawdown.

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

The World Bank DPL with CAT DDO could offer the GoV an option for immediate budget support in case of natural disasters. The GoV could borrow US$250 million under a DPL with CAT DDO to secure additional budget support in the event 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 percent 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 GoV 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 for 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 the GoV

Post-disaster reconstruction of public assets in Vietnam is primarily financed through the GoV capital investment budget in future fiscal years, although securing such funds can take several years. The reprioritization of capital expenditure after a disaster may affect the long-term development objectives, as already noted.

The GoV is likely to face an annual average reconstruction funding gap. The analysis conducted in Chapter 3 identified reconstruction funding gaps in 2006, 2007 and 2008 in the range of VND 2,500-4,500 billion (US$150-275 million). This gap could be even larger in the future in the event of a 1-in-10 year or less frequent disasters. A one-in-ten year event could create a reconstruction funding gap in excess of VND8500 billion (US$516 million).

The GoV has already identified potential reconstruction funding gaps. As part of the World Bank Natural Disaster Risk Management Project, a disbursement facility was created to provide funding for post-disaster reconstruction of eligible small-scale public infrastructure. This US$20 million allocation has been exhausted, and the GoV and the World Bank have processed an additional finance project with US$75 million funding for this component.

The GoV 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 GoV 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 become available.

The GoV 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 that the GoV may want to further explore, although the catastrophe risk financing structure, and particularly the catastrophe bonds, may be too premature for Vietnam (Box 4.2).

Parametric insurance could help the GoV to secure additional financing in case of a major disaster. Parametric insurance products are insurance contracts that make payments based on the intensity of an event (for example, wind speed, earthquake intensity). Unlike traditional insurance settlements, which require an assessment of individual losses on the ground, parametric insurance relies on an assessment of losses using a predefined formula based on variables that are exogenous to both the individual policyholder and the insurer, but which 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 (Box 4.3).

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 percent 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 parts 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 FONDEN to develop its own financial strategy, relying on private risk transfer instruments such as reinsurance and catastrophe bonds. This helps FONDEN to increase its financial independence and overcome delays in budget reallocation. If the financial needs exceed the resources available in FONDEN, an emergency budget reallocation may take several months, as it has to be approved by the Parliament. In non-disaster years and in years of 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 provide cover against the risk of earthquakes (with a return period of 100 years or more), complementing the reserves of 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 a three-year period of the date of 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 reached maturity in 2009. The US$290 million cat bond was issued in early October 2009.

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

Box 4.3. Sovereign Parametric Insurance in the Caribbean

The World Bank has 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 approximately US$67 million to the initial reserves 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 disaster 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 damage caused by natural disasters is only partially covered by the GoV. While the GoV provides emergency relief and finances the reconstruction of public infrastructure, selected case studies of past disasters have shown that damage to residential housing and agricultural losses are only marginally covered by the GoV. Given that these damages are not the direct responsibility of the GoV and because of the lack of a 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 GoV 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 the GoV wants to secure about US$1,200 million to cover recovery costs and start the reconstruction of key public assets. Using the preliminary catastrophe risk analysis (see Chapter 2), Figure 4.3 below depicts a possible catastrophe risk financing strategy combining a contingency budget, national reserves, contingent credit and disaster insurance.

Starting from the bottom of Figure 4.3, the contingency budget would cover the first US$270 million of government disaster expenditures. It follows the current disaster risk financing strategy under which the contingency budget is the main source of disaster response funding. It is estimated that such contingency funding would be exhausted with a 44 percent probability (about once every 2.5 years). The next layer would be a disaster reserve fund, covering up to US$134 million of losses in excess of the contingency budget. The catastrophe risk financing analysis shows that such a re-

Figure 4.3. Illustrative Sovereign Disaster Risk Financing Strategy

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

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

serve fund combined with the contingency budget would cover probable maximum losses of about US$450 million, as is likely to occur once every 4 years. This self-retention strategy could 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 the contingency budget, disaster reserves and contingent credit) be exhausted, as would occur on average once every 12 years, a disaster insurance policy could be designed to provide up to US$512 million cover 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 the GoV to devise a strategy to protect against the fiscal impact of natural disasters. By combining self-retention and risk-transfer (i.e., insurance) tools, the GoV could secure access to immediate liquidity in the aftermath of a disaster at the lowest possible cost.

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 percent of GDP. Although this is low relative to international norms in OECD countries, it represents a major growth in demand for insurance. Between 2002 and 2006 non-life premiums grew at an average rate of 13 percent per annum.

The non-life insurance market offers a range of property insurance covers including basic fire and 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) poli-

cies (forming a 14 percent share in 2008 non-life premium), Construction All Risk (CAR) and Erection All Risk (EAR) polices (12 percent of the premium), Property All Risk cover (8 percent of the premium) and a very small market for compulsory fire and explosion insurance (under 0.5 percent of the premium). These property and construction risk covers either include catastrophe earthquake, flood and windstorm cover as integral perils (e.g. under 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, 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 so are very exposed to catastrophe flood and cyclone losses. The GoV 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 commercial property insurance 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

The GoV may wish to promote the development of a catastrophe residential housing insurance market in Vietnam as public 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. The Turkish Catastrophe Insurance Pool (TCIP) was established in 2000 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 the TCIP to model and rate the earthquake exposure; and a contingent loan in the start-up implementation phase 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 (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, an average premium rate of US$ 46 and a 2 percent of sum insured deductible. Premium rates are based on the construction type (2 types) and property location (differentiating between 5 earthquake risk zones) and vary from less that 0.05 percent for a concrete reinforced house in a low risk zone to 0.60 percent for a house located in the highest risk zone.
3) Policy marketing. The policy is distributed by about 30 existing Turkish insurance companies who 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 its inception in 2000, TCIP has achieved an average penetration rate of about 20 percent 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, a number of key decisions which would need to be made, including 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 the 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. This also appears to be a major issue in Vietnam. If the GoV is to reduce its fiscal contingent liability for post-disaster response, it may want to consider compulsory earthquake, storm and flood cover for selected residential properties.

(c) Target the product at urban property owners alone or all households. In Turkey earthquake insurance is only compulsory in urban areas. In Vietnam much of the rural housing stock is of wooden construction and is unlikely to meet minimum building standards required by local insurers and their reinsurers.

(d) Involve government in the 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 the 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 that once the project is completed insurance cover ceases to be purchased.

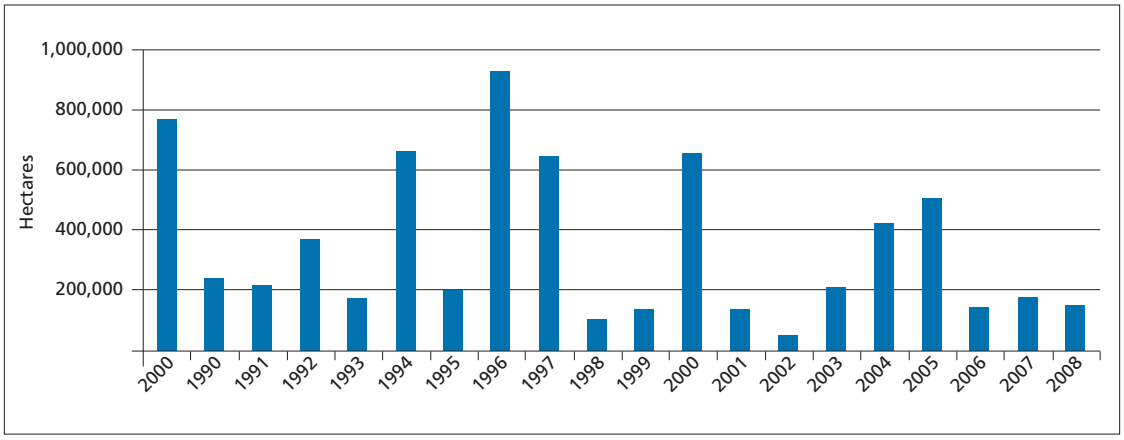
Property fire cover is compulsory for all public buildings and businesses. Fire (and explosion) cover is compulsory for public sector buildings in Vietnam and the MOF regulates a policy and sets market fire tariffs. These tariffs average about 0.4 percent, but range between 0.04 and over 1 percent according to the type of insured property, its use and fire exposure. This product is underwritten by 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 against fire or flood and wind storm. This is due to a number of factors including that buildings would not meet the minimum fire regulations required for insurance purposes, that insurance premiums are not budgeted for and that there is no tradition of insuring public property.

Some 30 to 40 percent of the total estimated value of disaster-related damage is incurred to rural schools, hospitals, public offices, businesses and rural infrastructure. Since these public assets are largely uninsured against natural catastrophe perils, the burden of 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

Figure 4.4. Annual Area of Rice Crop damaged by storm and floods (hectares)



Source: CCFSC Damage statistics

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 hazards in Vietnam. The agricultural crop, livestock, forestry and aquaculture sectors collectively suffer the highest damage as a consequence of natural hazards, totaling 35 percent of all reported losses according to CCFSC data over the 20-year period 1999 – 2008. Large areas of crops, including rice paddy, are affected. On average, 340,000 ha of rice were damaged by storms and floods each year between 1989 and 2007, with peak losses of over 900,000 ha in 1996 (a major storm and flood year) (Figure 4.4). Large numbers of livestock and poultry are also killed by storms and floods and major damage incurred to the aquaculture sector (Annex 6).

Agricultural Insurance Provision

The supply of agricultural crop and livestock insurance is extremely restricted in Vietnam and government disaster relief payments are the only source of compensation received by most farmers following a major flood or storm. The government provides recovery finance, usually in kind in the form of seeds, fertilizers and small livestock, to rural households following each major disaster. The government cannot, however, afford to compensate losses incurred by farmers, livestock breeders and aquaculture farmers in full.

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 country's 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 terminated the scheme in 1999 because of high losses. Today, Bao Viet only provides insurance for industrial crops including rubber, livestock

insurance for dairy cattle and a pilot aquaculture scheme for catfish (MoF, 2009)[20]. In 2001, the GoV granted Groupama the French mutual agricultural insurer, the first license 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 its products and major problems of adverse selection, particularly in the case of flood[21]. Other key issues identified by the company included 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 since withdrawn from crop insurance and in 2009 is underwriting a very small livestock portfolio only.

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

There is a 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. This is a major constraint to their development of this class of business for Vietnamese farmers.

Various international aid donors, including the World Bank, ADB and the Ford Foundation, have assisted the 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 Vietnam Bank for Agriculture and Rural Development (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) for coffee production in the central highlands. 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,. However, it is currently on hold pending decisions by the client. The drought index insurance cover is due for launch in 2010.[22]

The GoV 2008/09 Agricultural Insurance Initiative

In 2008, the GoV appointed MOF/MARD and VinaRe to conduct a feasibility study on the introduction of a national agricultural insurance program in Vietnam. The feasibility study was chaired by VinaRe and, in 2009, the study's "Working Group", comprising VinaRe and the Insurance Commission of the MoF, visited France and China to study 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

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

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

[22] 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.

China to provide state subsidized crop, livestock, forestry and aquaculture insurance. Other options under consideration included the formation of a National Agricultural Insurance Fund (MoF, 2009). VinaRe noted that if a national agricultural system was to be introduced into Vietnam, it believed that farmers might not be able to afford cover without heavy premium subsidies of up to 70 percent, perhaps costing the government US$200 - 500 million per annum. The Working Group has submitted its findings and recommendations to the GoV for a national agricultural insurance program in March of 2010.

The World Bank has major international experience with the planning and design of agricultural crop and livestock insurance programs. It 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. This could possibly be implemented 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 in 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. A combination of traditional and index insurance products may offer solutions which permit government to transfer a major share of its current natural disaster response fiscal burden to the insurance sector. Pre-conditions for the introduction of agricultural insurance into Vietnam include the development of a technically-based risk assessment, product design and rating and a commercial insurance approach to program implementation.

CHAPTER 5: CONCLUSION

This report analyses the financial protection of the state of Vietnam against natural disasters. This report has used catastrophe risk modeling techniques and reviewed the Government budget process to provide an empirical assessment of the budget impacts of natural disasters in Vietnam. It demonstrates a new methodology to identify and quantify the government recovery and reconstruction gaps/surpluses, which can be applied for different fiscal management purposes.

This analysis contributes to sensitizing the Ministry of Finance on the fiscal impact of natural disasters. The disaster risk management agenda is usually driven by the national disaster risk management office, under the MARD. By highlighting the economic and fiscal impacts of natural disasters, this analysis is geared towards the MoF and thus includes it in the overall dialogue on disaster risk management with the international donor partners. In particular, it provides the MoF with a tool to assess the fiscal risks due to natural disasters as part of its overall public debt management.

This report is a first step in building institutional capacity on sovereign disaster risk financing. Sovereign disaster risk financing is a relatively new pillar in the comprehensive disaster risk management framework. Very few countries have attempted to develop a sovereign financial strategy against natural disasters. This report provides the basis for a dialogue on sovereign disaster risk financing with the Government of Vietnam. Additional institutional capacity building could include (i) workshop(s) with the relevant departments within MoF, including budget, debt management and capital investment, on international experience on sovereign disaster risk financing; (ii) South-South cooperation (with countries like Mexico or Indonesia) on sovereign financial disaster risk management; and (iii) a regional workshop on sovereign disaster risk financing in Asia.

This analysis can be further refined, particularly using catastrophe risk modeling techniques. Catastrophe risk models, for major perils like typhoons and floods, could be developed for Vietnam. These models rely on state-of-the-art probabilistic risk modeling techniques and require a detailed inventory of assets and population at risk. Catastrophe risk models offer numerous applications to assist public and private decision makers in the management of natural disasters: emergency preparedness, risk mitigation investments, catastrophe risk insurance development, etc. Open source platforms 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.

