

Volume 1: Main Report



ASEAN

**Advancing Disaster Risk
Financing and Insurance in
ASEAN Member States: Framework
and Options for Implementation**

April 2012



THE WORLD BANK



GFDRR
Global Facility for Disaster Reduction and Recovery

Disclaimer: The team has made every attempt to verify the contents presented, but the information should be interpreted with due consideration to its limitations resulting from the fact that indirect sources have been used where primary sources were not available, and that the collective knowledge in this area is limited.

ASEAN

Advancing Disaster Risk Financing and Insurance in ASEAN Member States: Framework and Options for Implementation

April 2012

Disaster Risk Financing and Insurance Program, Global Capital Markets and
Non Bank Financial Institutions Unit & GFDRR
East Asia and Pacific Disaster Risk Management Program
East Asia Finance and Private Sector Unit
Global Facility for Disaster Reduction and Recovery



THE WORLD BANK



GFDRR
Global Facility for Disaster Reduction and Recovery

© 2012 The International Bank for Reconstruction and Development/The World Bank

1818 H Street NW
Washington DC 20433
Telephone: 202-473-1000
Internet: www.worldbank.org

All rights reserved

This publication is a product of the staff of the International Bank for Reconstruction and Development/The World Bank. The findings, interpretations, and conclusions expressed in this volume do not necessarily reflect the views of the Executive Directors of The World Bank or the governments they represent.

The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Rights and Permissions

The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development/The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center Inc., 222 Rosewood Drive, Danvers, MA 01923, USA; telephone: 978-750-8400; fax: 978-750-4470; Internet: www.copyright.com.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433.

Design: miki@ultradesigns.com

Volume 1: Table of Contents

Volume 2: Technical Appendices	v
Acknowledgements	vi
Abbreviations and Acronyms	vii
Foreword	ix
Executive Summary	1
Chapter 1. Introduction	5
Disaster Risk Management in ASEAN Member States	8
Objectives of the Report.....	10
Chapter 2. Financial Assessment of Natural Disasters	13
Economic Assessment of Natural Disasters	14
Fiscal Risk Assessment of Natural Disasters.....	22
Chapter 3. Fiscal Management of Natural Disasters	29
Introduction	30
<i>Ex-Post</i> Practices and Arrangements.....	31
<i>Ex-Ante</i> Practices and Arrangements.....	40
Chapter 4. Private Catastrophe Risk Insurance Markets	45
Private Property Catastrophe Insurance	46
Agricultural Insurance	54
Disaster Microinsurance	61
Chapter 5. Recommendations for Regional Disaster Risk Financing and Insurance Strategy for ASEAN Member States	71
Recommendation 1: Develop Risk Information and Modeling Systems to Assess the Economic and Fiscal Impacts of Natural Disasters	73
Recommendation 2: Develop National Disaster Risk Financing and Insurance Strategies at the National and Sub-national Levels	75
Recommendation 3: Establish National Disaster Funds.....	79
Recommendation 4: Promote Private Catastrophe Risk Insurance Markets.....	80
Recommendation 5: Strengthen Regional Cooperation on Disaster Risk Financing and Insurance	82
Glossary	84
List of Annexes	87
Bibliography and References	119



Makati City, Manila.

Volume 2: Technical Appendices

Available online at www.worldbank.org/fpd/drfi and www.gfdr.org/gfdr/drfi.
See “Publications” page of either website.

Volume 2 of the report includes 10 supporting technical appendices. This volume complements the main report but is published as a separate input document. It compiles background notes and papers drafted for the preparation of the main report. The team has made every attempt to verify the contents presented, but the information should be interpreted with due consideration to its limitations resulting from the fact that indirect sources have been used where primary sources were not available and that the collective knowledge in this area is limited. An overview of the contents of Volume 2 is presented here.

- Appendix 1.** Disaster Risk Exposure Profiles of ASEAN Member States
- Appendix 2.** Disaster Risk Management Profiles of ASEAN Member States
- Appendix 3.** Fiscal Risk Management of Natural Disasters by ASEAN Governments
- Appendix 4.** Property Catastrophe Risk Insurance Markets
- Appendix 5.** Agricultural Insurance in ASEAN Member States
- Appendix 6.** Disaster Microinsurance: Selected Case Studies and Profiles of ASEAN Member States
- Appendix 7.** Catastrophe Microinsurance – The Need and the Challenge, Finding Solutions
- Appendix 8.** Parametric Insurance – Basic Concepts
- Appendix 9.** Comparison of Ex-Ante Disaster Risk Financing and Transfer Instruments

Acknowledgements

This report has been prepared by a team led by Olivier Mahul (World Bank) and Abhas Jha (World Bank), and comprising Emily White (World Bank), Laura Boudreau (World Bank), Charlotte Benson (Public finance specialist, Consultant), Daniel Clarke (Actuary, Consultant), Robert Lee Kong Tiong (Catastrophe risk financing specialist, Institute for Catastrophe Risk Management, Nanyang Technological University, Singapore), Charles Stutley (Agricultural insurance specialist, Consultant), Zuzana Svetlosakova (World Bank), Ligia Vado (World Bank), and Eiko Wataya (World Bank). The team worked in close collaboration with Adelina Kamal (ASEAN Secretariat) and Marqueza Reyes (ASEAN Secretariat and UNISDR Technical Cooperation).

The report was presented and discussed with ASEAN Member States at the ASEAN Disaster Risk Financing & Insurance Forum, which was held from November 8-10, 2011 at the ASEAN Secretariat in Jakarta, Indonesia. The Forum provided a venue for the dissemination of the first draft of the report; feedback received from ASEAN Member States during the Forum has been incorporated into this final report. The team gratefully acknowledges the inputs provided by the ASEAN Member States and members of the ASEAN Secretariat during and following the Forum.

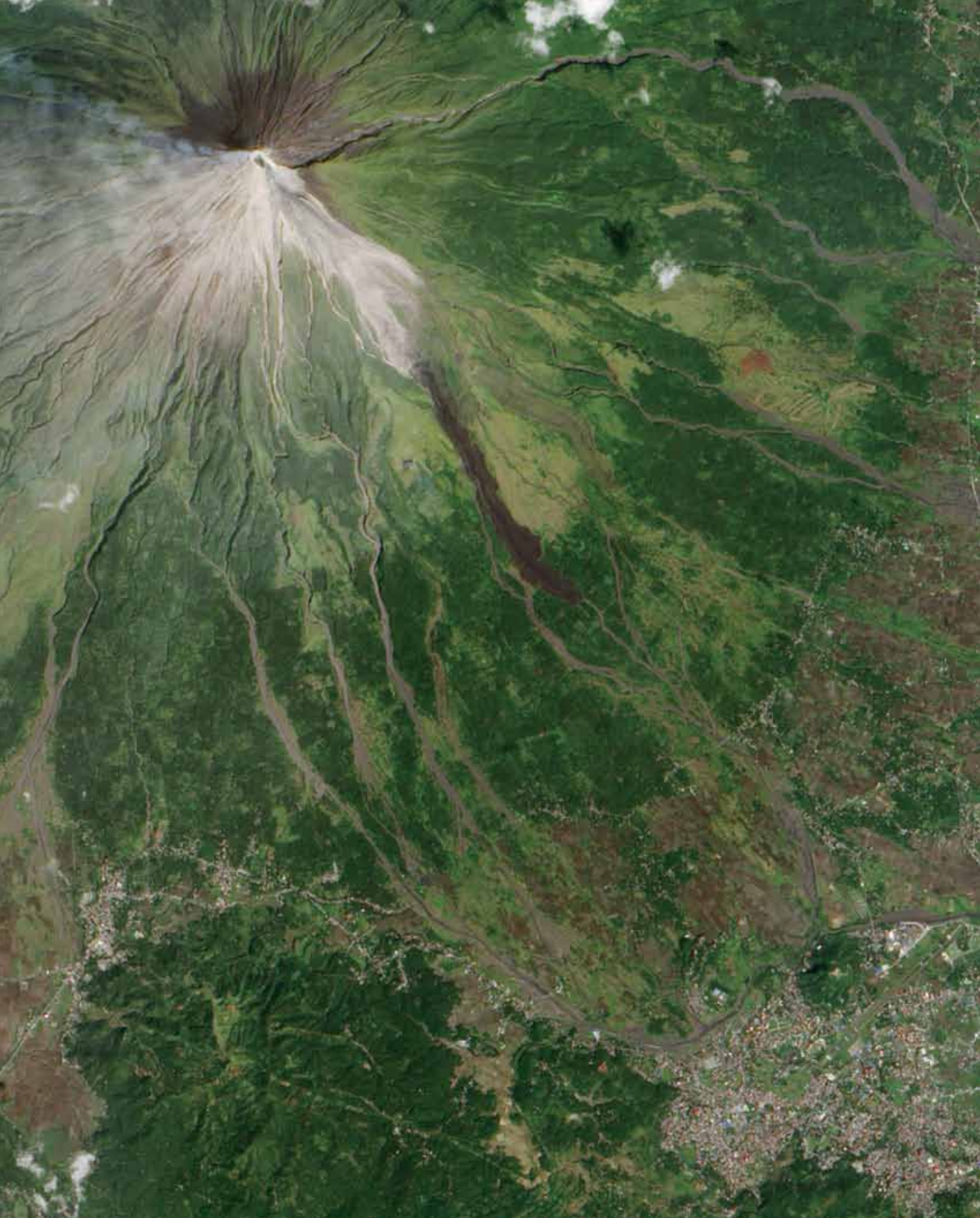
The report greatly benefited from data and information provided by academic, private sector, and other partners from the international community: Aon Benfield, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Microinsurance Innovations Program for Social Security Philippines, Guy Carpenter, International Finance Corporation, MicroEnsure, Munich Re, Nanyang Technological University, Swiss Re, Willis Research Network, and the United Nations Development Program Myanmar.

The team benefited from feedback provided by the members of the consultative committee: Adelina Kamal (ASEAN Secretariat), Marqueza Reyes (ASEAN-UNISDR Technical Cooperation), Neil Britton (Asian Development Bank), Takahiro Ono (Asia Disaster Reduction Center), Grant Morrison (Australian Agency for International Development), Sugeng Triutomo (National Agency for Disaster Risk Management (BNPB), Indonesia), Teddy Sudinda (BNPB, Indonesia), Pedro Oliviera (European Union), Per Byman (Swedish International Development Cooperation Agency), John Harding (UNISDR), Olivier Mahul (World Bank), and Abhas Jha (World Bank).

Financial support from the Global Facility for Disaster Reduction and Recovery (GFDRR) is gratefully acknowledged.

Abbreviations and Acronyms

AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ADB	Asian Development Bank
AEL	Annual Expected Loss
ASEAN	Association of Southeast Asian Nations
CBO	Community-Based Organization
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CERF	UN Central Emergency Response Fund
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FONDEN	Natural Disaster Fund (Mexico)
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
HFA	Hyogo Framework for Action
IFI	International Financial Institution
MEF	Ministry of Economy and Finance (Cambodia)
MFI	Microfinance Institution
MMPP	Malaysia Micro Protection Plan (Malaysia)
NDMO	National Disaster Management Office
NGO	Non-Governmental Organization
OIC	Office of the Insurance Commission (Thailand)
PCRAFI	Pacific Catastrophe Risk Assessment and Financing Initiative
PML	Probable Maximum Loss
PPP	Public-Private Partnership
RBC	Risk Based Capital
TCIP	Turkish Catastrophe Insurance Pool (Turkey)
UN	United Nations
UNISDR	United Nations International Strategy for Disaster Reduction
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs



Mayon Volcano, Philippines.

Foreword

More than 100 million people in ASEAN Member States have been affected by disasters since 2000, with events ranging from earthquakes to floods, volcanic eruptions, and typhoons. The human and economic costs of these catastrophes are huge, with annual disaster losses in the region estimated at close to US\$5 billion – a figure likely to increase with growing population, urbanization, and sustained GDP growth, all factors which will push more people and assets into zones vulnerable to natural hazards.

The ability of countries to manage this increasing impact of disasters will have important implications on the growth and development agenda in the region. Disasters can force countries to divert resources from longer-term development investments to meet immediate response and recovery needs. *Ex-ante* disaster risk management, including financial contingency planning in the form of a disaster risk financing and insurance (DRFI) strategy, can ensure access to fast and cost-effective liquidity post-disaster. This can in turn speed up recovery and help maintain the country's long-term development. DRFI instruments range from property catastrophe insurance for homeowners and agricultural insurance for farmers and herders to sovereign-level contingent facilities such as the World Bank's loan with catastrophe deferred drawdown option (CAT DDO).

The World Bank and the United Nations International Strategy for Disaster Reduction (UNISDR) are assisting ASEAN Member States in the area of disaster risk financing and insurance as part of a broader program to strengthen disaster risk reduction capac-

ity in the region. This program, organized around the Hyogo Framework for Action (HFA) and the ASEAN Agreement on Disaster Management and Emergency Response (AADMER), was developed following the signing of a Memorandum of Cooperation signed by the World Bank, ASEAN Secretariat, and the UNISDR in 2009. Disaster risk financing and insurance has gained increased interest among ASEAN policy makers and was identified as a key area for engagement under the work-program for AADMER. The topic was also highlighted as an area for regional cooperation at the ASEAN+3 Finance Ministers' meetings in 2011.