The government post-disaster budgeting process can be further analyzed to provide precise information. The report has illustrated the post-disaster budget reallocation and appropriation process through selected case studies. However, the lack of detailed reporting and recording of post-disaster expenditures by central and local governments is a major impediment for this analysis. Further investigation is required to analyze the post-disaster budget flows, particularly between the Central Government and the Local Governments.

A national sovereign disaster risk financing policy paper could be prepared. The World Bank could assist the Government of Vietnam in the drafting of a national sovereign disaster risk financing strategy, as part of its National Strategy for Disaster Prevention, Response and Mitigation.

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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 non-participation 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 related 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 than sellers 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	A situation where (1) the insured is liable for part of each and every loss, often expressed as a percentage of the sum insured or (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 are 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	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 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 non-insured causes.
Due Diligence	The responsibility of an external reviewer to perform an investigation of risk associated with a potential client, as 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 Management	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 Management	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	The risk that income will not reach expected levels, or that 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 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 which, once 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 Income	Gross written premium of a primary insurer, minus cancellations, 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 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 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 the 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 from 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.
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 insurer 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. This is 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, by 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 for 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) and 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 to 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 to 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 allows 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, floods, earthquakes and other natural perils. The physical and financial damages associated with cyclones, floods and landslides over the past 20 years are analyzed in Annex 3.

1.1 NATURAL HAZARD EXPOSURE IN VIETNAM

Vietnam is ranked as the seventh most exposed country in the world to multiple natural hazards including floods, tropical cyclones (typhoons), tornados, landslides and droughts. An estimated 59 percent of the total area and 71 percent of the population are exposed to cyclones and floods. (World Bank 2005)[23].

According to the GoV (2004,)[24] ***floods, typhoons, flash floods, tornados and droughts are high frequency events*** in Vietnam: hail, landslides, forest fires and salinization of soils due to tidal surge are medium events; and earthquakes are considered low frequency events (Table A.1.1).

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 hazard risk regions. The severity of each type of hazard in each region is indicated in Table A.1.2. and Figure A.1.1. Key features of the regions are as follows:

North West: This region is comprised of the four north-west provinces of North Vietnam, sharing borders with Lao PDR and China. It is mountainous, sparsely populated and prone to flash floods, floods and landslides.

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

[24] 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.

North East: This region contains 11 provinces, sharing a border with China to the north and facing sea to the east. Like the North West region, this region is mountainous and also prone to flash floods, floods and landslides. In addition, the coastal zone experiences storm surges, storms and whirlwinds.

Red River Delta: This is a densely populated region in the delta of the Red River region, consisting of nine provinces and the cities of Hanoi and Hai Phong. The country's main economic activities are located in this region. It is also one of the two main rice bowls of Vietnam (the Mekong Delta being the other). The delta of the Red River is a flat, triangular region of 15,000 km^2. Two other rivers, the Lo and the Da, supply water to the Red River, contributing to its high water volume, which averages 4,300 m^3 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 storms; and at some places the high-water mark of floods is fourteen meters above the surrounding countryside. Flood control has been an integral part of the delta's culture and economy for centuries.

North Central Coast: This highly populated region is located in the northern part of central Vietnam, consisting of 6 provinces. It has a long coastline and is most prone to storms and floods. The weather is harsh, for instance due to the continental hot dry wind blowing from Laos in the summer.

South Central Coast: This region is comprised of the five coastal provinces of southern central Vietnam. The country is wider along this stretch than in the North Central Coast region, so the inland areas are separate provinces. In common with the North Central Coast region, the South Central Coast region is also particularly prone to storms and floods**.**

Central Highlands: This region is comprised of the five inland provinces of south-central Vietnam, much of whose terrain is mountainous. The region is prone to droughts, floods, flash floods and whirlwinds.

Southeast: This region is comprised of those parts of lowland southern Vietnam which lie north of the Mekong delta. It contains seven provinces and 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 storms, floods, whirlwinds and forest fires.

Mekong Delta: This 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 is also important in the production of other agricultural and aquacultural outputs. 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 therefore back up into the Tonlé Sap, causing the lake to inundate as much as 10,000 km^2 of land, or 25 percent 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.

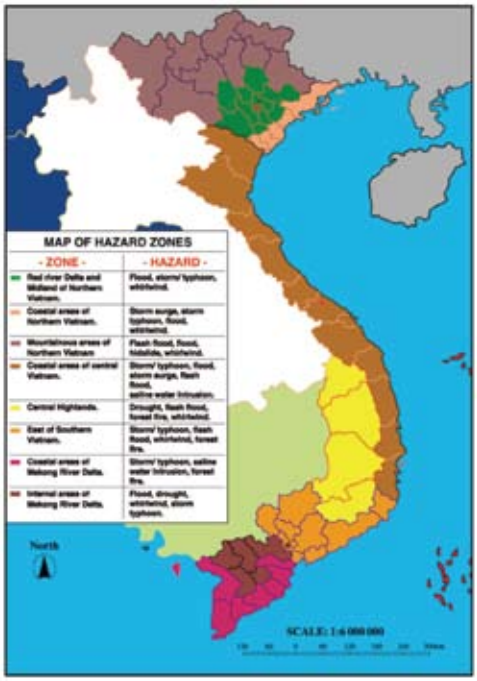
Table A.1.2. Assessment of Disaster Severity in Different Geographic Areas and in the Coastal Economic Zone of Vietnam

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 over a 48 year period from 1961 to 2008 drawing on data available from the National Hydro-Meteorological Service (NHMS) website[25].

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). The database records information on the coastal region affected, the Beaufort Storm scale and the month

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

and year of the occurrence for each event . Over the 48-year reference period, a total of 233 wind storm events were recorded.[26]

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 are (1) tropical depression, for wind speeds from 0 to 62 km/hr (up to and including category 7 on the Beaufort Scale); (2) tropical storm (62 to 88 km/hr); (3) severe tropical storm (89 to 117 km/hr); and (4) typhoon (sustained wind speeds in excess of 118 Km/hr), which is equivalent to a hurricane on the Beaufort Scale. While the Saffir-Simpson scale distinguishes between 5 categories of hurricane, NHMS data is only available for Beaufort Scale 12 (118-133 km/hr) and 13 (wind speeds in excess of 133 km/hr) events.

Table A.1.3. Tropical Cyclone Naming Definitions used in Vietnam and Comparison with the Beaufort and Saffir-Simpson Scales

Beaufort Scale					Saffir-Simpson Scale			
scale	Mph	km/hr	Description	Classification	mph	km/hr	meters/sec	Classification
0	<1	<2	Calm					
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	Tropical	0-38	0-62	0-17	Tropical
5	19-24	29-38	Fresh breeze	Depression				Depression
6	25-31	39-49	Strong breeze					
7	32-38	50-61	Near gale					
8	39-46	62-74	Gale	Tropical Storm				
9	47-54	75-88	Severe Gale					Tropical
10	55-63	89-102	Storm	Severe Tropical	39-73	63-117	17-33	Storm
11	64-72	103-117	Violent Storm	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

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

Windstorm Analysis by Region

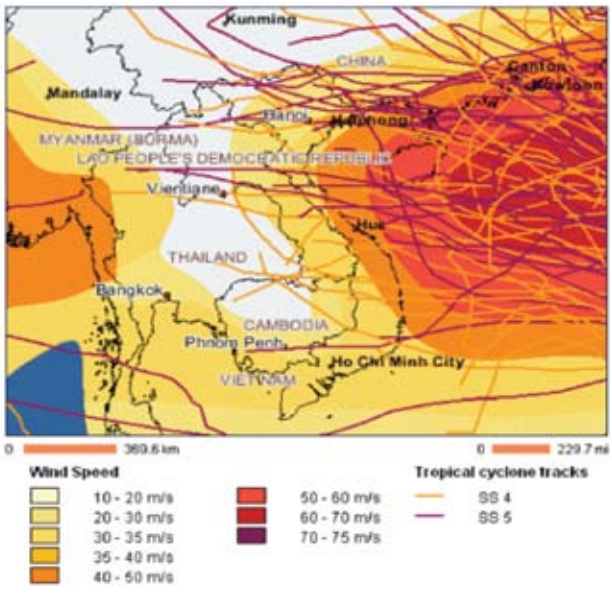
Moving from north to south, NHMS identifies 5 main windstorm regions in Vietnam as follows: Quang Ninh – Thanh Hoa; Nghe An – Quang Binh; Quang Tri – Quang Ngai; Binh Dinh – Ninh Thuan; Binh Thuan – Ca Mau (Figure A.1.2).

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 are very exposed to tropical storms and typhoons (hurricanes) while the south has historically experienced very few typhoons. Over the period 1961 to 2008 Vietnam experienced a total of 233 tropical cyclone events with wind speeds of Beaufort category 6 or above, equivalent to nearly 5 events per year. The northern regions of Vietnam exhibited 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 0.7 events of category 10 or greater (Severe Tropical Storm and Typhoon). In contrast, Binh Thuan – Cau Mauc (Mekong delta) experienced an average of only 1 storm event every three years and a category 10 or greater event only 1 in 10 years. Indeed, over the 48-year period of analysis only one typhoon (hurricane) was registered in southern Vietnam, namely Typhoon Durian in 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.

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



Source: AXCO 2009

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

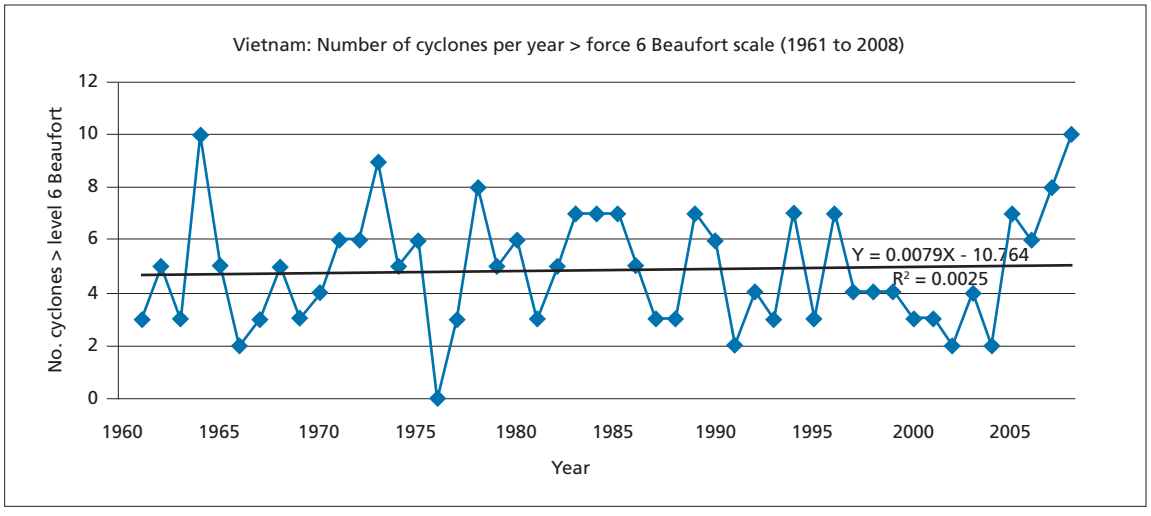
Region	Number of storm events	Average number of storms per year	Number of Storms of Scale 10+	Average number of storms of 10+ per year
Quang Ninh - Thanh Hoa	82	1.7	32	0.7
Nghe An - Quang Binh	41	0.9	17	0.4
Quang Tri - Quang Ngai	44	0.9	10	0.2
Binh Dinh - Ninh Thuan	51	1.1	8	0.2
Binh Thuan - Ca Mau	15	0.3	3	0.1
Grand Total	**233**	**4.9**	**70**	**1.5**

Source: World Bank analysis of NHMS tropical cyclone data.

Tropical Cyclone Trends over Time (1961 to 2008)

There has been an average of nearly 5 tropical cyclone events per year in Vietnam over the period 1961 to 2008 but there are no statistically significant trends in the frequency of events over this period. Tropical cyclone activity peaked in 1964 and 2007, with 10 events of Beaufort scale 6 or greater in both years (Figure A.1.4). The analysis shows that tropical cyclone activity was well below average between 1995 and 2005 and was on the increase from 2006 to 2008. 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 (see below).

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

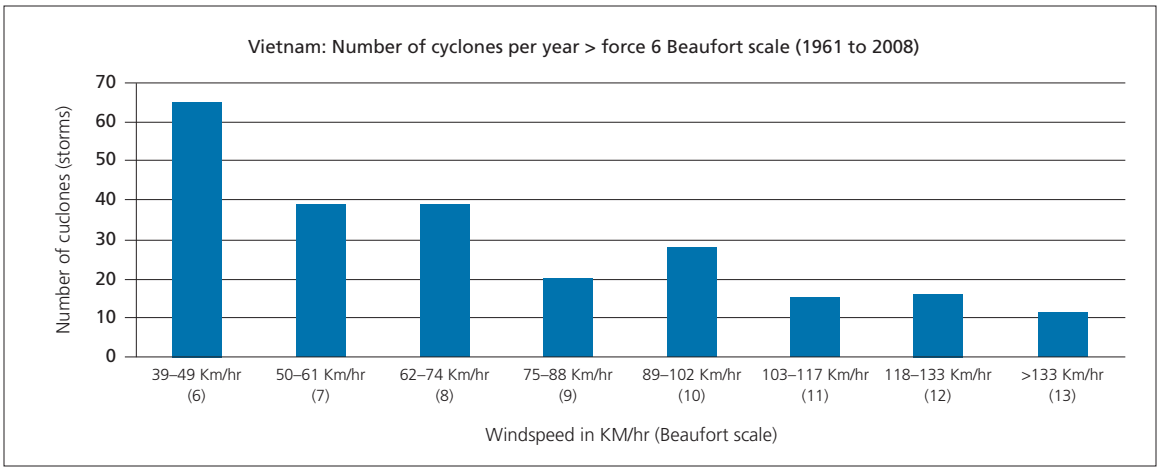


Source: World Bank analysis of NHMS tropical cyclone data.