This report is the result of collaboration among the ASEAN Secretariat, the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR), and the UNISDR. It examines the role of DRFI in the financial resilience of ASEAN Member States against natural disasters. The report looks at many facets of DRFI, reviewing domestic private catastrophe insurance markets, assessing contingent disaster liabilities of ASEAN Member States, and analyzing fiscal arrangements for funding of disasters. It highlights opportunities to reduce financial and fiscal vulnerability through the development of disaster risk financing and insurance strategies and market-based financial products.

We hope that this report will contribute to the dialogue between ASEAN Member States, development partners, and other stakeholders in this important area of resilience.



Pamela Cox
Vice President
East Asia and Pacific Region
The World Bank



Rachel Kyte
Vice President
Sustainable Development Network
The World Bank



Dr. Surin Pitsuwan
Secretary-General
ASEAN Secretariat



Rice field, Bali, Indonesia.

Executive Summary

This report is a first collaborative effort to present a comprehensive body of knowledge on the state of disaster risk financing and insurance in ASEAN Member States and share examples of best practice and lessons from international experience. It is part of a project being jointly conducted by the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR), the ASEAN Secretariat, and UNISDR to promote the development of national and regional disaster risk financing and insurance strategies in ASEAN Member States within the context of the broader disaster risk management agenda. This report aims to contribute towards a strengthened understanding and collective knowledge within the ASEAN region on disaster risk financing and insurance, and to encourage open dialogue between stakeholders on how strategies can best be developed to increase financial resilience against natural disasters.

Disaster risk financing and insurance has gained increased attention among policy makers. Finance Ministers in the ASEAN region highlighted the importance of regional cooperation on disaster risk financing and insurance at the ASEAN Finance Ministers' Meeting in Bali in April 2011. They agreed that a regional disaster risk financing and insurance strategy is essential to deal with natural disasters. They reiterated this statement at the 14th ASEAN+3 Finance Ministers' Meeting in Viet Nam in May 2011.

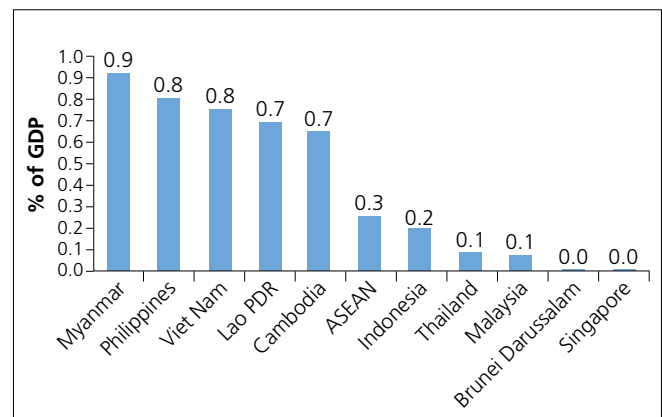
Key findings

ASEAN Member States are highly exposed to a wide range of adverse natural events. Earthquakes, floods, tropical cyclones (typhoons), and drought have all had large footprints in the region, with more than 100 million people in ASEAN Mem-

ber States affected by disasters since 2000¹. The 2011 floods in Thailand and, to a lesser extent, Cambodia, Lao PDR, and Viet Nam were the most recent example of the region's high exposure to weather-related (hydro-meteorological) disasters.

Each year, on average, the region suffers damage in excess of US\$4.4 billion a consequence of natural hazards. Annual average regional expected losses total US\$4.4 billion, equivalent to greater than 0.2 percent of regional GDP. Myanmar, the Philippines, Viet Nam, Lao PDR, and Cambodia face particularly high annual average expected losses relative to the size of their economies, standing at equivalent to 0.7 percent or more of GDP. See Figure 1.

Figure 1. Estimated Annual Expected Losses (AEL) as a percentage of national GDP

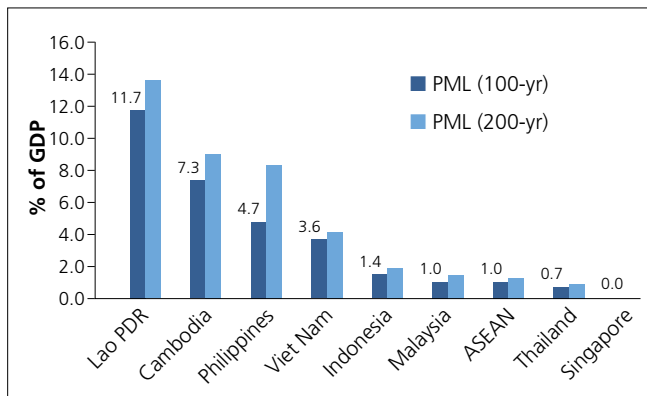


Every 100 years, on average, the ASEAN region will face disaster losses totaling US\$17.9 billion, equivalent to an estimated 1.0 percent of regional GDP. Indicative numbers suggest that Lao PDR will face the highest losses relative to GDP, standing at 11.7 percent. Catastrophic disasters oc-

¹ EM-DAT: The OFDA/CRED International Disaster Database – www.emdat.be – Université Catholique de Louvain, Brussels.

curing once every 200 years could result in contingent liability in excess of 8 percent in the Philippines, Cambodia, and Lao PDR. See Figure 2.

Figure 2. Estimated 100-year loss and 200-year Probable Maximum Loss (PML), as percentage of national GDP. Note the exclusion of Myanmar and Brunei Darussalam due to data limitations (see Chapter 2)



Disasters place a significant fiscal burden on many governments in the region. In particular, the governments of Myanmar, the Philippines, Cambodia, Lao PDR, and Viet Nam face average annual disaster response bills in excess of 0.5 percent of total public expenditure. Lao PDR, the Philippines, and Cambodia could experience bills totaling 18 percent or more of total public expenditure in the event of a 200-year disaster.

ASEAN governments typically have insufficient funding arrangements in place for major disaster events. ASEAN governments currently retain most of their disaster risk. They rely heavily on annual (contingency) budget allocations for potential disaster events and post-disaster reallocations to finance their disaster response efforts. Immediate humanitarian needs are largely met. Cambodia, Lao PDR, and Myanmar regularly struggle, however, to secure adequate and timely funding for early recovery.

Inadequate disaster financing arrangements have exacerbated the adverse socio-economic consequences of disasters. Most countries face de-

lays in reconstruction as it takes time to secure sufficient resources from limited public budget envelopes, exacerbating the socio-economic consequences of disasters at both the national and household level. Post-disaster budget reallocations can also derail progress toward the achievement of national and sector development goals and objectives. Funding gaps may be particularly acute at a sub-national level, potentially contributing to geographical disparities in economic development and levels of poverty.

Private disaster risk insurance markets have failed to offset a significant share of government contingent liability because they are still underdeveloped in most ASEAN Member States. Property catastrophe insurance, agricultural insurance, and disaster microinsurance are all still under-developed in most ASEAN Member States and have achieved low rates of penetration. This reflects a combination of challenges on the supply side (such as product development, limited delivery channels, lack of technical capacity), challenges on the demand side (such as low insurance education, low awareness on exposure to disaster risks), and a need to strengthen legal and regulatory systems.

Disaster losses are expected to rise in the future, in turn increasing the fiscal burden of disasters if existing financial management arrangements are not improved. There are growing concerns about increasing exposure and vulnerability to natural hazards in the ASEAN region. Predicted rises in the frequency and intensity of weather-related hazards as a consequence of climate change appear set to fuel this trend.

Options for Consideration

There is growing interest in the development of national disaster risk financing and insurance plans in the ASEAN region to improve the management of the fiscal burden associated with disasters and inter-annual volatility in disaster spending requirements. These efforts are also seeking to ensure more timely relief and recon-

struction efforts, to leverage additional resources, and to alleviate the periodic burden of disasters on planned development initiatives. The Philippines, for instance, signed a US\$500 million contingent credit for natural disasters with the World Bank in mid-2011. This contingent credit was drawn down on December 29, 2011, following the devastating impacts of Tropical Storm Sendong (Washi). Indonesia and Viet Nam are also actively exploring ex ante disaster risk financing and insurance strategies.

In parallel, private disaster risk insurance markets show some prospects of growth which could be further stimulated by public sector engagement. Demand for property catastrophe insurance is likely to expand in several countries where access to mortgages is becoming increasingly conditional on insurance coverage. There is also growing interest in agricultural insurance, in particular in index-based schemes, with some form of agricultural insurance available in five ASEAN Member States and a range of new initiatives recently launched or under development. Disaster microinsurance has been particularly undeveloped in the region but public-private partnerships are driving the early establishment of disaster microinsurance in two ASEAN Member States.

This study identifies five key recommendations to support and encourage the further development of cost-effective, affordable, and sustainable disaster risk financing and insurance in ASEAN Member States. These recommendations aim to offer a framework for a regional agenda on disaster risk financing and insurance.

Recommendation 1: Develop risk information and modeling systems for ASEAN governments to assess the economic and fiscal impact of natural disasters and include those risks in overall fiscal risk management.

ASEAN Member States could develop a joint regional risk information platform for this purpose, building on regional data sources currently in existence and including a geo-referenced exposure database and regional catastrophe risk models for major perils. This platform would offer ASEAN Member

States financial tools to assess the economic and fiscal impacts of natural disasters. It would also assist Ministries of Finance in the design of cost-effective national disaster risk financing and insurance strategies. The platform could offer tools for insurance regulators to implement risk-based supervision of domestic insurers and reinsurers and to monitor rate adequacy for catastrophe risk insurance products.

Recommendation 2: Develop disaster risk financing and insurance strategies at the national and sub-national levels to manage potential budget volatility associated with natural disasters and provide insurance coverage against natural disasters for key public assets.

Disaster risk financing and insurance strategies could be developed based on a combination of risk retention and risk transfer tools for different layers of risk and tailored to the circumstances of individual countries. They could include instruments such as contingency budgets, reserves, contingent credit, insurance, and catastrophe bonds. They need to ensure that the funding available matches the post-disaster needs. Comprehensive tracking systems would need to be established to monitor the scale and timing of flows of resources. Disaster risk financing and insurance strategies should be carefully coordinated with risk reduction strategies at both national and local levels and reinforce sound risk reduction principles. National and sub-national disaster risk financing and insurance strategies could also include a catastrophe risk insurance program for key public assets.

Recommendation 3: Establish national disaster funds as a financial mechanism to ensure the fast disbursement and execution of funds in the aftermath of a disaster.

A dedicated financial vehicle could be established in each ASEAN Member State to conduct transparent and efficient post-disaster damage assessments of public assets (and possibly low-income housing), mobilize immediate funding post disaster, and execute the funds in close collaboration with relevant line ministries and public agencies. The fund could contain three windows:

< 4 > ASEAN: Advancing Disaster Risk Financing and Insurance in ASEAN Member States

- o An emergency fund for immediate humanitarian needs;
- o A program to support the reconstruction of public infrastructure and low-income housing; and
- o A trust fund to manage the resources and act as the contracting authority for risk transfer mechanisms, via which governments could leverage their financial capacity.

The national disaster funds could build up reserves from the unspent portion of their annual budget allocations over time to increase their retention capacities. The creation of local government disaster funds and related pool facilities could also be considered at the sub-national level.

Recommendation 4: Promote private catastrophe risk insurance markets through public-private partnerships and the development of enabling regulatory and risk market infrastructure.

Three key areas for development of enabling regulatory and risk market infrastructure could be considered by ASEAN governments to promote the development of property catastrophe risk insurance, agricultural insurance, and disaster microinsurance:

- o Governments could work toward the development of an enabling insurance regulatory and supervisory framework that controls insurers' exposure accumulations to catastrophe risk using a risk-based capital approach. Regulation could also be used to support the growth of emerging insurance products that have the potential to increase insurance penetration and reach low-income populations.
- o Governments could develop risk market infrastructure to assist the development of a cost-effective, affordable, and sustainable insurance market. Risk market infrastructure development could include: product development, risk assessment and pricing methodologies, loss adjustment procedures, and distribution channels. The need to develop risk market infrastructure is particularly strong for disaster microinsurance.
- o Governments could facilitate disaster risk pooling, creating a larger, more diversified portfolio which