Analysis of Tropical Cyclone Severity

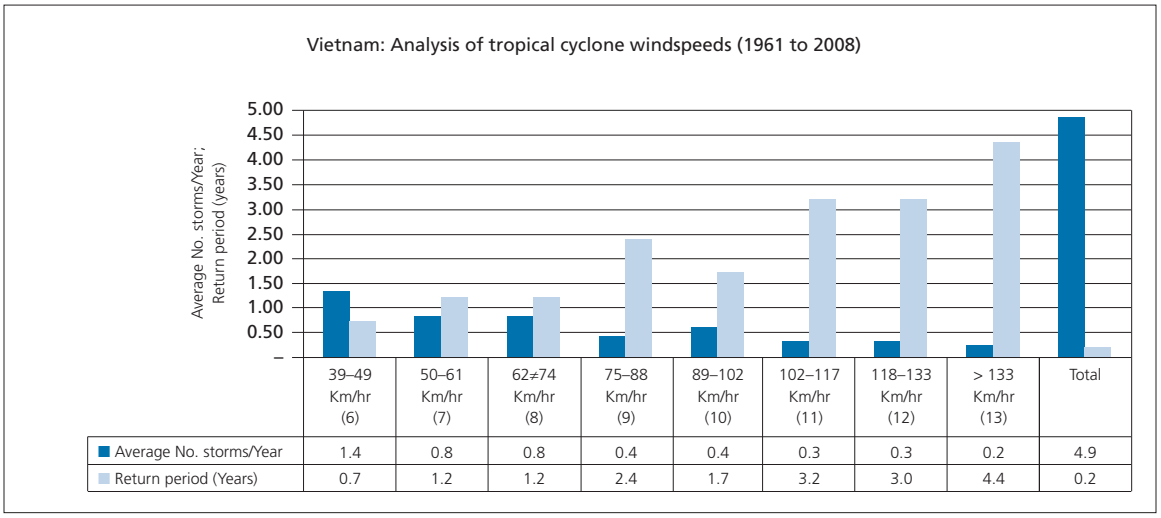
Between 1961 and 2008 Vietnam experienced 27 severe typhoon events, equivalent to a return period of 1 in 2 years. Over the same period there were 16 category 12 typhoons, implying a return period of 1 in 3 years, and 11 category 13 severe typhoons, implying a return period of 1 in 4.4 years (Figure A.1.5 and A.1.6).

Figure A.1.5. Number of Tropical Cyclones in Vietnam 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 in Vietnam by Beaufort Scale of Intensity,1961-2008



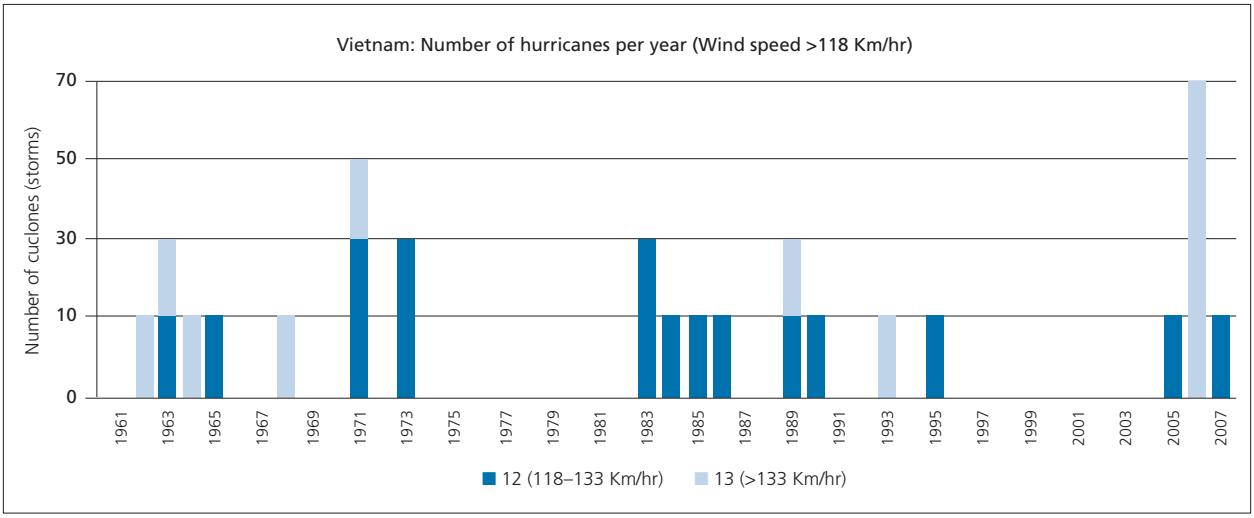
	39–49 Km/hr (6)	50–61 Km/hr (7)	62≠74 Km/hr (8)	75–88 Km/hr (9)	89–102 Km/hr (10)	102–117 Km/hr (11)	118–133 Km/hr (12)	> 133 Km/hr (13)	Total
Average No. storms/Year	1.4	0.8	0.8	0.4	0.4	0.3	0.3	0.2	4.9
Return period (Years)	0.7	1.2	1.2	2.4	1.7	3.2	3.0	4.4	0.2

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. In contrast, since 2005 there have been 6 typhoons (an average of 1.5 events per year). The year 2006 was the worst 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.).

Between 1961 and 2008, nearly two thirds of all typhoons struck the central region of Vietnam, one third hit the north and only 1 typhoon, Durian, affected the south of the country (Table A.1.5).

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



Note: There was no category 12 or 13 windstorm event recorded in 2008.

Source: World Bank analysis of NHMS tropical cyclone data

Table A.1.5. Vietnam Named Typhoon (Hurricane) events by Region, 1961 to 2008

Region / Named Typhoon event	Quang Ninh - Thanh Hoa	Nghe An - Quang Binh	Quang Tri-Quang Ngai	Bình Dinh - Ninh Thuan	Binh Thuan - Ca 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				

Table A.1.5. Continued

Region / Named Typhoon event	Quang Ninh - Thanh Hoa	Nghe An - Quang Binh	Quang Tri-Quang Ngai	Binh Dinh - Ninh Thuan	Binh Thuan - Ca Mau	Total
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. It is progressively later in the center and south of the country, with cyclones experienced in October and November in the far south (Table A.1.6). This finding has significant implications for the planning and deployment of emergency relief resources by region during the typhoon season (1 May to 30 November).

Table A.1.6. Tropical Cyclone Distribution by Month and Region in Vietnam, 1961 to 2008

Month	North – South direction →					
	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. There are some 2,372 rivers with a length of over 10 km, comprising 13 large river systems and covering 80 percent of the country's territory. The river systems have a total basin area of 1,167,000 km^2, both inside and outside Vietnam, and a total annual water flow of 847 billion meters^3. The Mekong River carries the largest volume of water (500 billion m^3), followed by the Red River (126 billion m^3). These two rivers are very prone to flooding in the summer rainy season from June to September (Figure A.1.8.)

Flash flooding is a feature of the Central Highlands and Central Coast where average rainfall is highest, reaching 2,000 to 2,500 mm per annum. The rivers are steep and highly incised and flow into the narrow coastal region where population and agriculture are concentrated. As such, 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

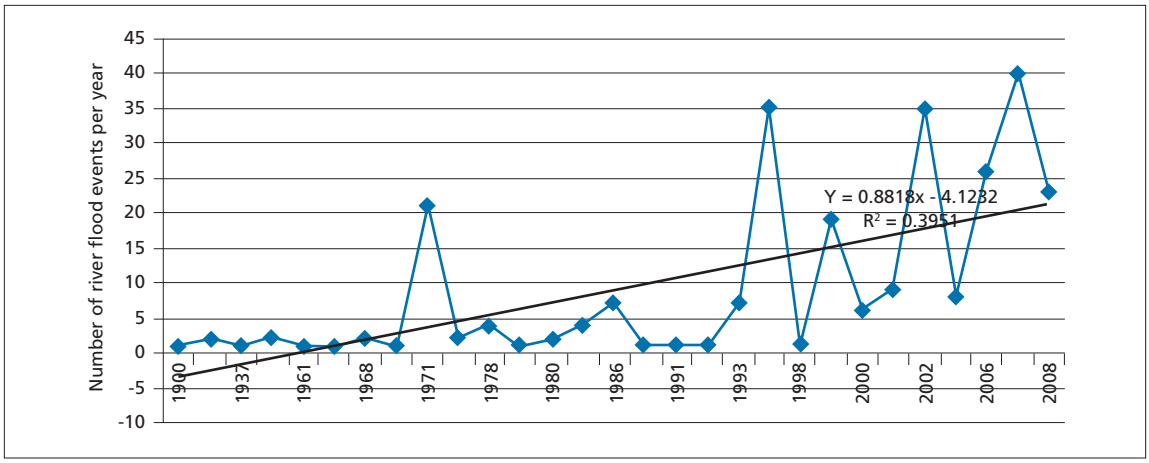
Source: Hydro-Meteorological Data Center at http://www.hymetdata.gov.vn/

Flood statistics

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 recorded between 1900 and 1960. This implies a grand total of 264 flood events. Analysis of the statistical data shows that:

- The flooding in the Mekong Delta (An Giang Province) occurs around August each year and lasts 111 days on average. The long duration of flooding is explained by the fact that the Mekong river catchment area is huge, extremely 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 to 8 days (Nghe An; Bac Giang) and 12 to 13 days (Thanh Hoa; Hue).
- 243 flood events, or 92 percent of the total, occurred between July and November. August is the peak month for flooding, accounting for 100 events, followed by October (47 incidents).
- The annual frequency of flood events peaked in 1971 (with 21 recorded flood events) and again in 1996 (35 incidents), with a period of lower incidence in between.
- In general, there appears to have been an increasing trend in the incidence of flooding since 1993 (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 rivers and improved monitoring, reporting and recording of floods.

Figure A.1.9. Annual Number of Flood Events in Vietnam, 1900 to 2008



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

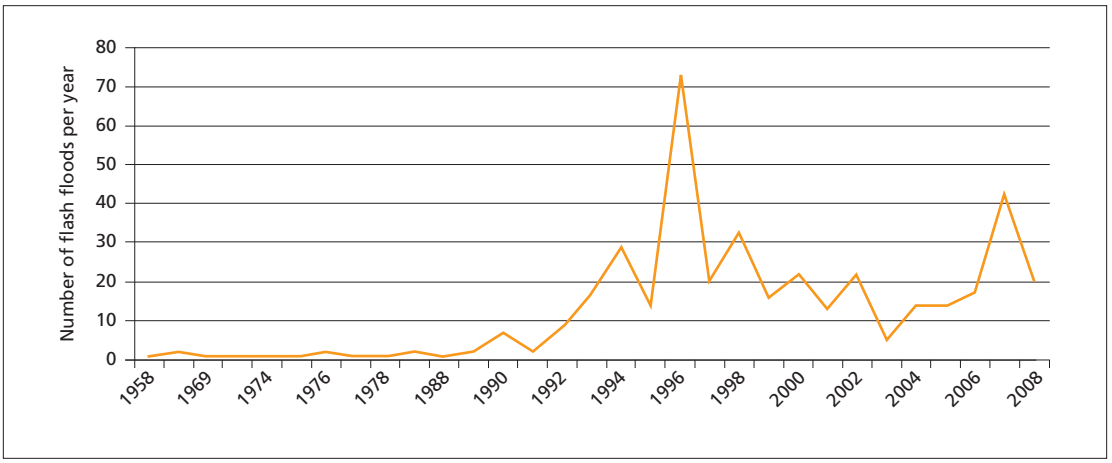
Flash Floods

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

Annual data on the number of flash floods for the period 1958 to 2008 appear to suggest that there has been a major increase in their incidence since 1992 (Figure A.1.10. However it is again suggested that this is not the case and that the reported increase reflects 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 the 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 (Figure A.1.11.a).

Earthquake is not recognized by the Vietnamese insurance industry as a major hazard, despite the fact that many earthquakes of magnitude 7.0 and greater have occurred in Vietnam in the past (AXCO, 2009).[27] This is due to the fact that the mountainous north-west region, which has the highest earthquake exposure, has a very low population density and no industry or infrastructure of any consequence.

The earthquake exposure in Vietnam may, in fact, be higher than recognized. Since 1900 Vietnam has experienced two level 8 (Richter scale) or more earthquakes, 17 level 7.0 or greater and 115 level 6.0 or greater (AXCO, 2009), suggesting that the country is not as low an earthquake risk as is often claimed.