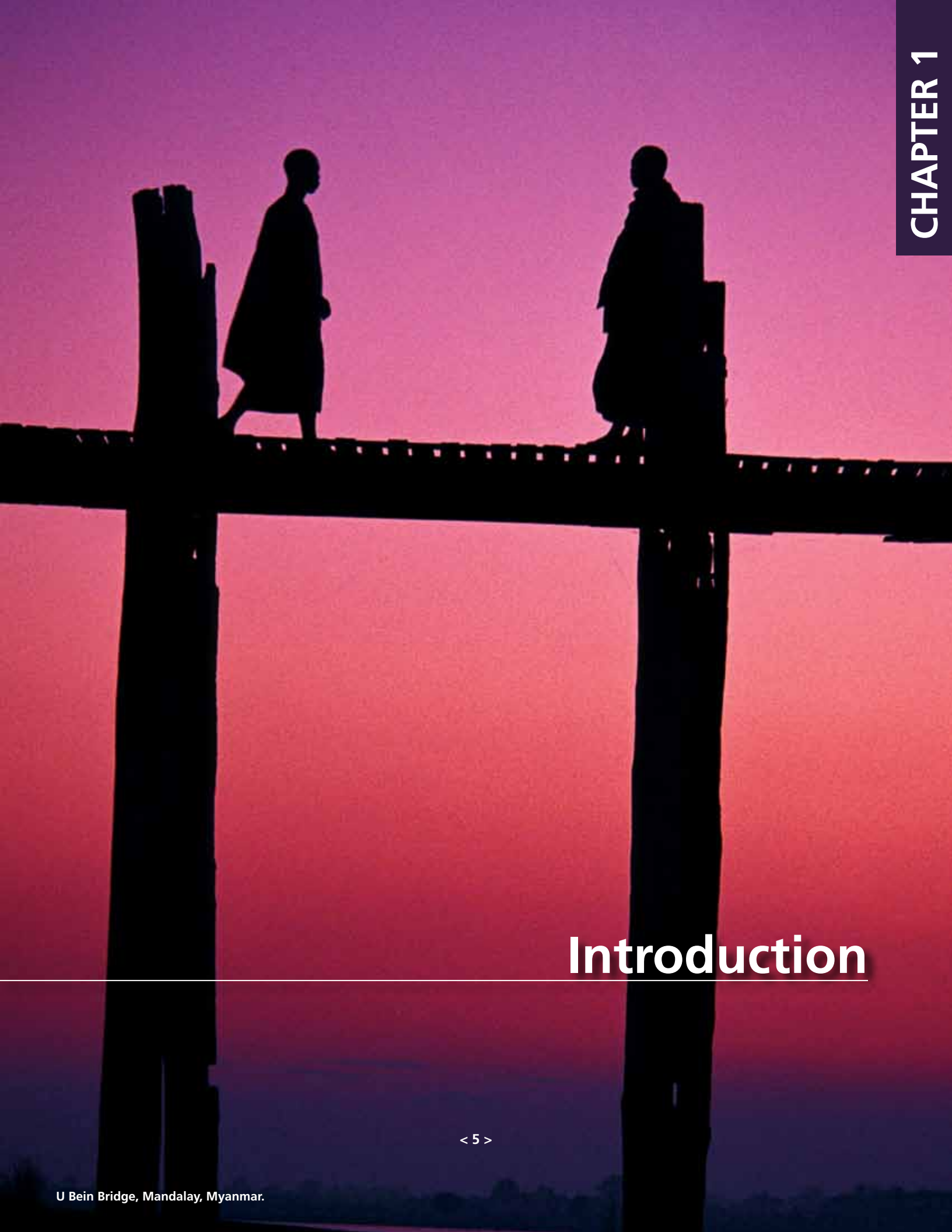
should lead to lower reinsurance prices and reduced transaction costs.

Recommendation 5: Strengthen regional cooperation on disaster risk financing and insurance to support its development, including the establishment of a regional catastrophe risk insurance vehicle.

The development of disaster risk financing and insurance could be strengthened via regional cooperation among ASEAN Member States in three key areas; a dedicated regional program on Disaster Risk Financing and Insurance for ASEAN Member States could be established to support these activities:

- o Regional risk information, assessment, and modeling systems. These systems would be more cost-effective than individual country equivalents, particularly in the context of trans-boundary hazards, and would promote regional cooperation in risk management. The resulting risk assessments could be used to develop country-specific financial disaster risk profiles.
- o Regional knowledge advisory services and capacity building programs to facilitate knowledge sharing.
- o A regional vehicle could leverage international reinsurance and capital markets, potentially generating significant economies of scale via both risk pooling benefits and reduced operating costs, thereby making risk transfer products more affordable both for governments and private individuals.

Recommendations 1 to 3 apply equally to municipal, provincial, and national levels, although a regional approach would be particularly advantageous in developing risk information and modeling systems. It should also be noted that those recommendations pertaining to risk pooling would benefit from scale to allow for maximum diversification and economies of scale. Recommendation 4 is targeted at the national level as it pertains to private markets and Recommendation 5 discusses a regional approach. Each ASEAN Member State may want to prioritize and tailor those recommendations based on its country-specific needs.



Introduction

From July 2011 to October 2011, a number of ASEAN Member States were affected by severe flooding. Cambodia, Lao PDR, and Viet Nam were impacted, but Thailand was worst hit, with estimated total economic damage and losses of US\$45 billion. Flood waters persisted in some areas through mid-January 2012; at maximum flood extent, 64 provinces in Thailand were affected. Bangkok was also inundated. Initial assessments indicated that the majority of losses were concentrated in the private sector, with manufacturing being the worst hit sector. Insured losses for Thailand could range from US\$15 billion to as high as US\$20 billion, coming principally through commercial and industrial lines where business interruption has been extensive. The event had consequences for the Japanese economy, as reports indicated that Japanese-owned companies in Thailand and Japanese companies supplied by Thai enterprises were particularly affected. The international (re)insurance industry will shoulder a large portion of the burden as cession of risk out of the domestic market for commercial and industrial risks is large. International reinsurers Munich Re and Swiss Re both indicate that their net losses from the flooding will exceed US\$600 million.

ASEAN Member States are highly exposed to a wide range of adverse natural events. Earthquakes, catastrophic flooding, tropical cyclones, and drought have all had large footprints in the region, with more than 100 million people in ASEAN Member States affected by catastrophic events since 2000².

ASEAN Member States are at risk from hydro-meteorological disasters. The monsoon and cyclone seasons impact all ASEAN Member States, with topography creating vulnerability to flash flooding and landslides in addition to significant river flood risk, specifically from the vast Mekong river basin. Flood is a recurring problem across the region; in the past ten years alone, half of all ASEAN Member States have experienced at least one flood event costing over US\$100 million³. Figures on recent levels of loss are expected to have increased significantly as a consequence of the major floods experienced in Thailand, Viet Nam, Cambodia, and Lao PDR in 2011. The 2008 cyclone Nargis ranks amongst the deadliest cyclones of all time, causing an estimated 138,000⁴ deaths in Myanmar.

Geophysical disasters, although less frequent in occurrence, have wrought particular devastation in the region. The December 2004 Indian Ocean tsunami, triggered by seismic activity off the west coast of Sumatra, Indonesia, remains one of the deadliest disasters on record, costing more than 200,000 lives across fourteen countries and causing damage in excess of US\$4.5 billion. In Indonesia, three earthquakes since 2004 have impacted more than 6 million people and caused US\$10 billion in economic losses⁵. Malaysia, Myanmar, the Philippines, and Thailand also count earthquake events in their costliest ten disasters since 1900. Indonesia has 70 active volcanoes classified as dangerous, while in the Philippines a review of the historic record indicates that central and southern Luzon are likely to experience a significant eruption about once every three years.

Exposure to natural disasters in ASEAN Member States is increasing. Increasing urbanization has seen a growth in the concentration of assets, particularly in flood-prone areas due to the prevalence of coastal cities in the region. In the past 20 years, four ASEAN Member States have experienced catastrophic events costing at least 1 percent of national GDP at 2009 value. A large proportion of

² EM-DAT: The OFDA/CRED International Disaster Database – www.emdat.be – Université Catholique de Louvain, Brussels

³ EM-DAT: The OFDA/CRED International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels

⁴ Swiss Re Sigma 2008

⁵ EM-DAT: The OFDA/CRED International Disaster Database – www.emdat.be – Université Catholique de Louvain – Brussels

Figure 1.1. Mortality Risk Index for Multi-Hazard Risk



Source: ASEAN DRM 2010

the population within the region is concentrated in coastal lowlands or deltas at risk of flooding. The broad extent of seismic activity across the region also puts a vast number of people at risk; in the Philippines an estimated 74 percent of the population is vulnerable to natural hazards, while in Lao PDR two thirds of the country's population face an average of 1.5 serious floods or droughts every year. In Viet Nam, more than 70 percent of the population is estimated to be exposed to risks from multiple natural hazards and in Cambodia 31 percent of the population is estimated to be in an area of risk from two or more hazards.

Disasters have created considerable public and private recovery and reconstruction financing requirements. The recovery and reconstruction cost resulting as a consequence of the 2009 West Sumatra earthquakes in Indonesia, for instance, was estimated at US\$2.4 billion, of which almost a

third fell on the public sector (Indonesia BNPB et al, 2009). Typhoon Ketsana and a second typhoon directly after resulted in recovery and reconstruction requirements totaling US\$4.4 billion in the Philippines alone, including US\$2.4 billion public spending needs (Philippines Government et al, 2009).

Disaster risk financing and insurance (DRFI) can help ASEAN Member States increase their financial resilience against natural disasters, as part of their broader disaster risk management agenda. DRFI has been identified as an area for exploration under the Prevention and Mitigation component of the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) Work Programme, for implementation in Phase 1 (2010-2012). Strategies and mechanisms for financial protection against disasters can reduce the impact of disasters on developing countries by taking pressure off fiscal and individual budgets in the aftermath of

a disaster and by reducing the opportunity costs associated with sourcing funding to meet post-disaster needs. Strategies that provide rapid, cost-efficient liquidity to governments or individuals can ultimately reduce the cost of disasters by preventing a resort to adverse financial coping mechanisms such as high-interest borrowing.

Disaster risk financing and insurance (DRFI) has been highlighted by the ASEAN Finance Ministers as an area for future regional financial cooperation. The Finance Ministers of ASEAN Member States highlighted the importance of regional cooperation on disaster risk financing and insurance at the ASEAN Finance Ministers' Meeting in Bali in April 2011. They agreed that a regional disaster risk financing and insurance strategy is essential to deal with natural disasters. They reiterated this statement at the 14th ASEAN+3 Finance Ministers' Meeting in Viet Nam in May 2011, where they requested the initiation of feasibility studies on disaster risk financing and insurance.

Disaster Risk Management in ASEAN Member States

ASEAN Member States take regional, national, and sub-national approaches to disaster risk management. The ASEAN Committee on Disaster Risk Management (ACDM) was established in 2003 and tasked with the coordination and implementation of regional activities on disaster management. The Committee has cooperated with United Nations bodies such as United Nations International Strategy for Disaster Reduction (UNISDR) and United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). The ASEAN Agreement on Disaster Management and Emergency Response (AADMER) provides a comprehensive regional framework to strengthen preventive, monitoring, and mitigation measures to reduce disaster losses in the region.

While progress has been made by ASEAN Member States in all priority actions of the Hyogo

Framework for Action (HFA), there is significant diversity in the progress of implementation both among countries and each HFA priority. Disaster risk management (DRM) efforts have gained momentum since the 3rd Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) held in Kuala Lumpur in 2008. Important milestones also include the 2nd Session of the Global Platform for Disaster Risk Reduction in June 2009 and the 3rd Session of the Global Platform for Disaster Risk Reduction in May 2011. See Table 1.1.

Box 1.1: Hyogo Framework for Action (HFA)

The HFA is a results-based plan of action adopted by governments around the world to reduce disaster risks and vulnerabilities to natural hazards and to increase the resilience of nations and communities to disasters over the period 2005 to 2015.

HFA Priority #1: Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

HFA Priority #2: Identify, assess, and monitor disaster risks and enhance early warning

HFA Priority #3: Use knowledge, innovation, and education to build a culture of safety and resilience at all levels

HFA Priority #4: Reduce the underlying risk factors

HFA Priority #5: Strengthen disaster preparedness for effective response at all levels

Disaster risk financing and insurance is a key component of HFA Priority #4 and is also one of the five pillars in the framework for disaster risk management (DRM) promoted by the World Bank. The World Bank has been promoting a proactive and strategic framework for DRM. This framework is based on five pillars: (i) risk assessment; (ii) institutional capacity building; (iii) risk reduction investments; (iv) emergency preparedness; and (v) disaster

Table 1.1. Progress toward the achievement of the HFA priorities as of 2011, as reported by ASEAN Member States

Scale: implementation progress ranges from 1 to 5 where:
 1 = achievements are minor and there are few signs of planning or forward action
 2 = some progress without systematic policy and/or institutional commitment
 3 = institutional commitment attained but achievements are neither comprehensive nor substantial
 4 = substantial achieved attained but with recognized limitations in capacities and resources
 5 = Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels

	Priority #1	Priority #2	Priority #3	Priority #4	Priority #5
Brunei Darussalam	3	3	2	2	3
Cambodia	2	2	3	3	2
Indonesia	4	4	3	4	3
Lao PDR	2	4	3	3	3
Malaysia	4	4	4	4	4
Myanmar	3	2	2	2	2
Philippines	4	4	3	3	4
Singapore	5	5	5	3	5
Thailand	4	3	4	3	4
Viet Nam	4	3	3	3	4

Source: Data for all countries except Cambodia and Singapore are taken from UNISDR (2011) HFA Progress in Asia Pacific – Regional Synthesis report 2009-2011. Data for Cambodia and Singapore are taken from their 2009 National progress reports on the implementation of the Hyogo Framework for Action.

risk financing and insurance. Despite prevention and mitigation efforts, no country can fully insulate itself against major natural disasters. Disaster risk financing and insurance allows countries to increase their financial response capacity in the aftermath of a disaster and to reduce the economic and fiscal burden of natural disasters by devising financial strategies combining post-disaster financing (for example, post disaster credit) and ex ante risk financing (for example, reserves, contingent credit, and risk transfer instruments like insurance).

According to the most recent HFA progress report for the Asia Pacific region⁶, the limited institutionalization of DRM as a priority at the national and

sub-national levels is a particular challenge. In addition, the development and use of tools and methodologies to support DRR activities remains limited, making investment in disaster risk reduction (DRR) a continuous challenge. Cross-sector and cross-jurisdictional coordination, a current area of weakness often underlined by low capacity and limited resources, require strengthening. Finally, while there has been progress in raising public awareness, countries find it challenging to sustain awareness of low frequency disaster risks and to expand public knowledge beyond high risk areas that face recurrent events.