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

Figure A.1.11.a Seismic Map of Vietnam

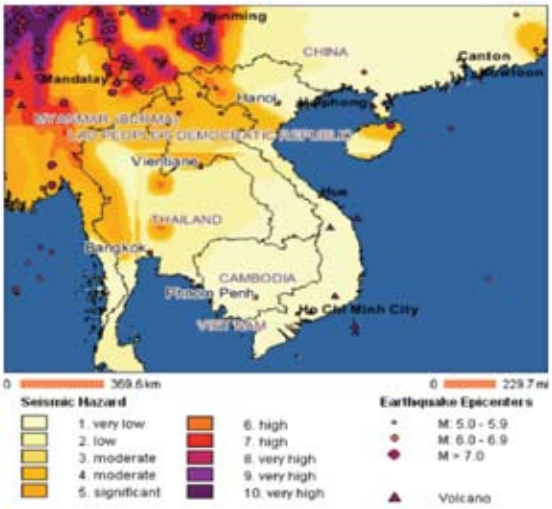
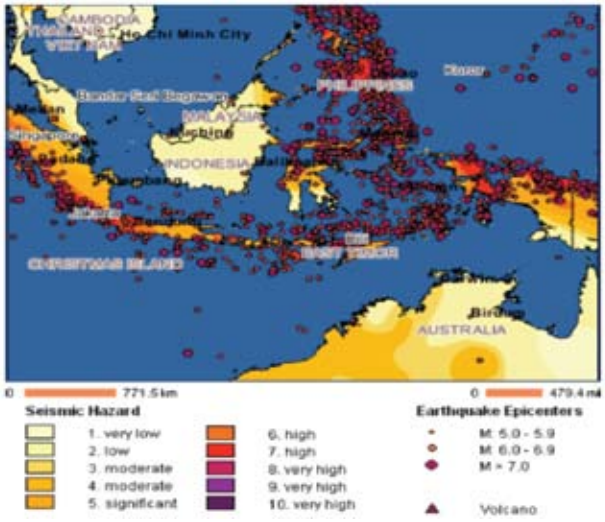


Figure A.1.11.b Seismic Map of Indonesia



Source: SwissRe CatNet reported by AXCO 2009

The extremely low-lying areas of Southern Vietnam could also be severely impacted by a tsunami caused by a sub-sea earthquake in the Indonesian fault zone (Figure A.1.11.b). 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 including drought, bush fire, saline water intrusion, and 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.[28] Cold weather and frosts are only reported in the northern part of the country.

Some typical event during the last few years include:[29]

- Drought (1998): 3.1 million people were affected and total estimated damage of VND500 billion (US$37 million) incurred;
- 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 were destroyed.
- Bush fire (2007): 791 bush fires destroyed a total 4,740 ha of forest.
- Cold (1991) in Central Vietnam: 251 dead.

[28] According to GoV (2007), food crop production is reduced by 20 to 30 percent in severe drought years, threatening people's livelihoods. Prolonged droughts results in desertification risks, particularly in the South Central region.
[29] Workshop on non-water related natural catastrophes in Vietnam, Hanoi, May 2008.

ANNEX 2. NATURAL DISASTER DAMAGE ASSESSMENT SYSTEM

This annex presents further details of the Damage Assessment and Needs Assessment (DANA) procedures and forms which were introduced into Vietnam in 2006 to strengthen the measurement, recording and reporting of the value of damage to public infrastructure, private housing, agriculture and so forth following a major natural disaster event. It is not, however, 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 the Ministry of Finance (MoF) and Ministry of Agriculture and Rural Development (MARD).[30]

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, provincial, district and commune levels following Vietnam's administrative system. At provincial, district and commune levels it is called the "Committee for Flood and Storm Control and Search and Rescue".

At the central level, CCFSC consists of a number of relevant line ministries and services such as the hydro-meteorological service and radio and television service. MARD takes the chair while representatives of the Office of the Government and Ministry of Defense are vice-chairmen (Figure A.2.1).

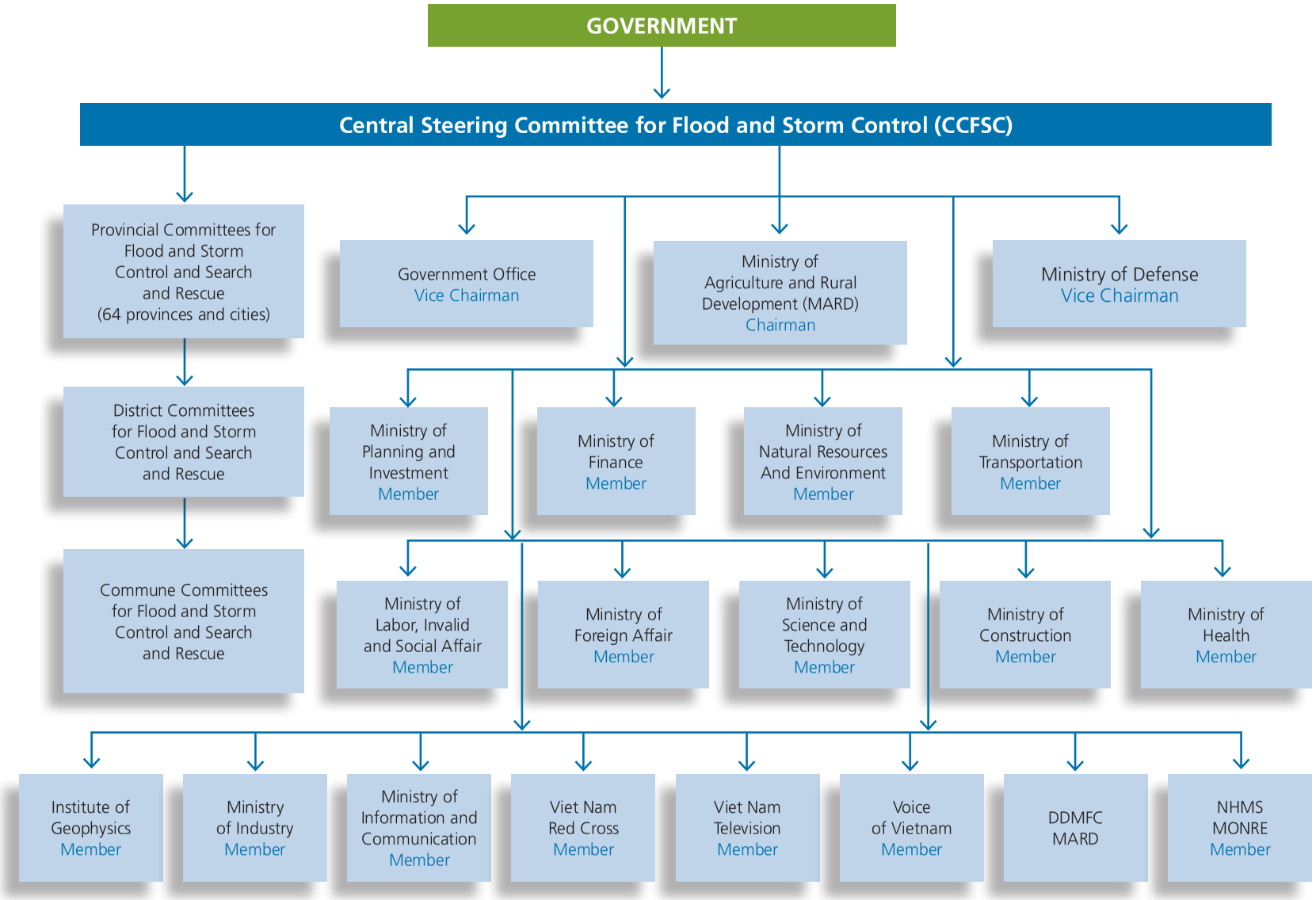
Decision 557/QD-TTG of the Prime Minister dated May 18, 1999 specifies that the functions of CCFSC are to assist the Government with:

- Monitoring and ensuring that 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 or local authority;
- Coordination with local authorities to rectify the aftermath of storms and floods;
- Review of activities and sharing of 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.

[30] 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 A.2.1. Organizational 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. This information is complemented by damage assessment data compiled by the local line ministry representatives. The damage data are typically updated on a daily basis after an event. The data are passed up from commune to district level where they are consolidated into a district-level report. District reports are then submitted to the provincial level where they are consolidated again into provincial-level reports and financial estimates of the damage added (see below for further discussion). The provincial damage assessment reports are submitted to the Standing Office of the CCFSC – that is, to the Department of Dyke Management and Flood and Storm Control (DDMFC) in MARD – for further consolidation and related advice prepared for CCFSC and the Prime Minister in determining allocations of post-disaster funding from the central government's contingency budget, reserve funds and other sources. DDMFC also places the consolidated damage reports, often by provinces and event, on the CCFSC's website at www.ccfsc.org.vn, and shares them directly with interested parties for information and research purposes.

In 2006, MARD implemented a project to strengthen Vietnam's natural disaster damage assessment procedures by introducing the Damage Assessment and Needs Assessment (DANA) system. A revised and strengthened damage assessment form was designed under this project, as presented in Table A.2.1. This form is very detailed, containing 13 sub-sections ranging from human loss of life (Section 1) through to damage to clean water and the environment (Category 13). The form requires commune-level assessors to compile data on the physical damage in quantity terms. It is understood that the provincial level committees are then responsible for completing columns on the financial value of the damage, based on the unit price of each category of damage.

The revised damage assessment system is currently being implemented in three provinces only (Lao Cai, Dong Thap and Quang Tri). Other provinces are using an earlier version of the form and the system has thus yet to be standardized across the whole country.

The recording of physical damage appears to have been 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.

Data on 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 estimate of total damage for the whole event, rather than a breakdown per category of damage. For 31 of the events (16 percent of the total) there is no available financial loss data at all. Furthermore, in nearly all other cases the value of damage is not recorded for each category of damage. To illustrate this problem, a summary of the damage resulting from a flood event in Central Vietnam between 1 and 6 November 1998 is presented in Table A.2.2. This report is one of the most complete on record in terms of the financial value of damage yet only 49 percent of the total damage in value terms is broken down by sector. This problem continues through to today.

2.3. NEEDS ASSESSMENT PROCEDURE AND AUTHORIZATION 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. The Provincial 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 reporting system by Lao Cai, Dong Thap and Quang Tri Provinces to the CCFSC nor of the procedures for authorizing the release of funds post disaster for 1) emergency relief, 2) post-disaster and c) Recovery/Rehabilitation.

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

On the basis of a review of sample province damage relief payment requests made to the Prime Minister's Office and CCFSC it appears that the procedures are not consistent or standardized across provinces.

Table A.2.3. presents a short one-page summary request from Ha Tinh Province for central funding to cover damages arising from Storms Nos. 2 and 5 in 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, VND 70 billion to cover repairs to public sector buildings and utilities, VND 55 billion to upgrade roads and dams and food aid, seed and a power boat in kind. The report is not, however, accompanied by any completed damage assessment or needs assessment forms and it is not possible to analyze 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 Office 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 DANA reporting system for natural disaster damages and (b) a centralized database for recording actual expenditure on post-disaster emergency relief, early recovery and medium to long term reconstruction make it very difficult to conduct a detailed review of the financial costs to government of natural disaster recovery and rehabilitation in Vietnam.

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				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		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				
		YT013	Rooms submerged	room				
		YT02	Medicine damaged	million VND				
		YT03	Medical materials & equipments damaged	million VND				
		YT04	Other assets damaged	million VND				
5	OTHER CON-STRUCTIONS	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.				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		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				
		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				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		NN17	Farmland area eroded without possible recovery	Ha				
		NN18	Cattle & poultry foodstuff damaged	ton				
		NN19	Decorative plants damaged	No.				
7	IRRIGATIO N	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	TRANSPORTA-TION	GT01	Damaged national and provincial roads					
		GT011	Length of roads swept away and slided	m				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		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				
		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				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		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	COMMUNICA-TIONS	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				
		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.				

Table A.2.1. Continued

No.	Type of damage	Code	Items	Unit	The total damage Province/City			Remark
					Quantity	Unit Price (million VND)	In-cash (million VND)	
		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.VND				
12	CONSTRUCTION	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 of damage	Item	Unit	Number 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 the 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 the Prime Minister's Office

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

For the short term, the Government is requested to:

- 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**

QUANG TRI, STORM NO. 6, 2006 (Typhoon Xangsane)			DAMAGE	UNIT COST	TOTAL LOSS
Category of Damage	**Detail**	**Unit**		**VND million**	**VND million**
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

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**
	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 database for the period 1989 to 2008. The analysis is presented both in current Vietnamese dong (VND) and US dollars (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. A complementary. provincial-level analysis of the impact of Typhoon Xangsane, which caused major losses across 15 provinces in October 2006, is also performed.

There are 193 recorded disaster events in the CCFSC database for the period 1989 to 2008. However, there are no financial damage estimates for 31 of these events (16 percent of total), many of which occurred during the earlier part of the period of analysis. It is thus recognized that the reported data probably considerably under-estimate the true level of losses prior to the mid-1990s.

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, state-owned enterprises and public infrastructure, rather than private property and private and commercial businesses. For this reason too, total reported losses are likely to significantly under-estimate the full cost of disasters in Vietnam. As noted in Section 2, however, the damage assessment process does include an attempt to record the value of damage to private residential property and agricultural production.

3.1. OVERVIEW OF 20-YEARS OF DAMAGES DUE TO NATURAL DISASTERS

Table A.3.1. presents a summary of CCFSC recorded disaster-related damage over the period 1989 to 2008 in terms of loss of human life, damage to agriculture and residential housing and the financial value of damage. Over this period, tornados, tropical cyclones (including tropical storms and typhoon), floods, flash floods and landslides, resulted in 13,035 deaths. Damage to residential housing, public sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) totaled VND 91 billion (US$ 6.4 billion) or an annual average of VND 4,547 billion (US$ 322 million).[31]

On average, 652 people either lost their lives or were reported missing each year, with a peak of 3,083 mortalities in 1997. Tropical Storm Linda (reaching Category 10 on the Beaufort scale) accounted for 2,901 of the lives lost in 1997. Flood-related drownings were the main cause of death (Figure A.3.1.).

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

On average, 36,488 houses were totally destroyed (classified as collapsed) each year, mainly due to floods and windstorms. The worst year was 1989, with a total of 235,729 houses reported collapsed (Figure A.3.1.). If partial flood or storm damage to housing is included, the average annual number of damaged houses increases significantly to 565,140 houses. Damage peaked in 1996, a very severe storm and flood year, 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 entitled to receive up to VND 5 million if their house is damaged. If this sum was paid out to an average of 565,000 households each year, the annual bill would amount to VND 2.825 billion (US$ 172 million at the 2008 exchange rate).

Damage to public schools, hospitals, and other buildings was typically very high in the event of major floods and storms. On average 7,812 school rooms were damaged each year, with a peak of 34,105 rooms in 1996 when severe flooding occurred in much of Vietnam (Figure A.3.1).

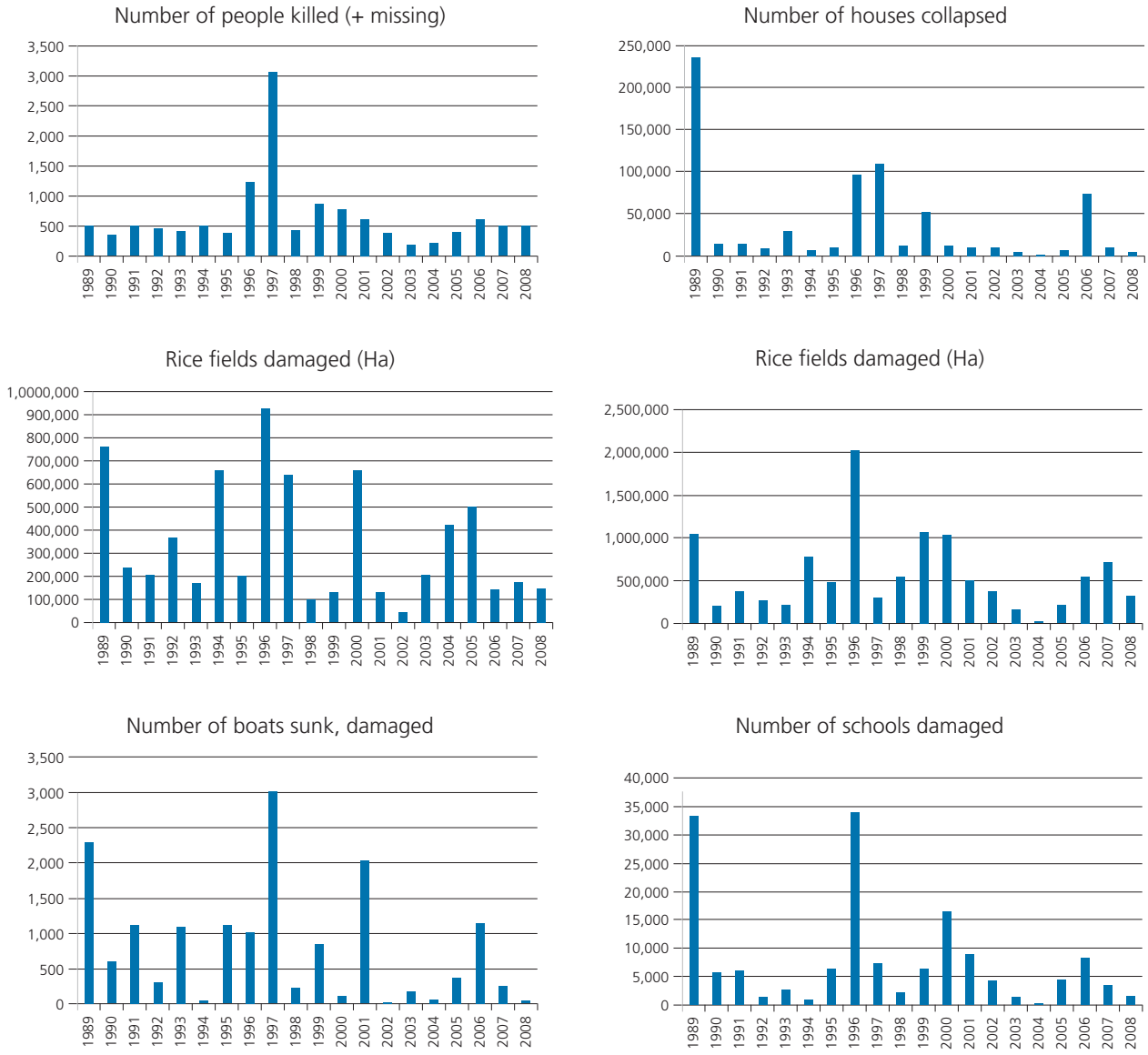
Damage to agriculture was also extremely high. On average, over 340,000 ha of paddy (rice) were damaged by natural disasters each year, with the worst losses in 1996 when nearly 1 million hectares of paddy were damaged by severe storms and flooding. Damage to the fishing industry is also high, as evidenced by the fact that on 799 boats were sunk or damaged each year on average over the period of analysis, largely due to storms.

Table A.3.1. Vietnam: Natural Disaster Losses, 1989 to 2008 (VND billion and US$ million)

Year	Number of people killed or missing	Number of houses collapsed	Rice fields damaged (Ha)	Fish shrimps lost (Tons)	Number of boats sunk, damaged	Area of forest fire (Ha)	Total value of losses (VND billion)	Total value of 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. Vietnam: Natural Disaster Losses in Different Sectors, 1989 to 2008



3.2. TRENDS IN ASSESSED VALUE OF DAMAGE FROM NATURAL DISASTERS

The CCFSC reported data indicate that the estimated annual value of damage from natural disasters was much higher over the period 2006-2008 than the annual average for the longer period 1989-2008. Over the past 20 years the annual value of damage has averaged VND 4,547 billion or US$ 322 million. 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) (Figures A.3.2. and A.3.3).

Figure A.3.2. Vietnam: Value of Losses due to Natural Disasters, 1989 to 2008 (VND billion)

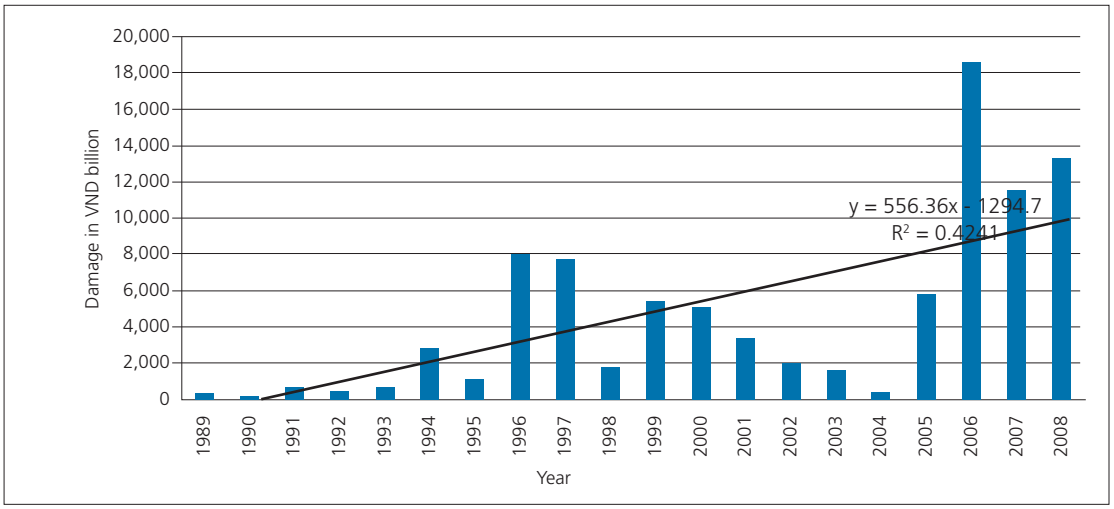
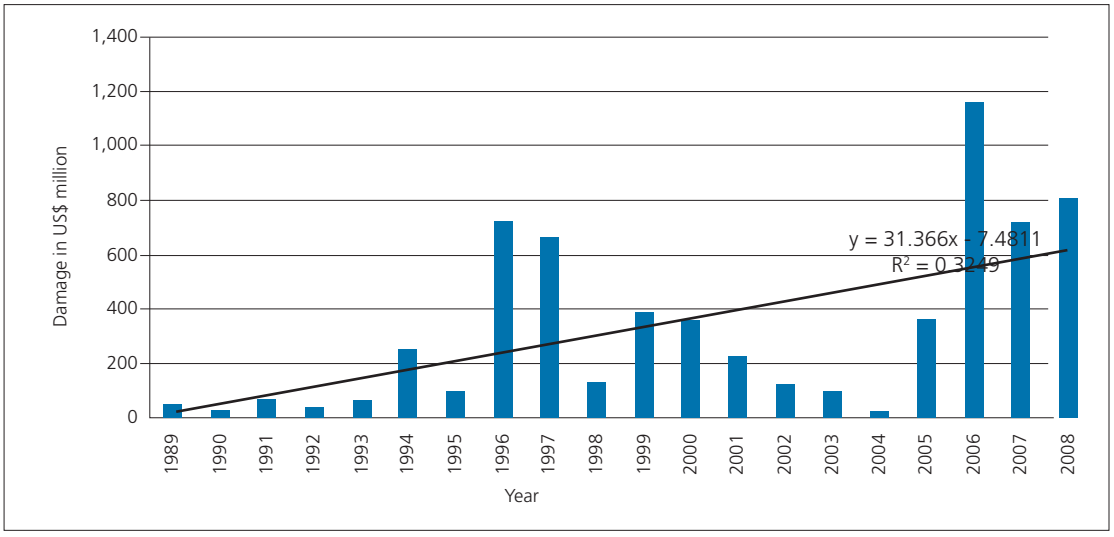


Figure A.3.3. Vietnam: Value of Losses due to Natural Disasters, 1989 to 2008 (US$ million)



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

In 2006-2008, the total annual value of natural disaster losses ranged between two and three times higher than the long-term average, with peak losses of VND 18,566 billion (US$ 1.16 billion) in 2006, 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 major growth in the Vietnamese economy in recent years, a related increase in capital assets and a rise in construction and reconstruction 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 next page for further discussion).

3.3. NATURAL DISASTERS: VALUE OF DAMAGE AS A PERCENTAGE OF GDP

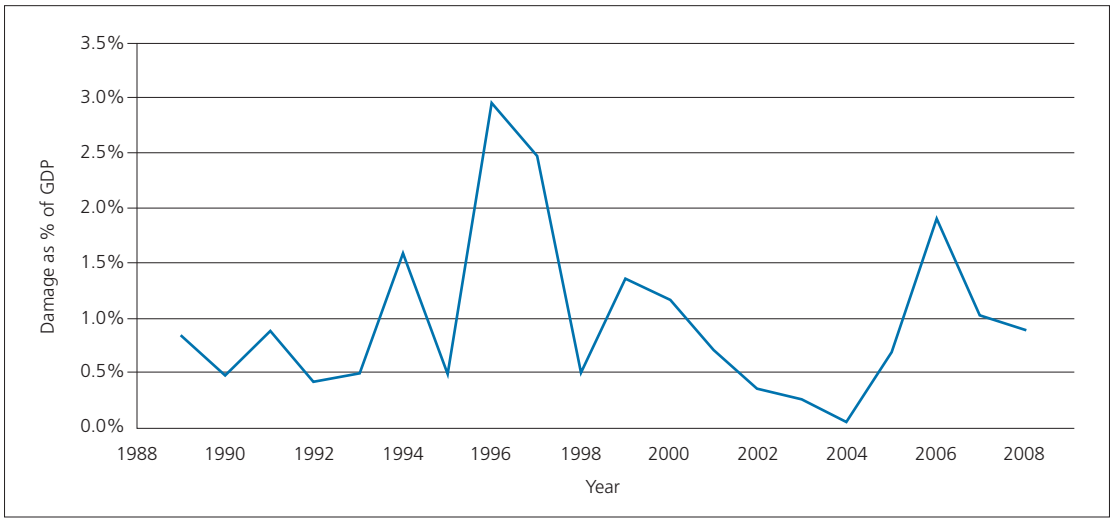
The average annual value of direct disaster-related losses over the period 1989-2008 was equivalent to 1.0 percent of Gross Domestic Product (GDP), rising to 2.9 percent in 1996 (Figure A.3.4.). Losses were slightly higher for the shorter period 1994 to 2008, averaging 1.1 percent of GDP, but were equivalent to only 0.8 percent of GDP for the period 1999 to 2008 alone.

The pattern of natural disaster losses expressed as a percentage of GDP shows that there is no trend towards increased damage in recent years. Disaster losses exceeded 1.5 percent of GDP in four years: 1994, 1996 1997 and 2006. The high losses experienced in 2006 reflected a large number of mainly flood-related events rather than a single major catastrophe (see below).

3.4. CAUSES OF LOSS

Floods were the single most important cause of loss over the period 1989-2008, accounting for 49 percent of the total value of CCFSC reported losses, followed by storms (tropical storms and typhoons), which accounted for 46 percent of losses (Table A.3.2. and Figure A.3.5.). Other perils such as flash floods, landslides, tornados and cold waves accounted for less than 5 percent of the total value of damage.

Figure A.3.4. Vietnam: Value of Natural Disaster Losses as a Percentage of GDP, 1998 to 2008



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

An average of nearly 10 natural disaster events was reported by CCFSC each year, each event causing estimated damage of VND 6,437 billion (US$ 40 million per event) on average. The value of losses per event averaged US$ 53 million for storms and US$ 49 million for floods. The average value of damage per event associated with flash flooding/landslides and tornados has been much lower.

Full details of the 193 loss events occurring over the period 1989 to 2008, including date, type of hazard and value of damage in VND billion and US$ million are presented in Annex 3, Appendix A.