Progress on HFA priority #1. The importance of an institutional framework for DRM is widely accepted. Between 2009 and 2011, new DRM policies and legislature were introduced or ad-

⁶ Regional Synthesis report 2009-2011

opted in the Philippines, Viet Nam, and Thailand. While most countries reported that they have dedicated funds for response, budget allocation for disaster risk reduction measures is in general still limited. The Philippines and Malaysia have made specific allocations for DRM activities. In Malaysia, US\$2 billion was spent on DRR related mitigation measures during 2006-2010, and US\$1.7 billion has been allocated for mitigation, early warning, preparedness, and awareness for 2010-2015. In the Philippines, US\$111 million has been allocated for the National Disaster Risk Management and Recovery Fund (NDRMRF), for risk reduction, preparedness, and response purposes. The Strategic Framework on Climate Change also provides resources for financing DRR activities. In addition to the NDRMRF, sectoral agencies, such as infrastructure, agriculture, and social welfare, can use a portion of their budgets for DRM purposes. Local governments also have their own Local DRM Funds.

Progress on HFA priority #2. While hazard risk assessments have been carried out by most countries, they are often limited in terms of the scope of hazards and geographical area covered. Myanmar launched an Action Plan on Disaster Risk Reduction which includes vulnerability and risk assessment and the production of a national hazard and vulnerability atlas. However, information dissemination at the community level is challenging. The Philippines completed the Hazard Mapping and Assessment for Effective Community-Based DRM (READY project). Early warning systems have received attention from most governments.

Progress on HFA priority #3. There has been progress in the development of disaster risk information. However, with often limited internet connectivity, information dissemination remains a challenge. There have been efforts to include DRM into school curricula (Myanmar, the Philippines, and Lao PDR) but these initiatives often do not reach university and college levels. Lao PDR carried out a pilot on mainstreaming DRM in education that is to be expanded across the country. Thailand has made

progress in improving its research methods and tools in risk assessment.

Progress on HFA priority #4. Rapid urbanization, growth of informal settlements, weak enforcement mechanisms, and low capacity have all acted as constraining factors in reducing underlying risk factors. Contingency planning and vulnerability and risk assessment figure prominently in the efforts in Indonesia and the Philippines. Indonesia, the Philippines, and Viet Nam have also made efforts in watershed management and crop diversification. Recovery efforts in Myanmar after Cyclone Nargis (2008) and in the Philippines after typhoons in 2009 have included DRR measures.

Progress on HFA priority #5. Disaster preparedness activities and the preparation of contingency plans have been undertaken in several countries. The development and use of contingency mechanisms and financial reserves is still at an early stage, as countries still focus mostly on post-disaster response. In the Philippines, the government pledged to make 100,000 education and health facilities safe from disasters as part of the 'One Million Safe Schools and Hospitals Program'. Targeted school and hospital safety programs were also developed in Lao PDR, while legislative provisions were strengthened in Thailand, Viet Nam, and Myanmar.

Objectives of the Report

This report is part of a project being jointly conducted by the World Bank, the GFDRR, the ASEAN Secretariat, and UNISDR. It aims to provide capacity building on disaster risk financing and insurance (DRFI) in ASEAN Member States. DRFI is a relatively new topic and, therefore, training and capacity building of local stakeholders is essential. Governments must understand the benefits and the limitations of disaster risk financing and insurance as part of their comprehensive DRM strategies.

This report is a first collaborative effort to present a comprehensive body of knowledge on the state of disaster risk financing and insurance in ASEAN Member States. It shares examples of best practice and draws lessons from international experience. It concludes by presenting options for consideration for the development of regional and national integrated disaster risk financing and insurance strategies, to be further discussed by ASEAN Member States. It is expected that this report will contribute toward a strengthened understanding and collective knowledge within the ASEAN region on DRFI and will encourage open dialogue between stakeholders on how regional and national strategies can best be developed to increase financial resilience against natural disasters.

This report presents main findings and recommendations on DRFI in the ASEAN region. Following the World Bank disaster risk financing and insurance framework, it consists of five chapters, including this introduction. Chapter 2 presents a preliminary economic and fiscal risk assessment of natural disasters in ASEAN Member States. Chapter 3 provides an overview of the fiscal management of natural disasters currently implemented by ASEAN Member States. Chapter 4 reviews the state of the private catastrophe insurance markets, including property catastrophe risk insurance, agricultural insurance, and disaster microinsurance. Chapter 5 identifies five main recommendations for strengthening the long-term financial and fiscal resilience of ASEAN Member States against natural disasters, as part of their broader disaster risk management and climate change adaptation agendas.

Financial Assessment of Natural Disasters

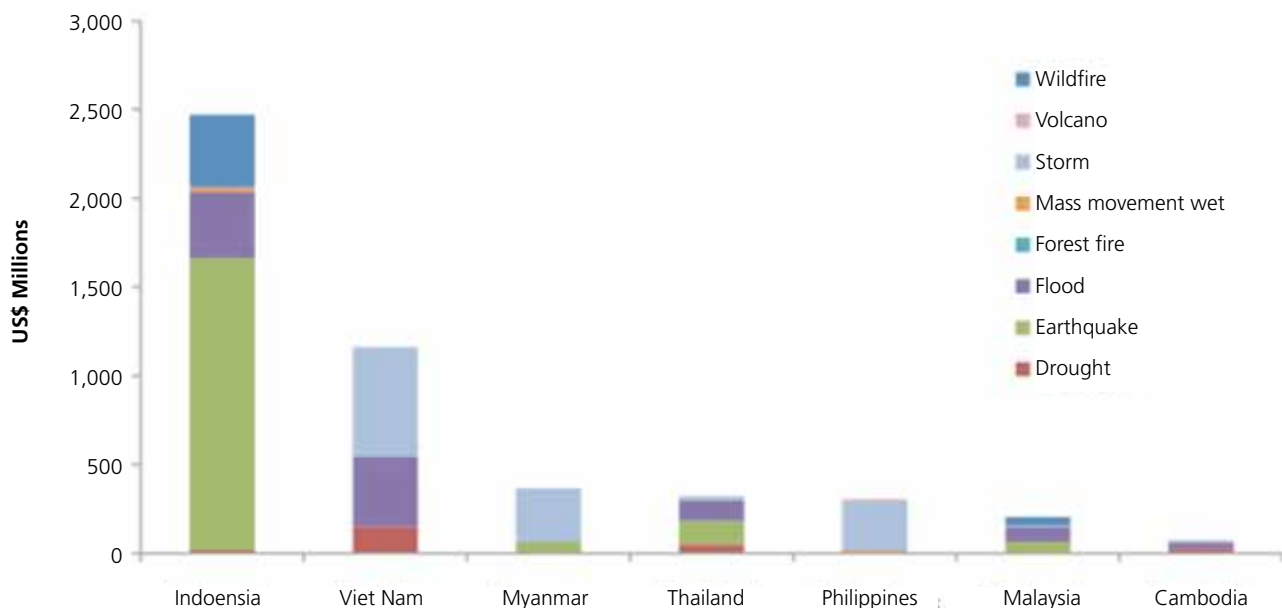
Quantifying risk is a critical first step in the development of any strategy for financial management of natural disasters. Furthermore, the value of such analyses goes well beyond disaster risk financing, as outputs have applications across all areas of disaster risk management, from contingency planning to resilient building. This chapter presents an initial disaster risk assessment of the ASEAN region. It looks at the past and potential future costs of natural disasters in the region from both a total economic and fiscal perspective. The economic and fiscal risk assessment of natural disasters presented in this chapter complements other analyses utilizing different base data sources and modeling methodologies⁷.

⁷ Readers can consult a number of alternative views such as the 2011 UN Global Assessment Report on Disaster Reduction and the ASEAN DRMI 2010 report for alternative views on economic losses and risk

Economic Assessment of Natural Disasters

Floods, storms (cyclones and typhoons), and earthquakes have caused major economic losses for the ASEAN region over the last 15 years. Importantly, both low-frequency, high-impact events, such as earthquakes and cyclones, and high-frequency, typically lower-impact events, such as floods, droughts, and wildfires, have caused significant economic damage in ASEAN Member States over the last decade. Figure 2.1 shows historical annual average losses over the period 1996-2010. The figure illustrates the range of perils experienced in the ASEAN region, including high-frequency, low-impact hazards, such as droughts, and low-frequency, high-impacts events, such as earthquakes and storms.

Figure 2.1. Historical Average Economic Losses for ASEAN Member States by peril (1996-2010)



Source: Authors from EMDAT CRED

Note: EMDAT CRED loss data is recorded in current US\$ dollars of the year in which the disaster occurs. To account for possible changes in exposure and price over time, financial losses are multiplied by a factor of (GDP_{2010}/GDP_{year}) . Singapore does not report historical losses over the study period, while Brunei Darussalam only reported one major loss (of US\$ 2 million loss in 1998). Due to the small size of annual average historical losses, both countries are excluded from the graph.

Assessment of natural disaster risk requires analysis of both historical data and catastrophe probabilistic models. For example, although the Philippines experienced relatively low annual average losses between 1996 and 2010, it is one of the most exposed ASEAN Member States, particularly to the risk of catastrophic cyclones. For this reason, historical information needs to be complemented with probabilistic catastrophe risk models; the latter capture the possibility of infrequent events, such as a one-in-100 year storm, even if they are not observed in the his-

torical period under consideration. In practice, while catastrophic probabilistic models have been developed and are available for certain perils (earthquakes and storms), catastrophic flood probabilistic models are seldom available, mainly due to the underlying complexity of such disasters. Therefore, the analysis of disaster economic losses in ASEAN Member States presented in this report combines scientific probabilistic models for earthquakes and storms with a historical approach to modeling losses from all other perils, including floods. See Boxes 2.1 and 2.2.

Box 2.1. Loss risk assessment methodology

Following the World Bank methodology, a preliminary financial risk assessment has been conducted to calculate average expected losses (AELs) and probable maximum losses (PMLs) for the purposes of this report. This assessment is based on a combination of reported historical and simulated disaster losses, the latter obtained from earthquake and typhoon probabilistic models.

Historical disaster loss data, as reported by EM-DAT CRED, provide information on historical geophysical and hydro-meteorological events that exceed a defined threshold of severity. Historical loss data for high-frequency, low-impact natural disasters such as droughts, floods, and forest fires for 1996-2010 were extracted from the EM-DAT CRED database. These data are expressed in the database in current US dollars in the year of the disaster event. Losses were therefore multiplied by a factor equivalent of GDP_{2010}/GDP_{year} to account for changes in exposure through time as well as for price inflation.

Simulated catastrophe losses were computed from probabilistic catastrophe risk models for the perils of earthquake and typhoon, providing information about catastrophic losses caused by simulated major natural disasters of varying severity. Willis Re along with members from the Willis Research Network contributed simulated catastrophe losses for this analysis.

Statistical analysis and inference based on the historical data were performed and complemented with the results generated by the probabilistic catastrophe models to calculate AELs and PMLs.

Box 2.2. Probabilistic catastrophe risk modeling

The economic assessment of natural disasters presented herein uses probabilistic catastrophe risk modeling output. This technique was originally developed by the insurance industry to assess the risk of a portfolio of assets and to price insurance contracts. Probabilistic catastrophe risk modeling is increasingly used by governments to assess their exposure to adverse natural events and by insurance regulators to implement risk-based supervision of insurers/reinsurers underwriting catastrophe risk.

Access to catastrophe risk models is limited in the ASEAN region. The principle model sources are:

- Independent third-party vendor modeling firm ‘off the shelf’ models
- Broking house models
- Insurer and reinsurer tools developed in-house

Independent third-party model vendor coverage:

The table below details ‘off-the-shelf’ model availability from the three largest independent third-party catastrophe model vendors. For the perils of earthquake and typhoon, all models explicitly capture the principal loss agents of wind damage for typhoon and ground motion for earthquake. Treatment of additional loss agents varies as follows:

- Tsunami following earthquake is not modeled by any vendor;
- Rainfall-induced-flooding from typhoon is modeled by both vendors providing typhoon modeling in the region;
- Coastal storm surge from typhoon is modeled by EQECAT but not included in the AIR Philippines typhoon model.

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
AIR Worldwide			Earthquake				Earthquake, Typhoon			
EQECAT			Earthquake		Earthquake, Typhoon		Earthquake, Typhoon	Earthquake	Earthquake, Typhoon	
Risk Management Solutions			Earthquake				Earthquake			

Broking house models:

International brokers operating in the region have also developed models, primarily used for technical support to their clients. Aon Benfield Impact Forecasting has an Asia typhoon model covering the Philippines, Thailand, and Viet Nam. Willis has created regional stochastic risk tools and models mostly for those areas or perils for which there are no vendor models. Their models include typhoon models for the Philippines, Viet Nam, Thailand, Cambodia, and Lao PDR and earthquake models for the Philippines, Indonesia, Singapore, Malaysia, Viet Nam, Thailand, Cambodia, and Lao PDR.