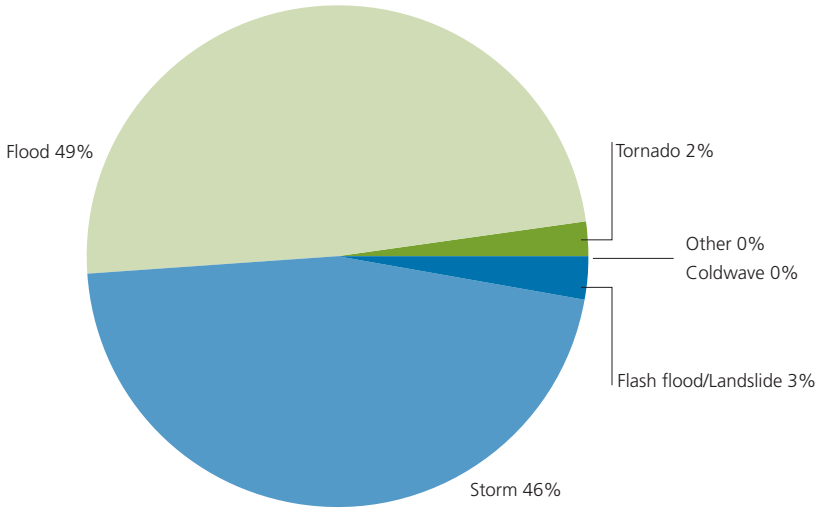
The relative importance of storm and flood damage varies significantly between years (Figure A.3.6). In 2006, practically all damage was caused by typhoons. In contrast, floods caused all

Table A.3.2. Vietnam: Estimated Value of Damage by Type of Hazard, 1989 to 2008

Peril (Hazard)	Number of events	Number of events with recorded value of damage*	Total value of damage (VND million)	Total value of damage (US$ million)	% of total value of damage	Average value of damage/ event (VND Mio)*	Average 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 31 events. The average size of loss is calculated only for those events with reported loss values.

Figure A.3.5. Vietnam: Percentage Value of Damage by Type of Hazard, 1989 to 2008



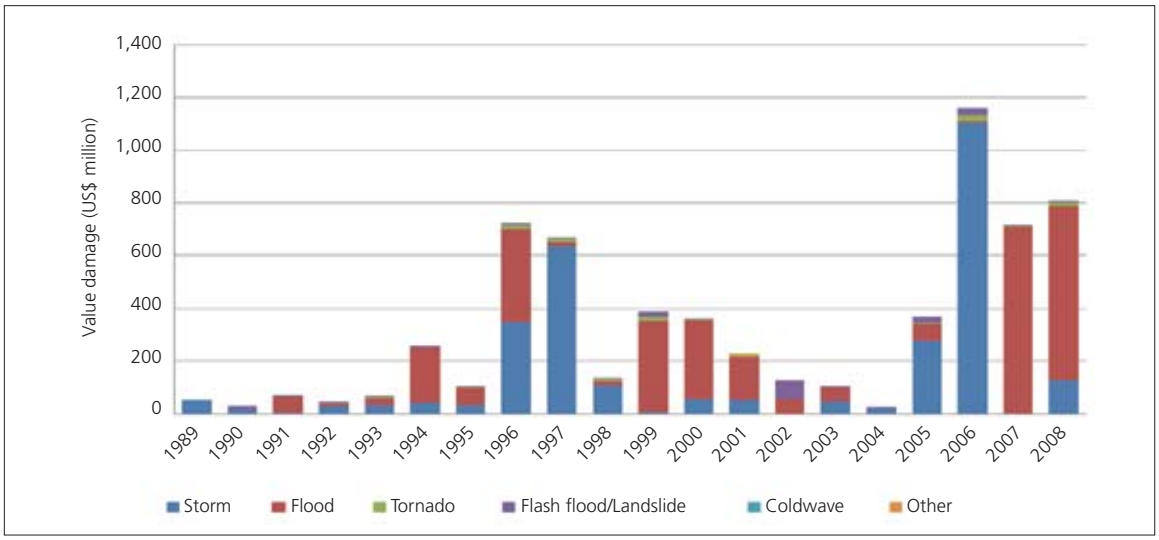
Source: World Bank analysis of CCFSC damage data, 1989 to 2008.

losses in 2007 and were the most significant cause of losses in 2008. A combination of several large storms and an above average number of major flood events contributed to peak losses as a percentage of GDP of 2.9 percent in 1996.

3.5. MAJOR LOSS EVENTS

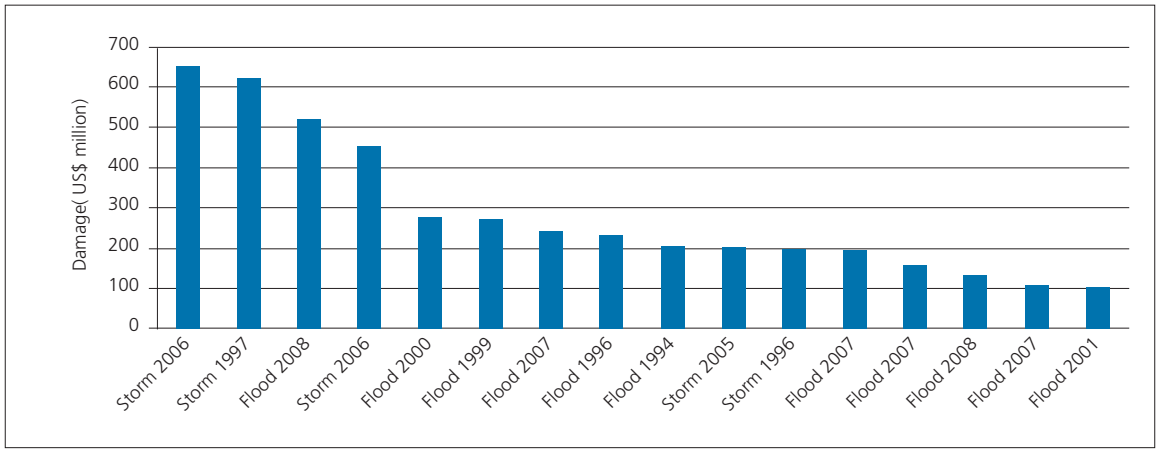
Floods and storms have the potential to cause catastrophic losses in Vietnam, as evidenced by the losses associated with Typhoon Xang-

Figure A.3.6. Vietnam: Value of Damage by Type of Hazard and Year, 1989 to 2008 (US$ million)



Source: World Bank analysis of CCFSC damage data, 1989 to 2008.

Figure A.3.7. Vietnam: Major Flood and Storm Events Incurring Damage in Excess of US$100 million, 1989 to 2008



Source: World Bank analysis of CCFSC damage data 1989 to 2008

sane in 2006 . Over the period 1989 to 2008, 16 storm and flood events each caused estimated damage in excess of US$ 100 million (Figure 2.6). Storm No. 6 (Typhoon Xangsane) in October 2006 was the single most costly event on record, resulting in total estimated damage of VND 10,402 billion (US$ 649 million) (see below). Storm No. 5 of 2007 was the second largest event on record, causing estimated losses of US$ 619 million. The largest flood loss event occurred in the Red River Basin between 21 October and 3 November 2008, causing major damage valued at US$ 522 million to property, infrastructure and agriculture in the Hanoi region.

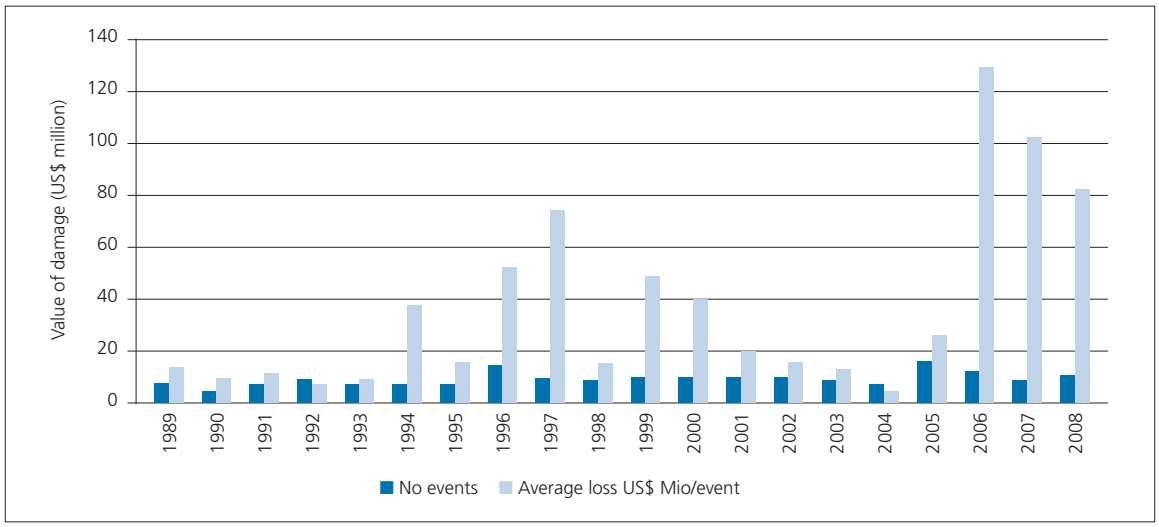
3.6. AVERAGE SIZE OF LOSS PER EVENT

There is no clear trend in overall damage (as percentage of GDP) patterns over time. The number of declared disaster events has been relatively stable, with an average of 10 events per year, a minimum of 5 events in 1990 and a maximum of 16 events in 2005 (Figure A.3.8).

However, there has been a major increase in the average value of losses in nominal terms in recent years. The value of assessed damage averaged US$ 40 million per event over the period 1989-2008 but was 2 to 3 times higher than this in each of the years 2006, 2007 and 2008, averaging US$ 129 million, US$ 102 million and US$ 81 million per event respectively for each of these three later years.

Further research is required to explain the major increase in the average size of losses in recent years, but it is likely to be a combination of (i) major increases in the scale 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. In 2006, US$ 1.1 billion, or 95 percent of total reported damage for the year, was associated with typhoons of which 3 typhoons—Durian, Xangsane and Cimaron—were Category 13 typhoons.

Figure A.3.8. Vietnam: Average size of Natural Disaster Losses per Event, 1989-2008 (in US$ million)



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.

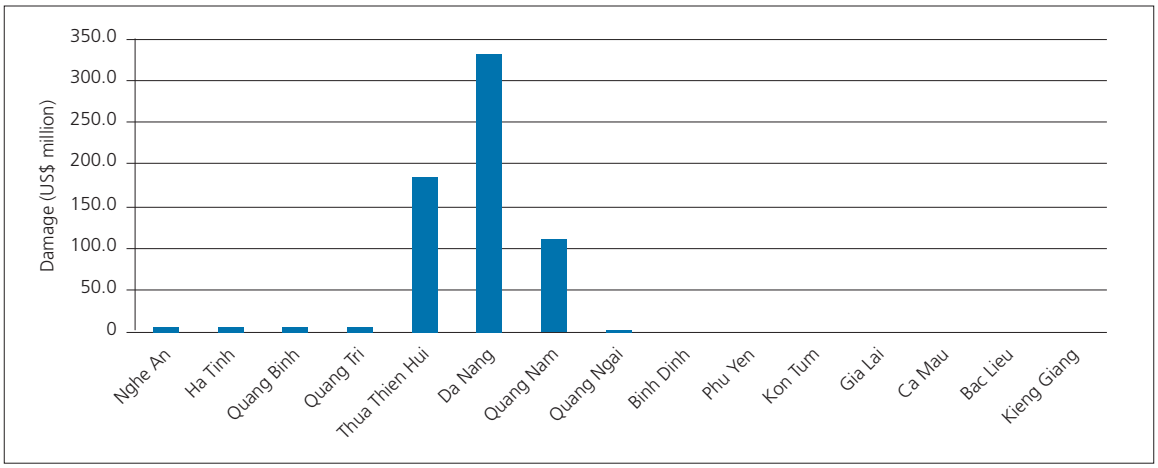
3.7. ANALYSIS OF DAMAGE BY SUB-SECTOR

A major drawback of the CCFSC data is that it does not include a sectoral breakdown of the value of losses for most disaster events. There appears to have been no standardized reporting by provinces of the estimated value of damage for each of the 15 categories or sub-sectors included in the damage assessment reports. Complete valuation data for all categories of damage is available for less than 5 percent of the 193 events analyzed in this study. This means that it is very difficult to conduct a formal analysis of the relative value of damage to residential property, agriculture, public sector property (schools, hospitals, etc) or public infrastructure (roads, bridges, etc) caused by floods and wind storms. For Typhoon Xangsane, however, it has been possible to obtain a detailed breakdown of the damages by sub-sector.

Typhoon Xangsane was a Category 13 Beaufort scale typhoon (with sustained wind speeds exceeding 133 km/hour) 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 resulted in total estimated damaged of VND 10.4 billion (US$ 649 million), according to CCFSC data. The typhoon caused major flooding and storm damage to property and infrastructure in the three provinces/cities of TT Hue and Da Nang and Quang Nam immediately to the south, together accounting for nearly 96 percent of total damage. Da Nang suffered the highest losses, totaling US$ 330 million. Twelve other provinces were also affected but losses were relatively small, standing at less than US$ 7.5 million in each province (Figure A.3.9).

The highest losses incurred as a consequence of Typhoon Xangsane were recorded in agriculture (crops, livestock, forestry and aquaculture) accounting for 36 percent of the total value of losses, followed by damage to housing (27 percent of total). It has been possible to access a sectoral breakdown of the estimated value of damage for four of the affected provinces (Quang Binh, Quang Tri, TT Hui and Kon Tum) (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 percent of the total value of losses or 36 percent including aquaculture. The housing sector suffered

Figure A.3.9. Typhoon Xangsane, 2006: Estimated Damage by Province (US$ million)



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

the second highest losses, equivalent to 25 percent of total estimated damage. Damage to industry and enterprises[32] accounted for a further 15 percent, damage to water resources including dykes, dams, canals for 9 percent and damage to transportation for 7 percent of total losses. Schools, hospitals and telecommunications only incurred minor damage.

This case study tends to suggest that under a catastrophic typhoon event, approximately one third of all damage is incurred by the agricultural sector (including crops, forestry, livestock and aquaculture), a quarter by private residential property and the remaining forty percent by public-sector property (schools, hospitals other buildings) ***and infrastructure*** (dykes, dams, bridges, roads, power lines, telecommunications etc). However, there is some uncertainty as to whether the reported damage to industry and enterprises in T.T. Hue was to public or private sector industry. If the latter, then damage to public sector property and infrastructure is reduced to 25 percent and 30 percent of the total value of damage. Comparable data providing a breakdown of damage associated with major flood events are not available.

3.8. SIMULATION ANALYSIS (PROBABLE MAXIMUM LOSS ANALYSIS)

Under this study a simple simulation analysis was applied to the CCFSC damage data to

Table A.3.3. Typhoon Xangsane, 2006: Damage by Sub-Sector for Four Provinces (VND billion)

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, fertilizers)					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, September. 2009: Provincial Disaster Relief Requests to Prime Minister's Office

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

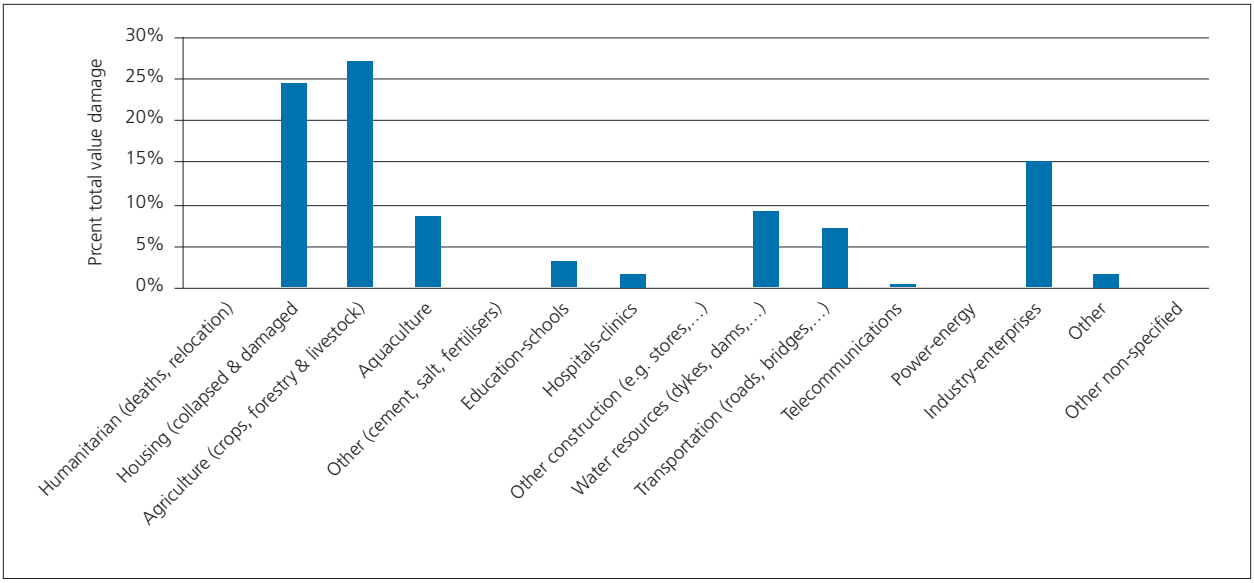
assess the probable maximum losses (PMLs) which might be expected to occur in Vietnam for disaster events with return periods of between 1 in 10 years, 1 in 50 years and 1 in a 100 years. The PML is defined as an estimate of the maximum loss that is likely to arise on the occurrence of an event or series of events considered to be within the realms of probability, ignoring remote coincidences and possible but unlikely catastrophes. 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 percent chance per year on average).

1) Annual Aggregate PML Analysis

A PML analysis was applied to the annual total damage data reported by the CCFSC in value terms expressed as a percentage of GDP for the 15-year period 1994 to 2008. The analysis was not applied to the full 20-year data set because the earlier years contain several events with missing damage values. The procedure involved the initial fitting of a parametric distribution to the data and the selection of 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 periods 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 in excess of US$ 3.8 billion. This preliminary finding has major financial implications for the GoV because it shows that under extremely severe loss years, it would face post-disaster emergency relief, recovery/rehabilitation and reconstruction losses in excess of US$ 3.8 billion or 4.1 percent of current 2008 GDP. There is a clear need for an adequate strategy to finance extreme natural disaster loss years.

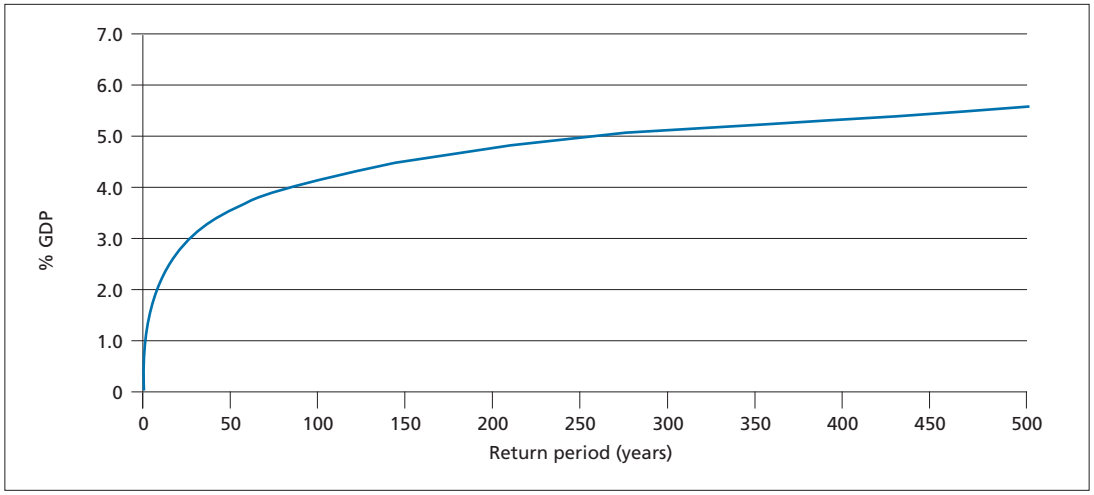
Figure A.3.10. Typhoon Xangsane, 2006: Distribution of Damage by Sub-Sector for Four Provinces



Source: CCFSC September 2009: Provincial Disaster Relief Requests to Prime Minister's Office

Figure A.3.11. Indicative Annual Aggregate Probable Maximum Losses due to Natural Disasters

(percent of 2008 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

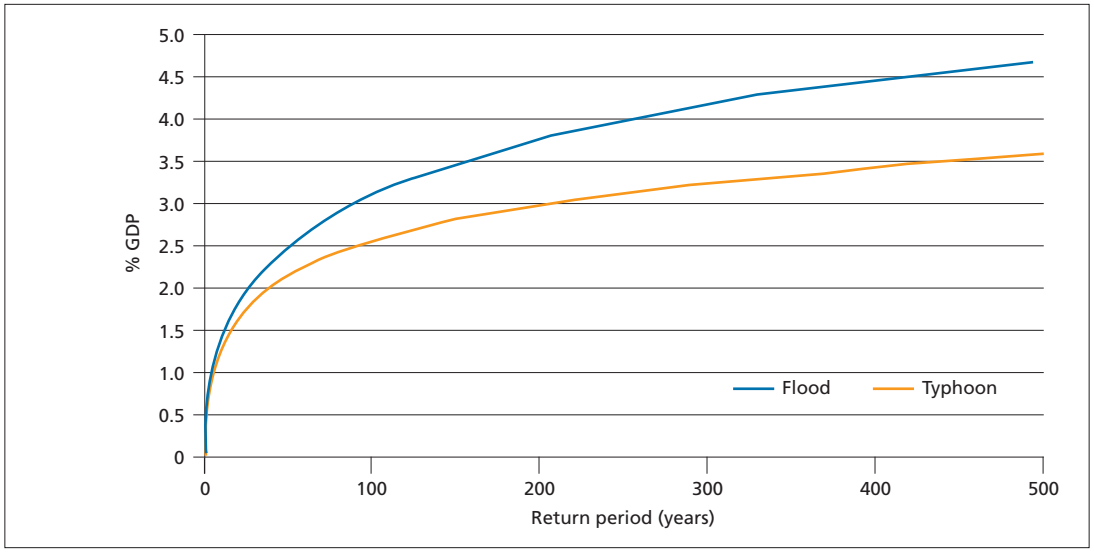
Natural disaster managers, insurers and reinsurers are not only interested in the total annual value of damage caused by natural disasters, but also in planning for the maximum losses which might be expected under a single catastrophe event. This study has shows that over the period 1989 to 2008 there were 16 events where the value of losses exceeded US$ 100 million. The highest loss windstorm, Typhoon Xangsane in 2006, caused damage valued at US$ 649 million; the highest loss 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 windstorm (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; in the case of windstorm, it included 70 such 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 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 equivalent to 3.1 percent of GDP, while a one in 100 year typhoon event would generate damage estimated at equivalent to 2.5 percent.

Figure A.3.12. Indicative Probable Maximum Losses per Storm and Flood Event

(percentage of GDP)



	Indicative Annual Aggregate Probable Maximum Loss with 2008 GDP (US$ million)	
Return period	**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 for flood and storm, 1989 to 2008.

Annex 3, Appendix A. Value of Natural Disaster Damage by Year and Hazard Event

Year	Peril	Value of damage		Year	Peril	Value of damage		Year	Peril	Value of damage	
		VND million	US$ million			VND million	US$ million			VND million	US$ million
2008	Flash flood/Landslip	96,000	5.8	2002	Flash Flood/Landslip	1,082,052	70.8	1996	Flash Flood/Landslip	81,647	7.4
2008	Storm	0	0.0	2002	Flood	79,443	5.2	1996	Storm	581,367	52.7
2008	Flood	2,193,000	133.2	2002	Flood	57,000	3.7	1996	Flood	124,958	11.3
2008	Tornado	193,000	11.7	2002	Flood	199,961	13.1	1996	Flood	565,757	51.3
2008	Flood	14,000	0.9	2002	Flood	0	0.0	1996	Flood	204,785	18.6
2008	Storm	8,000	0.5	2002	Flood	456,831	29.9	1996	Flood	46,080	4.2
2008	Storm	1,536,000	93.3	2002	Flood	0	0.0	1996	Flood	25,622	2.3
2008	Storm	141,000	8.6	2002	Flood	3,100	0.2	1996	Flood	2,571,223	233.0
2008	Flood	127,000	7.7	2002	Flood	36,779	2.4	1995	Tornado	35,510	3.2
2008	Flood	8,590,000	521.6	2001	Tornado	26,461	1.8	1995	Flash Flood/Landslip	21,634	2.0
2008	Storm	402,000	24.4	2001	Flash Flood/Landslip	67,503	4.6	1995	Flood	145,876	13.3
2007	Tornado	67,614	4.2	2001	Flood	14,000	0.9	1995	Flood	183,017	16.6
2007	Flood	4,188	0.3	2001	Flood	33,000	2.2	1995	Storm	0	0.0
2007	Flash flood/Landslip	29,188	1.8	2001	Other	92,370	6.3	1995	Storm	132,532	12.0
2007	Storm	0	0.0	2001	Flood	634,590	43.1	1995	Storm	227,113	20.6
2007	Flood	2,519,298	156.6	2001	Storm	66,824	4.5	1995	Flood	383,752	34.9
2007	Flood	3,215,508	199.8	2001	Flood	1,535,910	104.2	1994	Tornado	25,896	2.3
2007	Flood	1,786,220	111.0	2001	Flood	196,702	13.3	1994	Flash Flood/Landslip	51,565	4.7
2007	Flood	3,891,900	241.9	2001	Storm	691,643	46.9	1994	Flood	2,283,858	206.6
2007	Storm	0	0.0	2001	Storm	11,220	0.8	1994	Storm	1,500	0.1
2006	Tornado	362,910	22.7	2000	Tornado	13,816	1.0	1994	Storm	37,650	3.4
2006	Flash flood/Landslip	405,315	25.3	2000	Flood	15,372	1.1	1994	Storm	413,175	37.4
2006	Storm	26,360	1.6	2000	Coldwave	0	0.0	1993	Tornado	67,145	6.3
2006	Flood	0	0.0	2000	Flood	6,000	0.4	1993	Flash Flood/Landslip	4,982	0.5
2006	Flood	21,700	1.4	2000	Flood	3,911,249	276.4	1993	Flood	50,000	4.7
2006	Storm	22,352	1.4	2000	Storm	156,050	11.0	1993	Flood	180,525	17.0
2006	Flood	70,000	4.4	2000	Storm	362,974	25.6	1993	Flood	58,000	5.5
2006	Storm	10,401,624	649.4	2000	Storm	254,629	18.0	1993	Storm	2,000	0.2
2006	Flood	0	0.0	2000	Flood	326,284	23.1	1993	Storm	153,554	14.5
2006	Flood	0	0.0	2000	Flood	0	0.0	1993	Storm	181,299	17.1
2006	Storm	7,234,300	451.7	1999	Tornado	222,231	16.0	1992	Tornado	2,155	0.2
2005	Tornado	72,785	4.6	1999	Flash Flood/Landslip	305,323	21.9	1992	Flood	0	0.0