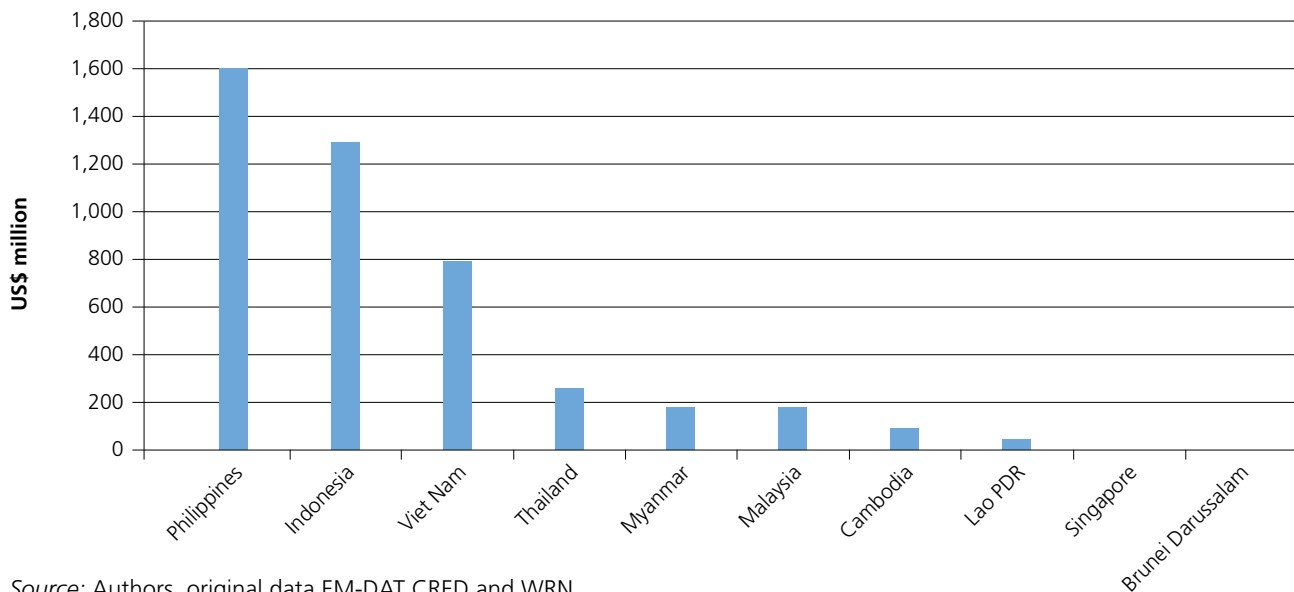
Insurer/reinsurer models:

International reinsurers often develop their own models in-house to supplement vendor model output for their catastrophe exposure management and pricing processes. It is likely that the large international reinsurers operating in ASEAN Member States have their own view of risk for some territories and perils. Some insurers operating in the region will also have models developed in-house – for example, specialist Indonesian earthquake insurer PT Maipark has developed a probabilistic earthquake model to support its operations.

Every year, on average, the ASEAN region experiences losses related to natural disasters estimated at US\$4.4 billion. Annual expected losses (AEL)⁸ are highest for the Philippines, Indonesia, and Viet Nam, with AELs of US\$1.6, US\$1.3, and US\$0.8 billion respectively, according to the analysis undertaken for the purposes of this report. Singapore and Brunei Darussalam present the lowest expected economic losses from natural disasters in the region⁹. See Figure 2.2.

of national GDP: high risk countries, comprising Myanmar, the Philippines, Viet Nam, Lao PDR, and Cambodia; medium risk countries, comprising Indonesia, Thailand, and Malaysia, and low risk countries, comprising Brunei Darussalam and Singapore. Myanmar's AEL represents 0.9 percent of its GDP, while the Philippines and Viet Nam's AELs represent 0.8 percent of their national GDPs. These three countries have the highest AELs as a percentage of GDP in the ASEAN region. Lao PDR and

Figure 2.2. Annual expected economic losses in ASEAN Member States (US\$ million)



Source: Authors, original data EM-DAT CRED and WRN

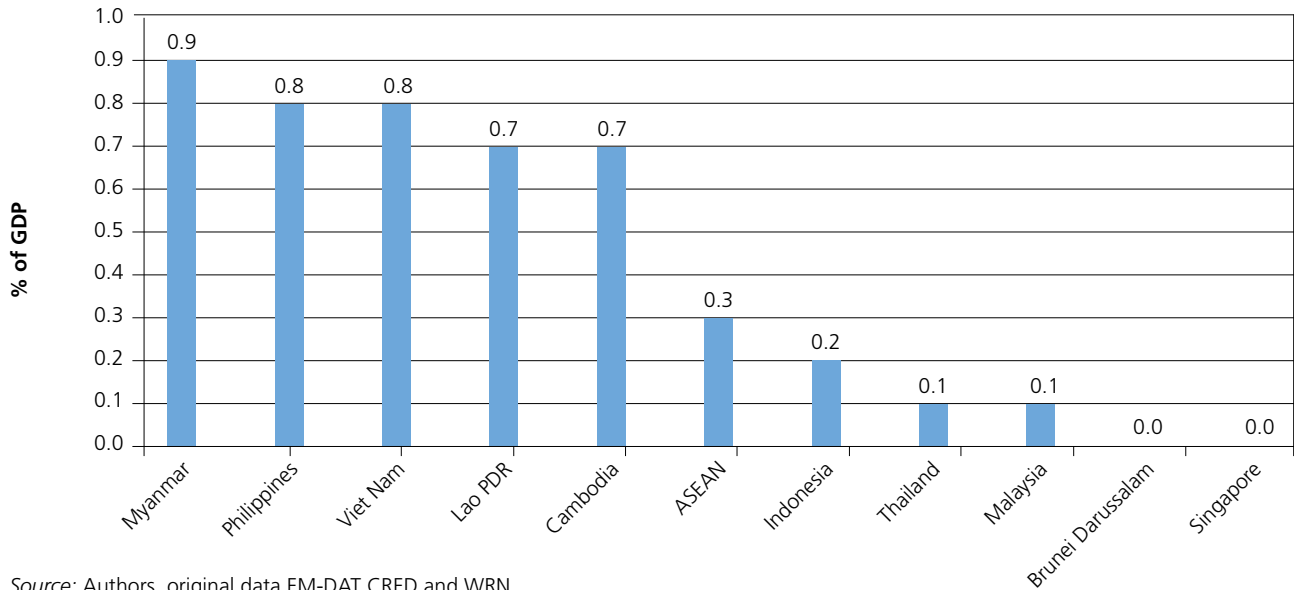
The ASEAN region annual expected loss from natural disaster represents in excess of 0.2 percent of the region's GDP. ASEAN Member States can be classified into three risk groups according to their annual expected loss as percentage

Cambodia also have significant AELs with respect to their economies. On average, Lao PDR and Cambodia experience annual economic losses equivalent to about 0.7 percent of GDP. Indonesia, Thailand, and Malaysia face moderate AELs relative to GDP, ranging between less than 0.1 percent and 0.2 percent. As expected, the two countries with lowest exposure to natural disasters, Singapore and Brunei Darussalam, face marginal AELs relative to GDP. See Figure 2.3. Note that limited data was available for Myanmar and therefore its AEL may not accurately reflect the long-term average annual losses Myanmar would be expected to sustain.

⁸ The annual expected loss (AEL) is an expression of the average annual loss over a long period of time.

⁹ AEL in Brunei Darussalam is based on historical data since no simulated earthquake or cyclone loss data was obtained, perhaps due to the country's low exposure. Singapore, presenting no historical economic loss data related to natural disasters during the estimation period, is exposed to earthquakes, and AEL and PMLs are based on earthquake simulated losses.

Figure 2.3. Annual expected economic losses in ASEAN Member States, as percentage of national GDP

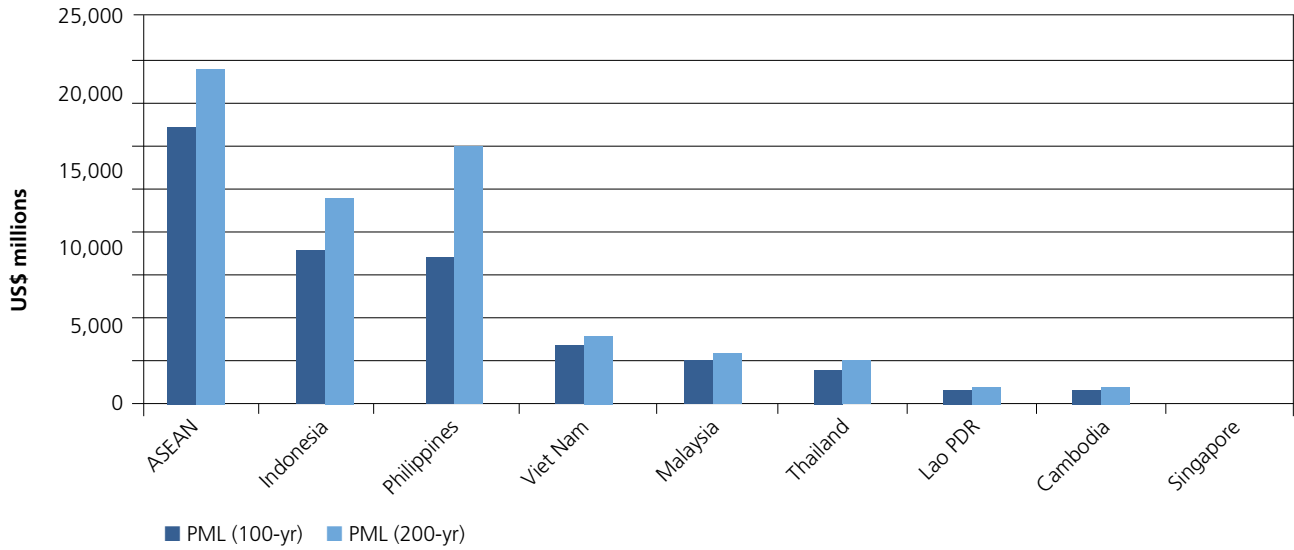


The ASEAN region is estimated to face annual disaster losses in excess of US\$17.9 billion once every 100 years. Indonesia, the Philippines, and Viet Nam present the highest 200-year and 100-year probable maximum losses (PMLs)¹⁰. The 100-year PML for these three countries ranges from US\$9.9 billion for Indonesia to US\$3.7 billion for Viet Nam. Malaysia and Thailand face lower 100-year losses of US\$2.3 billion and US\$2.2 billion respectively. Lao PDR, Cambodia, and Singapore face 100-year losses ranging from US\$0.9 billion for Lao PDR to US\$3.6 million for Singapore. Myanmar and Brunei Darussalam did not present a sufficient number of loss years, either historically or simulated, to compute reliable PMLs. See Figure 2.4 and Box 2.1.

¹⁰ The PML represents the expected loss severity based on likely occurrence, such as the 1-in-100 year loss (event of such severity that the recurrence is anticipated only every 100 years) or the 1-in-200 year loss.

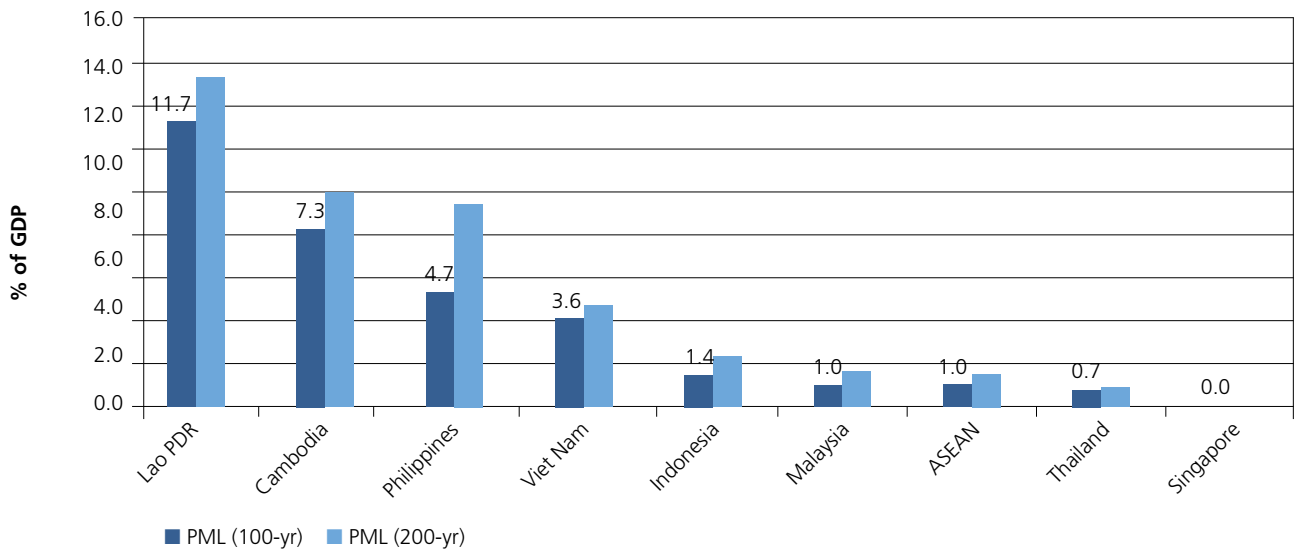
Probable maximum losses for the 100-year return period in the ASEAN region represent 1 percent of the regional GDP. Probable maximum losses as percentage of national GDPs, however, vary considerably across countries, being highest for Lao PDR, Cambodia, and the Philippines. In these three countries, 100-year losses as percentage of GDP range from 11.7 percent in Lao PDR to 4.7 percent in the Philippines, indicating that these countries are particularly vulnerable to extreme hazard events, such as large earthquakes and typhoons, relative to their economic scale. Viet Nam and Indonesia present 100-year losses of 3.6 percent to 1.4 percent of their GDPs, respectively. Malaysia, Thailand, and Singapore present 100-year losses equal to or lower than 1 percent of their GDPs. Probable maximum losses for Myanmar and Brunei Darussalam are excluded from the ASEAN pool due to limited data. See Box 2.3.