Year	Peril	Value of damage		Year	Peril	Value of damage		Year	Peril	Value of damage	
		VND million	US$ million			VND million	US$ million			VND million	US$ million
2005	Flood	30,519	1.9	1999	Storm	20,050	1.4	1992	Flash Flood/Landslip	6,500	0.6
2005	Flash flood/Landslip	336,559	21.3	1999	Storm	0	0.0	1992	Storm	30,374	2.7
2005	Flood	0	0.0	1999	Flash Flood/Landslip	0	0.0	1992	Flood	0	0.0
2005	Storm	365,066	23.1	1999	Flood	20,700	1.5	1992	Storm	32,520	2.9
2005	Storm	230,000	14.6	1999	Storm	62,224	4.5	1992	Flood	130,496	11.7
2005	Storm	0	0.0	1999	Flood	40,551	2.9	1992	Storm	266,773	24.0
2005	Storm	58,800	3.7	1999	Flood	3,773,799	271.0	1992	Storm	0	0.0
2005	Storm	353,417	22.4	1999	Flood	982,261	70.5	1991	Tornado	581	0.1
2005	Storm	3,202,150	202.6	1998	Tornado	108,527	8.2	1991	Flash Flood/Landslip	35,139	3.7
2005	Flood	311,516	19.7	1998	Flash Flood/Landslip	23,386	1.8	1991	Flood	590,000	61.5
2005	Flood	186,920	11.8	1998	Flood	800	0.1	1991	Storm	29,285	3.1
2005	Storm	177,808	11.3	1998	Flood	31,461	2.4	1991	Storm	0	0.0
2005	Flood	12,017	0.8	1998	Flood	189,437	14.3	1991	Storm	0	0.0
2005	Flood	463,277	29.3	1998	Storm	145,973	11.0	1991	Flood	5,000	0.5
2005	Flash flood/Landslip	8,500	0.5	1998	Storm	923,117	69.7	1991	Coldwave	20,402	2.1
2004	Tornado	30,735	1.9	1998	Storm	57,493	4.3	1990	Tornado	0	0.0
2004	Flood	3,070	0.2	1998	Storm	317,055	23.9	1990	Flash Flood/Landslip	78,920	12.2
2004	Flash Flood/Landslip	64,994	4.1	1997	Tornado	136,692	11.8	1990	Storm	7,520	1.2
2004	Storm	298,199	18.9	1997	Flash Flood/Landslip	21,724	1.9	1990	Storm	113,322	17.5
2004	Storm	0	0.0	1997	Flood	19,769	1.7	1990	Flood	0	0.0
2004	Storm	9,000	0.6	1997	Flood	67,496	5.8	1989	Tornado	0	0.0
2004	Flash Flood/Landslip	680	0.0	1997	Storm	61,500	5.3	1989	Flash Flood/Landslip	0	0.0
2004	Flood	0	0.0	1997	Flood	0	0.0	1989	Storm	300,000	46.3
2003	Tornado	22,296	1.4	1997	Flood	87,100	7.5	1989	Storm	0	0.0
2003	Flash Flood/Landslip	16,200	1.1	1997	Storm	136,694	11.8	1989	Storm	0	0.0
2003	Storm	36,303	2.4	1997	Flood	19,880	1.7	1989	Storm	0	0.0
2003	Storm	20,520	1.3	1997	Storm	7,179,615	619.2	1989	Storm	10,677	1.6
2003	Storm	682,304	44.3	1996	Storm	2,211,630	200.4	1989	Storm	39,500	6.1
2003	Flood	12,076	0.8	1996	Storm	536,886	48.7	Total		90,941,740	6,437.1
2003	Flood	367,558	23.8	1996	Storm	124,153	11.3	Average		471,201	33.4
2003	Flood	432,471	28.1	1996	Storm	383,900	34.8	Standard deviation		1,357,189	91.9
2003	Flood	0	0.0	1996	Flood	346,292	31.4	Minimum		0	0.0
2002	Tornado	43,212	2.8	1996	Tornado	194,110	17.6	Maximum		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 US$, 1990 to 2008

Year	Annual growth of GDP (%)	GDP (billion of VND, current price)	GDP per capita (thousand of VND per capita, current price)	GDP per capita (US$)	Exchange rate (Annual average)	GDP (US$ 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 US$, current price)	53.1	60.8	71.1	89.7
Growth	8.4%	8.2%	8.5%	6.2%
Total Government Revenue as % of GDP	27.2%	28.7%	28.7%	28.2%
Government Revenue Excluding Revenue from oil and grants as % of GDP	18.8%	19.3%	21.3%	21.7%
Tax Revenue as % of GDP	9.6%	10.4%	10.9%	11.7%
Total Government Revenue in billion US$	14.4	17.4	20.4	25.3
Interior Government Revenue in US$, 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 Budget Expenditure, 2005 to 2008 (US$ billion)

		2005	2006	2007	2008
1.	Capital expenditure	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 expenditure	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 expenditure	3.9	5.4	6.4	3.0
	Total of budget expenditure (upper-line)	19.8	24.1	29.2	30.0
	Upper-line as % of GDP	37.4%	39.6%	41.0%	33.5%
5.	Under-line of budget expenditure (under-line)	2.5	2.0	3.4	3.7
	Total of expenditure (under and upper line)	22.4	26.1	32.6	33.7
	Under-line as % 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 capita (US$)	Total Government Revenue	Total Government Revenue (% GDP)	Total Expenditure	Total Expenditure (%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 the Natural Disaster Risk Management Project (NDRMP) in Vietnam conducted a disaster financial resource gap analysis for the years 2000, 2002 and 2003. This analysis was based on actual post-disaster expenditure from all sources including central and provincial contingency budgets, the national government Financial Reserve Fund and budget surplus, local donations and funding from international aid donors. Key features of the NDRMP are summarized in Box A.7.1, Findings of the resource gap analysis are presented below.

The 2005 study identified an overall funding gap for total disaster relief and reconstruction requirements of between US$130 million in 2000, a year of severe typhoon and flood losses, and US$ 46 million in 2001, a low loss year[33] (Table A.7.1.). The financial resource gap was defined as the difference between the CCFSC-reported total annual value of storm and flood damage and total actual expenditure on relief and reconstruction from all sources. Key features of the analysis included:

(a) The state contingency budget stood at VND 1,600 billion (US$ 113 million) in 2003, divided 40:60 between central and local government. By 2008, the contingency budget had increased to US$ 650 million in nominal terms; and the central government's share had increased to 55 percent.

(b) Over the 3 years of the earlier analysis, on average only 19 percent of the central government contingency budget and 16 percent of the local contingency budgets were allocated to post-disaster relief, recovery and reconstruction expenditure.

(c) The National Financial Reserves and surplus income in the budget were the most significant sources of finance for post-disaster response in 2000, 2002 and 2003, on average covering 46 percent of actual expenditure. In contrast, between 2005 and 2008 Vietnam incurred budget deficits exceeding 10 percent of GDP and it is understood that the National Financial Reserve Fund and budget surplus were therefore unable to contribute significantly to the financing of post-disaster response.

(d) Total annual expenditure from all source on post-disaster recovery averaged NVD 1,295 billion in 2000, 2002 and 2003, of which central government contributed 60 percent of funding, local

[33] At the time of preparation of the 2005 report, total disaster-related damage for 2000 was reported at VND 3,911 billion according to DMC (MARD) data . However, in 2009, the CCFSC website reported a revised figure of VND 5,098 billion for 2000, thereby increasing the post-disaster financing gap from US$ 130 million (rounded up from US$ 128 million) to US$ 220 million.

government 20 percent and other sources, including local donors and international aid donors, 20 percent.

(e) Total actual expenditure on disaster response averaged only 45 percent of total assessed damage advised by the provinces in 2000, 2002 and 2003. The corresponding difference 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 expenditure into short-term emergency relief and recovery spending and medium term reconstruction expenditure because this data was not available from the 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 the 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, fertilizers and replacement livestock. The study concluded that the 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 of post-disaster recovery and reconstruction efforts; and (c) strengthening the capacity of 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); and Component 4: Project Management and Institutional Strengthening.

Quote from the Project Appraisal Document (PAD) on Natural Disasters Financing Gap for Reconstruction.

According to Article 9(1) of the Government's 2002 Law on State Budget, 2-5 percent of the central budget and of local budgets at various levels should be allocated to a contingency budget "to meet contingent spending on preventing, combating, and overcoming consequences of the acts of God and fires, important tasks of 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**

Box A.7.1. (Continued)

between an estimated US$46 million and US$130 million over the period 2000 to 2003. Priority in the allocation of 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 well as on the provision of education, health care and other services. The Contingency Budgets have also been used for extreme events such as the control of the 2004 and 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.

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

	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$ million
DAMAGE ASSESSMENT REPORT													
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
Transportation	31.3	10.8	7.0	9.8	210.0		45.0				5.5	319.4	19.9
Communication		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													
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													
Funds paid by Central Government	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	

ANNEX 9. WORLD BANK 2009 ANALYSIS OF NATURAL DISASTER FINANCIAL RESOURCE GAPS FOR POST-DISASTER RECOVERY AND RECONSTRUCTION

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

The GoV Contingency Budget for Natural Disasters

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

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 underpinning the World Bank Financial Resource Gap Analysis

This study has sought to distinguish clearly between potential GoV financial resource gaps for:

(a) the immediate, short-term post-disaster relief and recovery phase; and
(b) the medium-term reconstruction phase.

The assumptions underlying this analysis are summarized in Box A.9.1. Full details are provided in Chapter 3. Results are presented in Tables A.9.2, A.9.3, A.9.4 and A.9.5.

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

Source of Natural Disaster Financing	Expenditure as a % of 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, in the aftermath of a disaster, government can reallocate up to 1 percent of planned investment expenditures for the current 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 percent of the reported value of damage falls under short-term recovery expenditure requirements and the remaining 30 percent falls under medium-term reconstruction expenditure requirements for public assets.

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

CCFSC Damage Assessment	% of Total Value	Actual Natural Expenditures as % of Total Estimated Value Damage
Recovery: (housing/agriculture/emergency repairs/reconstruction of infrastructure)	70%	25%
Reconstruction: UPublic assets including shhools, hospitals, irrigation, transport, communications, power)	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	1	0	0	0	0	0	0	0	0
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

Notes:

1) Allocation of state contingency budget to natural disaster expenditure: Central 40% of budget; Local 20% of budget

2) Recovery costs settled by government: 25% of Reported natural disaster damage (CCFSC)

3) Costs of reconstruction of public assets settled by government: 30% of Reported natural disaster damage (CCFSC)

Table A.9.3. Natural Disaster Financial Resource Gap Analysis (US$ 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	0	0	0	0	0	0	0	0	0
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

Notes:

1) Allocation of state contingency budget to natural disaster expenditure: Central 40% of budget; Local 20% of budget

2) Recovery costs settled by government: 25% of Reported natural disaster damage (CCFSC)

3) Costs of reconstruction of public assets settled by government: 30% of Reported natural disaster damage (CCFSC)

Table A.9.4. Natural Disaster Financial Resource Gap Analysis (percentage 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	1,477,700
Government Revenues	21%	21%	23%	25%	27%	27%	29%	29%	28%
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, etc.)	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
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	1.20%
AIG*	44,181	13,327	0	669						21,056	14,004	93,237	5.6	19.10%
Bao long	19,142	99,019		90,544	11,494		5,340	5,543			34,350	265,432	16	41.50%
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	44.70%
Bao ngan	1,083	3,802		3,777		389	100	872			9,040	19,063	1.1	40.50%
ABIC	2,922	16,500		38,893	9,360	308	14,094	1,699			55,897	139,673	8.4	20.20%
Bao tin	1,063	1,910		2,672	1,211	40	44	516	2		2,170	9,628	0.6	3.80%
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	44.50%
BIC	15,351	17,686		72,670	24,707	1,292	23,149	1,162			131,944	287,961	17.4	25.00%
AAA	49,149	792	7,361	104,403	10,100		7,086	1,331			30,733	210,955	12.7	28.20%
UIC*	15,293	42,300		4,719	71,556	3,672	3,059	5,101		72	97,725	243,497	14.7	12.10%
FUBON*	91	14			334						334	773	0	0.00%
Groupama*	464				1,998	108		887	19		2,390	5,866	0.4	7.70%
Aviation	873	17,965	46,627	3,854	877		85	122		659	2,085	73,147	4.4	0.40%
Hung Vuong	102	353		945	1,190			75			5,334	7,999	0.5	0.50%
LIBERTY*	19,053	455		19,685	1,413			372			3,358	44,336	2.7	14.10%
MIC	9,181	13,375		64,210	9,036	2,886	11,156	666		4,812	36,899	152,221	9.2	11.50%
PJICO	101,452	137,444		506,858	113,681		118,207	11,816			185,011	1,174,469	70.8	34.00%
PTI	24,604	30,137		139,648	13,101		7,145				241,840	456,475	27.5	32.70%
PVI	97,901	89,946		402,229	124,947	412	407,784	31,943			982,316	2,137,478	128.9	41.00%
QBE*	2,304	1,290		957	5,667	2,473	23	14,702			13,437	40,853	2.5	8.40%
Samsung	11,344	10,129		2,497	6,140			1,497		656	61,475	93,738	5.7	16.10%
Vina*														
SHB												0		
Global	13,367	9,236	38,675	52,897	8,149	26	38,250	1,750			32,012	194,362	11.7	18.80%
VIA*	19,806	46,574		35,027	36,895	3,940	3,722	6,928			52,792	205,684	12.4	19.20%
VASS	40,398	19,145		113,272	11,348		12,262	4,103			29,769	230,297	13.9	41.50%
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**	**38.20%**

* Foreign companies – 100% foreign owned and joint ventures betwe en 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

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