Figure 2.4. 100-year and 200-year probable maximum loss in US\$ millions



Source: Authors original data EM-DAT CRED and Willis with members of Willis Research Network

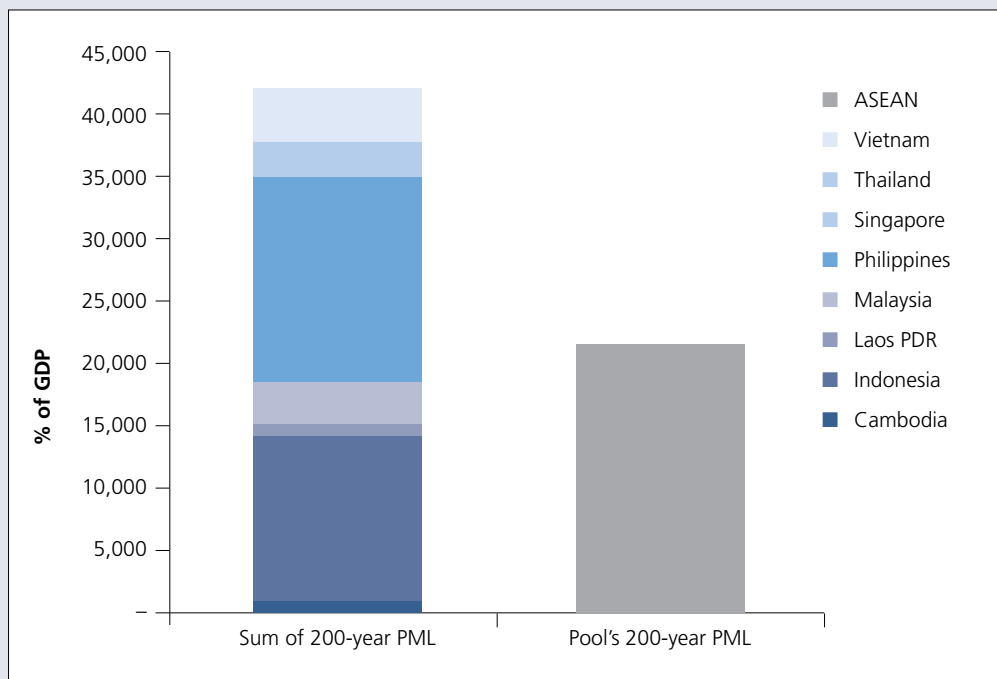
Figure 2.5. 100-year and 200-year probable maximum loss, as percentage of national GDP



Source: authors original data EM-DAT CRED and Willis with members of Willis Research Network

Box 2.3. Benefits of Risk Pooling

The ASEAN region can benefit from regional risk diversification. The figure below illustrates the benefits of risk pooling across countries and perils in the ASEAN region. The sum of 200-year probable maximum losses for the ten ASEAN Member States totals US\$42.1 billion without risk pooling. In comparison, the 200-year probable maximum loss with risk pooling amounts to US\$21.6 billion. This 48.5 percent reduction could translate into significant savings in the cost of risk transfer (e.g., insurance premiums) if a regional pooled risk transfer mechanism, rather than a series of individual country mechanisms, were developed.

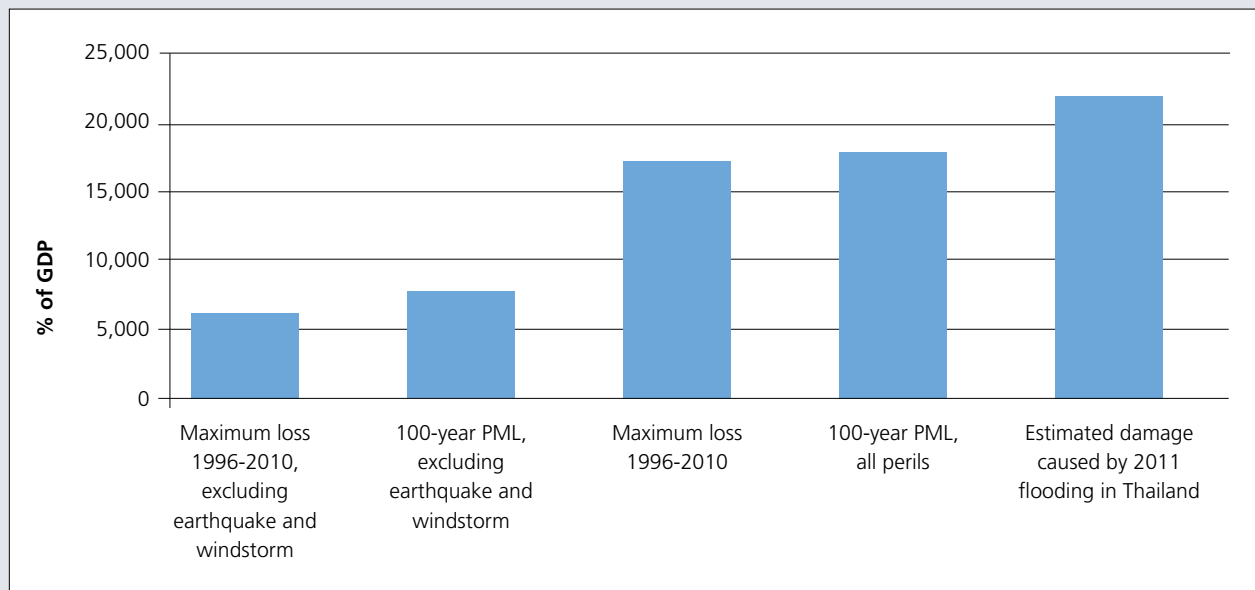


It is acknowledged that the 2011 flooding in Thailand tragically demonstrated the catastrophic potential of floods, implying the analysis of flood risk in this report is imprecise due to the limited availability of catastrophic flood models for the ASEAN region. See Box 2.4. This limitation poses both a challenge and an opportu-

nity: while the analysis presented in this report reveals that potential economic losses are subject to the current state of knowledge, it points at the necessity of exploring and of developing probabilistic flood models for the improvement of future risk assessments.

Box 2.4 Implications of the 2011 Thailand floods for financial loss assessment

The approach to risk assessment taken in this report suggests that the 100-year and 200-year damage across all ASEAN Member States, excluding damage from earthquake or windstorm, is approximately equal to US\$7.8 billion and US\$8.9 billion respectively. However, the damage caused by the 2011 floods in Thailand is estimated to be more than 200 percent higher than this, at US\$22 billion. Moreover, the damage from this flooding is estimated to be greater than even the 100-year damage across all ASEAN Member States and across all perils.



This box discusses whether and how the methodology in this report may have led to the underestimation of catastrophic flood risk and what can be done about it.

Risk assessment in this report has been conducted by combining catastrophe probabilistic models for earthquake and storm risk with statistical analysis of 15 years of historical data for all other perils. This relies upon the crucial assumption that earthquake and storm events drive losses of catastrophic magnitude (50-year, 100-year, or less frequent losses). If ASEAN Member States are exposed to other perils that can cause major damages then this approach is likely to be insufficient for a complete risk assessment. This is because it is typically not possible to accurately extrapolate the expected damage from 100-year (or less frequent) events from 15 years of historical data.

The 2011 Thailand floods suggest that at least one ASEAN Member State is exposed to the risk of catastrophic flooding. This risk cannot, therefore, be assessed by statistical analysis of 15 years of data alone; a catastrophic risk model that combines models of climactic events with models of on-the-ground exposure is required. This model would estimate the probability of flood events of varying severity, the localized extent of damage resulting from such events, and the exposure. It would most likely capture a combination of factors that contribute towards flooding, namely, short periods of heavy rainfall or chronic rainfall events, possible coastal and river surge, and slope of terrain, among other factors, in order to determine loss potential for residential, commercial, and industrial facilities.

continues

Box 2.4 Implications of the 2011 Thailand floods for financial loss assessment (cont.)

If catastrophic flooding may be a significant risk faced by some ASEAN Member States, then a full risk assessment will only be possible once a set of catastrophe probabilistic models for flooding has been developed for the region, as outlined above. A thorough understanding of disaster risks would not only be useful in designing effective disaster risk financing and insurance strategies, but would also encourage risk mitigation and preparedness, including actions to reduce vulnerability and exposure to natural hazards (e.g., territorial planning, building standards, retrofitting).

Fiscal Risk Assessment of Natural Disasters

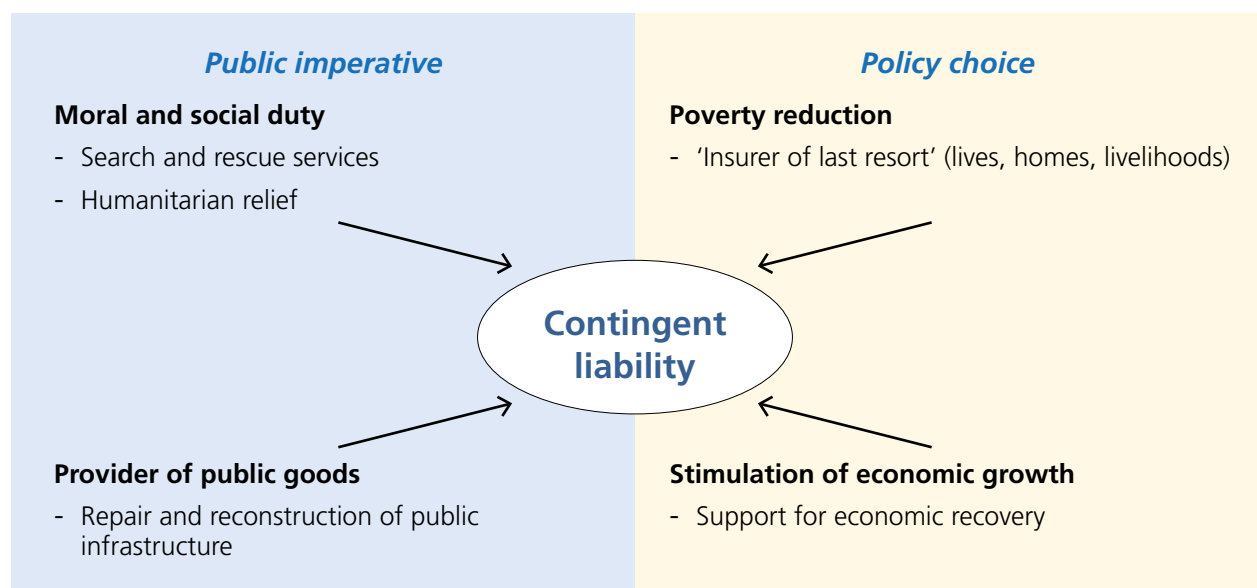
Governments only assume financial responsibility for part of the total economic losses incurred as a consequence of natural disasters. As a basis for developing disaster risk financing and insurance strategies it is necessary to define public responsibilities in the event of a disaster and then to assess the related cost in fulfilling these responsibilities; this provides estimates of a government's contingent liability for disaster events with different rates of return. This section addresses this topic.

Defining contingent liability

Contingent liabilities can be explicit or implicit.

Governments have an obvious duty as a provider of public goods to repair public infrastructure in the aftermath of a disaster. They have a moral and social imperative to provide rescue services and short-term humanitarian relief. Further government actions are driven by a combination of poverty reduction and economic growth concerns. These can lead governments into the role of "insurer of last resort" and stimulator of economic recovery. See Figure 2.6.

Figure 2.6. Forms of contingent liability



Source: Benson (2009a)

Contingent liability relating to the loss of public assets and infrastructure can be calculated in countries where a detailed inventory of public assets and a comprehensive disaster risk assessment of public property have been conducted, although with slight complications where the private sector is heavily involved in basic services provision. The extent of commitment to build-back-better principles and the precise nature of specific actions required to strengthen resilience (e.g., relocation of public assets) will also affect the cost of public infrastructure reconstruction.

In order to establish the total scale of contingent liability, however, governments and stakeholders need to define their exact roles and responsibilities with regard to affected communities and businesses. These include precise levels of support that will be provided under different disaster scenarios.

Contingent liability relating to personal losses can already be directly estimated in countries such as Viet Nam and Lao PDR, where statutory levels of personal compensation in the event of a disaster have been set, relating to loss of human life or injury and loss of homes and productive assets. In both Viet Nam and Lao PDR, compensation is fixed at very low levels, providing a safety net for the poor but also ensuring that related costs are not prohibitive.

Estimation of contingent liability for personal losses is more difficult in countries where levels of public support are not explicitly defined.

Provision of emergency relief, compensation for loss of life, injury, and loss of homes, and support for the recovery of livelihoods, particularly farming, is common. However, in the absence of mandated forms and levels of post-disaster support, the amount provided by a particular government in response to different events can fluctuate widely. Indeed, it can even vary where obligations are set. See Box 2.5.

Levels of compensation in response to different disasters may be influenced by a range of factors including:

- The *scale of the event*, with larger events often resulting in additional forms of compensation to offset potentially exponentially larger indirect and secondary economic consequences.
- The *level of national and international media coverage*, in turn in part correlated with the scale of the event.
- The *availability of funding* relative to the scale and nature of response needs, itself in part influenced by prevailing macroeconomic conditions as well as disaster risk financing arrangements.
- *Political opportunism*.

Box 2.5. In-country variations in post-disaster support for affected households

- In Thailand, substantially higher payments were made to families who lost their principal breadwinner as a consequence of the 2004 Indian Ocean tsunami than to those who lost breadwinners in more recent flood events.
- Homeowners in Indonesia received more support following the 2006 Central Java earthquake than the 2009 West Java and West Sumatra earthquakes (World Bank, 2011a).
- In Viet Nam, provinces sometimes provide much higher levels of disaster compensation – in some cases perhaps five to six times more – than legally mandated (Benson, 2009b). Ad hoc compensation may also be provided for private losses in addition to those specified under Vietnamese law.

The lack of clarity on forms and levels of post-disaster government support to affected communities and businesses and variations in actual practice make it extremely difficult to estimate public contingent liability from an ex ante perspective, based on expected government behavior. Moreover, it can make it difficult to manage expectations and to provide equitable, cost-efficient disaster response packages. A clear delineation of public and private roles and responsibilities is essential in encouraging private commercial and domestic uptake of risk transfer products and investment in risk reduction.

Evidence on contingent liability

Ex post estimates of damage and of public sector shares in recovery and reconstruction spending requirements for recent disasters in the ASEAN region may provide the basis for an alternative approach to the estimation of contingent liability. Observed ratios of damage to public sector recovery and reconstruction spending requirements can be applied to the average expected economic loss (AEL) and probable maximum loss (PML) data presented in Section 2 above to generate public contingency liability estimates for hazard events with varying rates of return for each ASEAN Member State. As already noted, governments meet some part of the recovery and reconstruction bill but do not fund it in full. See Table 2.1. Contingent liabilities can then be placed in context relative to socioeconomic indicators such as GDP, government expenditure, and population.

An initial analysis on this basis indicates that the annual expected fiscal burden of disasters is equivalent to 0.5 percent or more of total public expenditure in Myanmar, the Philippines, Cambodia, Lao PDR, and Viet Nam. See Figure 2.7. According to the assumptions outlined below, this spending would be split across two years, with early recovery costs relating to a particular disaster event accounting for 0.2 percent or more of annual expenditure in year one and reconstruction for 0.3 percent or more of annual expenditure in year two in these five countries. See Box 2.6. These countries should have comprehensive financing strategies in place to avoid substantial regular diversion of public resources from development to disaster response purposes.

The particularly high levels of contingent public liability relative to annual government expenditure for 1-in-100 and 1-in-200 year events in Cambodia and Lao PDR and for 1-in-200 year events in the Philippines are also noteworthy, emphasizing the importance of instruments to manage low-frequency, high-cost events in these countries. See Figure 2.8 and Appendix 3. Note that limited data was available for Myanmar and therefore that its high AEL relative to government expenditure may be a consequence of the limited historical period underpinning the analysis rather than a reflection of the long-term AEL Myanmar would be expected to sustain.

Table 2.1. Recent damage, loss and needs assessment estimates for ASEAN Member States

Note: Estimates of damage are based on the replacement cost of damaged and destroyed infrastructure and assets at their original location and to original specifications. In contrast, reconstruction costs incorporate changes in location and specification to increase disaster resilience and possible changes in service provision as envisaged in the reconstruction plan. The below table also indicates reported losses. These relate to disrupted flows of income resulting as a consequence of the damage and destruction of physical infrastructure. Losses are not included in the estimates of average expected loss and probable maximum loss reported above so are not taken into account in estimating contingent liability as a percentage of AEL or PML in Figures 2.7 and 2.8. However, they are reported in the table below for the sake of completeness.

Year	Disaster	Damage and losses				Recovery and reconstruction requirements		
		Total (US\$ million)	Damage (US\$ million)	Losses (US\$ million)	Public sector share in total (%)	Total (US\$ million)	Public sector share (%)	Public sector requirement as % of GDP
Cambodia								
2009	Typhoon Ketsana	132	58	74		191		
Indonesia								
2004	Aceh and West Sumatra tsunami	4,452	2,920	1,531	34	NA	(\$4.6bn)	1.8
2006	Aceh floods	210	198	12	30	NA	NA	NA
2009	West Sumatra earthquakes	2,300	2,070	230	12	2,436.50	31	NA
Lao PDR								
2009	Typhoon Ketsana	58	51	7	45	124a	20b	0.4
Myanmar								
2008	Cyclone Nargis–2008	4,057	1,754	2,303	NA	NA	(\$1.0bn)	NA
2009	Typhoons Ondoy (Ketsana) and Pepeng (Parma)	4,383	1,452	2,931	10	4,423d	55c	NA

^a \$4.8 million (4%) for immediate needs, \$47.1 million (38%) over 24 months to restore pre-Ketsana standards plus a further \$72 million (58%) for longer-term improvements (structural improvements, relocation of human settlements etc.). The assessment noted that the cost of some additional longer-term improvements had yet to be calculated and thus that the estimate of \$72 million was based on incomplete information.

^b The estimate includes relief requirements.

^c The assessment notes that the exact public sector need depends on government decisions on specific programs of support, the timing and pacing of those programs, and the effectiveness with which they are implemented.

^d US\$2.6 million (59%) in short-term recovery and reconstruction needs and US\$1.8 million (31%) in medium-term needs.

Sources: Cambodia Royal Government, 2010; Lao PDR Government et al, 2009; Indonesia Government, 2005; Indonesia BAPPENAS and the International Donor Community, 2005; Indonesia Government Kecamatan Development Program and the World Bank, 2007; Indonesia BNPB et al, 2009; Philippines Government et al, 2009; TCG, 2008.

Box 2.6. Assumptions underlying contingency liability estimates

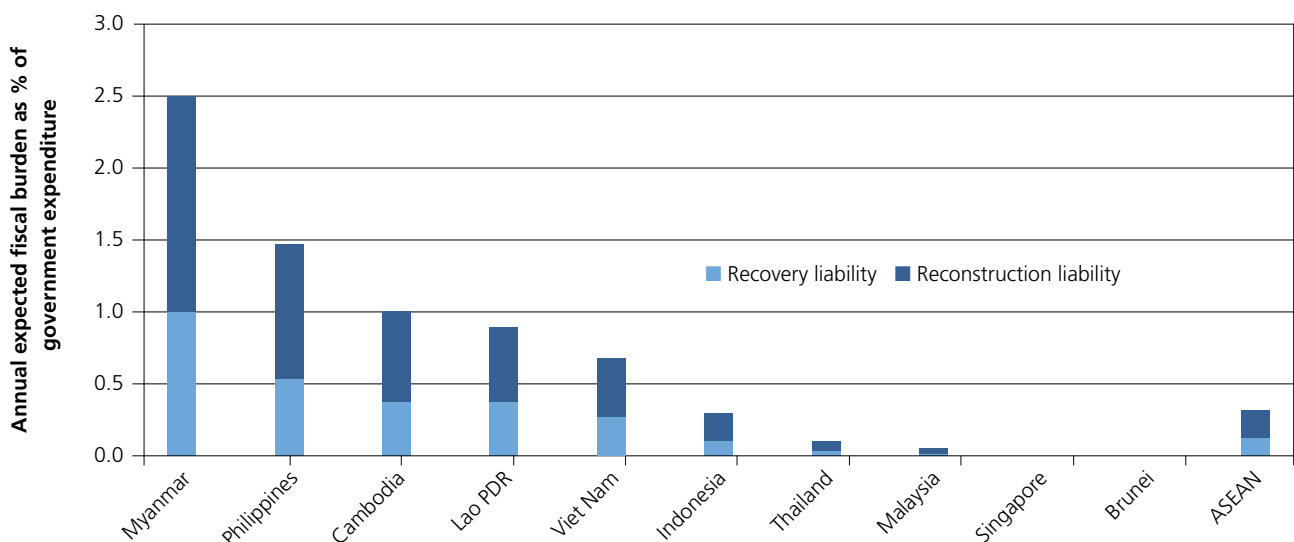
Contingent liability is equivalent to:

- 30% of average expected loss
- 30% of damage for 1-in-20 year events
- 35% of damage for 1-in-100 year events
- 40% of damage for 1-in-200 year events

40 percent of contingent liability is incurred within 12 months from the date of a disaster, in the form of recovery requirements.

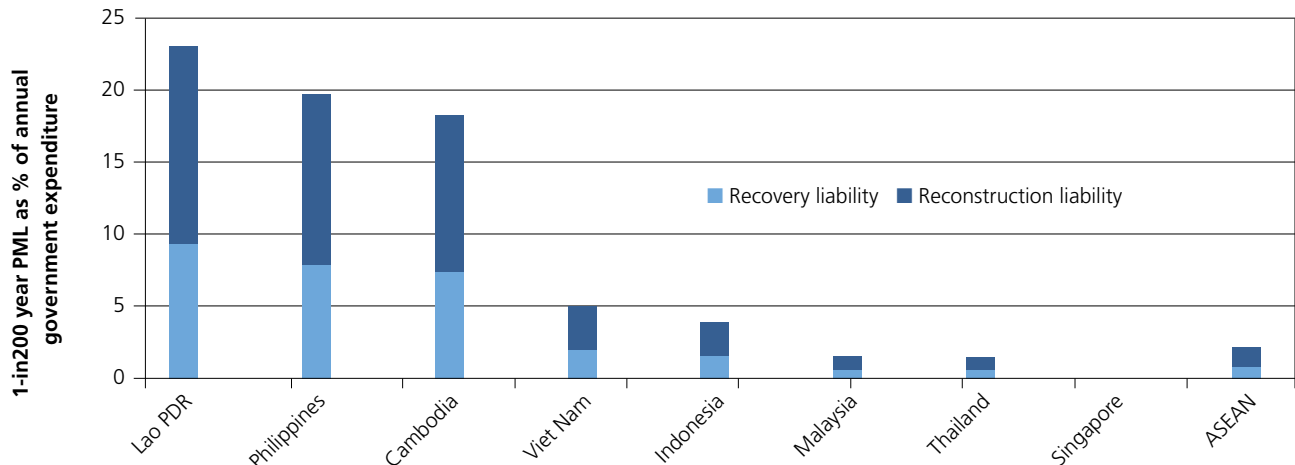
60 percent of contingent liability is incurred 12-24 months from the date of a disaster, in the form of reconstruction requirements.

Figure 2.7. Annual expected fiscal burden arising as a consequence of natural disasters as a percentage of annual government expenditure



Note: Limited data was available for Myanmar and therefore its AEL may not accurately reflect long-term average annual losses.
 Source: authors, original data listed in methodology description.

Figure 2.8. Estimated probable fiscal burden arising as a consequence of a 1-in-200 year probable maximum economic loss event as a percentage of annual government expenditure



Note: Myanmar and Brunei Darussalam did not present sufficient number of loss years, either historically or simulated, to compute reliable PMLs. Source: authors, original data listed in methodology description.

Box 2.7. Limitations of the public contingency liability analysis

The public contingency liability analysis has certain limitations relating to difficulties in determining robust underlying assumptions. As the data in Table 2.1 clearly indicate:

- **The ratio of damage to recovery and reconstruction costs can vary significantly.** For instance, the estimated cost of recovery and reconstruction in Lao PDR following Typhoon Ketsana was more than double that of reported damage because the disaster highlighted the extreme vulnerability of existing assets and the need for substantial investment to reduce future risk (Lao PDR Government et al, 2009).
- **The public sector share in total recovery and reconstruction costs can vary widely.** It will depend on the nature and scale of damage and the relative balance of public and private sector asset ownership in the affected sectors.
- **The relative balance of reconstruction and recovery requirements can differ and most likely varies both among countries and types of hazard.** (See Table 2.1 footnotes (a) and (d)). The overall split between reconstruction and recovery needs was not reported for the other events.)
- **Emergency relief needs are typically not included in recovery and reconstruction estimates. As such, the latter provide an underestimate of the total cost of disaster response.**

Furthermore, data on damage and losses also need to be treated with some caution. The assessments in Table 2.1 are comprehensive and fairly reliable. In other cases, however, damage and loss assessments are often incomplete and subject to inaccuracies. This reflects the fact that many countries lack standard, systematic

continues

Box 2.7. Limitations of the public contingency liability analysis (cont.)

damage assessment guidelines and related training courses, resulting in gaps in data collected and variations in methods of loss estimation. The extent to which private damage is covered can also vary widely, implying that public contingent liability may account for a distortedly high share in total damage in some instances. In addition, total damage and losses in monetary terms are often not reported. A review of EM-DAT revealed that such information is absent for around two-thirds of disasters (Loayza and others 2009).

In view of these various limitations, ***rules of thumb on the ratio of the public contingent liability bill to average expected economic losses or probable maximum losses ideally need to be developed on an individual country and hazard basis. These ratios may well need to be graduated too, with contingent liability as a share of total recovery and reconstruction costs rising as the scale of a disaster event increases.*** Community and familial support structures may be increasingly undermined as the scale of a disaster increases, forcing exponentially higher reliance on the state, while the proportion of public infrastructure that is totally destroyed, rather than damaged, may also rise.



Fiscal Management of Natural Disasters

This chapter outlines existing disaster risk financing and insurance arrangements for post-disaster response in the ten ASEAN Member States. It includes a desk-based review of the performance and adequacy of these arrangements and the extent of reliance on non-formalized instruments in the form of post-disaster budget reallocations, longer-term capital investment realignments, and fiscal deficit financing. It ends by presenting available evidence on the scale of the public funding gap for post-disaster response in several ASEAN Member States and emphasizing the need for comprehensive disaster financing tracking systems. International experience is drawn upon for comparison. This analysis aims to open a discussion with the ASEAN Member States on the fiscal management of natural disasters to (i) validate and complete the findings and (ii) discuss the efficiency of the current management in terms of resource mobilization and execution. A more detailed discussion is provided in Appendix 3.

Introduction

Disasters potentially increase public spending requirements while simultaneously reducing revenue. Their immediate and longer-term fiscal consequences depend on the nature and extent of impact of individual disasters and the disaster risk financing instruments at a government's disposal. To reduce disaster risk, levels of public expenditure on risk reduction should be sufficient relative to the level and nature of risks faced, the expected net economic and social returns to individual risk reduction options, and the reasonable responsibilities and obligations of government (most critically to avert loss of life) (Benson, 2009).

The World Bank framework for disaster risk financing and insurance advocates a three-tiered layered approach to the development of financing arrangements to cover the residual disaster risks that cannot be mitigated. Risks associated with high-frequency, lower-cost events occurring on a near-annual, recurrent basis should be met via regular annual budget allocations. Further

funding for slightly larger events can be raised via the post-disaster reallocation of budgetary resources and the realignment of national investment priorities, potentially at a slightly higher opportunity cost. Governments can also introduce temporary, post-disaster tax increases, increase borrowing or expand money supply. Related funding instruments include development partner contingency credit arrangements and post-disaster reconstruction loans. Remaining layers of residual risk associated with lower-frequency, higher-cost event should be transferred to third parties via a mixture of more expensive re-insurance tools and catastrophe bonds and, for the most extreme events, via reliance on international assistance. This approach is elaborated upon in further detail in Chapter 5.

There is an additional time dimension relating to the decomposition of post-disaster funding needs into the various phases of relief, early recovery, and reconstruction. Some financing instruments can be activated very rapidly. See Figure 3.1. Certain others may take longer to activate but can generate substantial funding. The disaster risk financing strategy needs to reflect both time and cost dimensions, ensuring that the volume of funding available at different stages in the response efforts matches actual needs in a cost-efficient manner. It also needs to incorporate a systematic tracking system to monitor resources.

If adequate and timely funding arrangements are not in place, the adverse socioeconomic impact of a disaster can be significantly exacerbated, both at macroeconomic and household levels. Recent theoretical econometric modeling by Hallegatte et al (2007) suggests that the economic impacts of disasters, as defined in terms of gross domestic product (GDP) losses, are much higher in countries where public (and private) reconstruction resources are limited and thus where reconstruction is spread over a number of years. At the household level, if public assistance is insufficient or even simply delayed poorer families may be forced to resort to adverse coping mechanisms

Figure 3.1. Availability of financial instruments over time

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

Source: Ghesquiere and Mahul, 2007

such as informal high-interest borrowing, the sale of household and productive assets (sometimes at highly reduced prices), and withdrawal of children from school. Opportunities presented by disasters to upgrade infrastructure and technology and to strengthen resilience to future hazard events are also partly lost if there is insufficient funding available for reconstruction.

Ex-Post Practices and Arrangements

Annual budgeting for disaster relief and early recovery

Most ASEAN governments make some regular national annual budgetary provision for potential disaster relief and early recovery purposes.

National disaster management offices (NDMOs) commonly have overall responsibility for humanitarian relief and often have a related budget to support them in that role. Local governments can typically request support from this central budget once they have exhausted local resources. In some countries, line agencies can also access this funding. Certain line agencies may hold additional emergency financing of their own. Most countries in the region stockpile emergency relief items as well. See Table 3.1 and Box 3.1

In some ASEAN states, there is a second more general budget line for a wider range of unforeseen circumstances that can be drawn upon once the disaster response budget line is exhausted. In certain other ASEAN Member States, post-disaster relief and early recovery spending requirements are simply covered under this more general budget allocation and there is no disaster-specific line of funding.

Singapore is a notable exception. The Government of Singapore makes no annual budgetary allocations for disaster response because the risks of a disaster are low. In the event that one does occur, the Government's Operations Civil Emergency Plan is activated. This plan gives the Singapore Civil Defense Force the authority to direct all response forces under a unified command structure and for all required resources to be pooled (Singapore MSD, 2009). This practice parallels that in certain other high-income, low-disaster-risk countries which, similarly, do not allocate annual resources for disasters. Instead, they have budgetary mechanisms or funding lines that can be activated in the event of a disaster and adequate financial capacity to ensure that these lines are sufficiently resourced (Benson, 2011).

Box 3.1. Enhancing budgetary arrangements for disaster risk management in the Philippines

In 2010, the Philippines passed a new Disaster Risk Reduction and Management Law, replacing the existing disaster risk management system with one emphasizing the need for a coherent, comprehensive, integrated, and proactive approach across different levels and sectors of government and among vulnerable communities.

The new law revamped the prevailing National and Local Calamity Funds into National and Local Disaster Risk Management and Recovery Funds (NDRRMF/LDRRMF). These Funds continue to receive annual budget appropriations from the relevant level of government but 70 percent can now be used for disaster risk reduction purposes. In the case of the NDRRMF, disbursements are endorsed by the newly constituted National Council to the President, which decides on allocations. The Fund is administered by the Department of Budget and Management (DBM), and disbursements are directly made to affected agencies and local governments. A portion of the NDRRMF is automatically allocated to the Quick Response Fund, which supports immediate response and recovery efforts. To encourage spending on ex ante measures, the declaration of a state of calamity is only required to trigger disbursement of the quick response fund. Monthly reporting on the use of the NDRRMF is required for all national and local agencies which receive support from the national fund.

At the local level, the new law removed the 5 percent ceiling imposed on the local calamity fund and set it as a new minimum spending requirement on disaster risk management. The law also allows for any unspent LDRRMF resources to be rolled over at the end of the fiscal year and accrue for up to five years (see Box 3.3), for the LDRRMF to be used for the purchase of insurance coverage, and for local governments to transfer their unexpended LDRRMF to other LGUs. The establishment of a local government disaster response pool is also being discussed (see below)

Over the last few years there has been a substantial increase in the level of allocations to the national calamity fund/NDRRMF, rising from PhP 2 billion (US\$44 million) in FY2010 to PhP 5 billion in FY2011, with a further increase to PhP 7.5 billion (US\$176 million) proposed for FY2012. The FY2012 proposal is equivalent to 85 percent of the Government's total estimated contingent liability for a one-in-five year event, as estimated according to the World Bank (2010b).

Source: World Bank, 2010b

The scale of annual budgetary provision for disaster response varies considerably between ASEAN Member States both in absolute terms and relative to average expected needs and total government expenditure. Annual allocations are apparently near sufficient to cover statutory personal compensation and early recovery costs in, for instance, Viet Nam (World Bank, 2010a) and Indonesia (World Bank, 2011a). The Philippines has also increased its budgetary provision for disaster response substantially over the past few years and the allocation now stands at an apparently reasonable amount to meet immediate humanitarian and early relief needs. Thailand is similarly considering a rise in

its more general emergency budget line in FY2012, in this case in response to a perceived increase in the incidence of climatic hazards. In contrast, very limited budgetary provision relative to likely need is made for potential disasters in Cambodia, Lao PDR and Myanmar.

Speed of disbursement is critical too. In practice, it can take some time for these and other forms of disaster response funding to move, potentially significantly exacerbating the adverse impacts of disasters both for affected populations and the wider macro-economy. The speed of disbursement depends both on the complexity of procedures in place (including

Table 3.1. ASEAN government annual budget allocations for potential disaster response purposes^a

	National government			Local government
	Annual budget for potential disaster needs		Annual budget for wider range of unforeseen events	
	Held by NDMO	Held by line agencies		
Brunei Darussalam				
Cambodia				
Indonesia	US\$470m (2011)			
Lao PDR			US\$11.7m (2010-11)	
Malaysia	US\$3.3m (2008)			
Myanmar				
Philippines	US\$112m (FY2011)			Not less than 5% of revenue from regular sources
Singapore				
Thailand			US\$8.3bn (FY2011)	
Viet Nam			2-5% of national budget	2-5% of provincial budget

Source: See Appendix 3

Legend: ■ Blank shaded boxes denote where authors are aware of the existence of a budget allocation but no information on budget size was available.

(a) This table is based on the best information that the World Bank team has been able to collate, but should be interpreted with due consideration to limitations arising from the secondary nature of the underlying sources.

approval processes) for the release of funds to local government and national implementing agencies and on the timing of disasters relative to the fiscal calendar. See Box 3.2.

Disaster response budgets may be topped up from a range of sources. In Viet Nam, surplus revenue (defined as the difference between planned and actual revenue) can be used to supplement

Box 3.2. Delays in disbursement post disaster

- Following Typhoon Ketsana in 2009, it took three months for the LAK 110 billion (US\$13.9 million) approved from the Government of Lao PDR Special Fund for emergency relief and early recovery purposes to begin disbursing.
- The 2004 Indian Ocean tsunami occurred at the end of the Indonesian fiscal year, after the budget allocation for the next fiscal year had already been approved. In accordance with normal practice regarding two allocations to the Rehabilitation and Reconstruction Fund per year, during annual budget preparation and (if necessary) the mid-budget review, major budgetary appropriations for the tsunami response efforts were therefore not made until mid-2005 (World Bank, 2011a).
- In October 2009, the Philippines Congress passed a resolution authorizing the use of unprogrammed funds of up to PhP 12 (US\$266 million) for disaster response efforts relating to typhoons Ondoy (Ketsana) and Pepeng (Parma). One year later, the Department of Budget and Management had allocated only 2.8 percent of this PhP 12 billion.¹¹
- According to Viet Nam's Ministry of Finance, it can take two to three years for the government to secure funds from the investment plan for post-disaster reconstruction purposes (Benson, 2009b).

¹¹ http://www.senate.gov.ph/press_release/2010/0927_legarda3.asp

the budget and provide additional relief and early recovery funding. In practice, however, surplus revenue has been very limited in recent years, in large part because crude oil prices have been much lower than forecast (World Bank, 2010a). Meanwhile, the Government of the Philippines authorized the use of PhP 12 billion (US\$ 266 million) from its PhP 76 billion Unprogrammed Fund for relief operations, rehabilitation and reconstruction works, and the provision of support to affected households following Ondoy (Ketsana) and Pepeng (Parma) in 2009. The Unprogrammed Fund can only be released when total revenue collections for the entire year exceed the original revenue targets.

Local governments across the ASEAN region are also commonly required by law to make an annual budgetary provision for disaster response purposes and to fulfill certain related responsibilities. They are expected to utilize these resources and any other available funds before requesting post-disaster support from national government. Data on the extent of these resources are extremely difficult to obtain without embarking on a detailed, sub-national data collection exercise. However, it is widely observed that often only richer local authorities are able to fulfill these requirements. Moreover, the funding available at a local level is frequently only sufficient to deal with relatively localized events as, for instance, in the

case of Lao PDR. On the other hand, if a disaster does not occur over the course of the fiscal year then local governments are left with unspent resources, potentially at some considerable opportunity cost. In the Philippines, for instance, it was estimated some years back that, nationally, perhaps as much as 50% of local government budgetary provision for potential disasters went unutilized each year (World Bank and NDCC, 2005). The Philippine Department of the Interior and Local Government (DILG) and League of Cities are exploring the pooling of reserves at the provincial level (Philippines OCD- NDRRMC, 2011) to utilize these resources more effectively and to increase individual local government access to disaster funds at relatively low cost.

Any remaining resources under both disaster-specific and more general national and local government budget lines for unforeseen circumstances typically revert to the budget surplus at the end of the fiscal year in most ASEAN states, with the notable exception of the Philippines. See Box 3.3. This practice in part reflects concerns in some countries that disaster resources may have been used for non-disaster related purposes on occasion, a risk associated with any line of unallocated funding, and that the rolling over of funds could exacerbate this problem. International experience suggests, however, that the multi-year accumulation of unused

Box 3.3. Building multi-year disaster reserves in the Philippines

Following a recent change in legislation in the Philippines (see Box 3.1), unutilized local government disaster response budget allocations now accrue into a special trust fund at the end of the budget year. This fund is solely for use in supporting disaster risk reduction and management activities. After five years, any remaining funding reverts to the general fund for expenditure on other social services (Philippines Senate and House of Representatives, 2010).

A number of bills are under consideration in the Philippines which would potentially alter the Local Disaster Risk Reduction and Management Fund and its operation yet again. One proposed amendment, for instance, seeks to remove the provision that allows local governments to set aside their unspent funds into a trust fund, where, as off-budget items, funds cannot be audited. The amendment proposes reclassification of the unspent funds into a continuing appropriation, implying that the budget would remain valid for a prescribed number of years if unspent. At the time of drafting of this report, however, the debate on the various bills was at an early stage and it was too soon to determine whether any of them would be implemented.

Box 3.4. The Mexican Fund for Natural Disasters (FONDEN)

Following Hurricane Pauline which struck Acapulco in 1997 and severe floods in Chiapas in 1998, the Federal Government of Mexico established a Fund for Natural Disasters (FONDEN) as a mechanism to finance the post-disaster recovery and reconstruction of public assets. FONDEN's policies, procedures, and financial instruments provide a useful example of a disaster risk management approach taken by a government.

FONDEN consists of three primary financial accounts:

- *The FONDEN Program for Reconstruction.* This program is designed to provide financial support to rehabilitate and reconstruct public assets. It focuses on (i) the reconstruction of public infrastructure at each tier of government (federal, state, and municipal); (ii) the reconstruction of low-income housing; and (iii) the restoration of forestry, protected natural areas, rivers, and lagoons.
- *The FONDEN Trust.* This trust was established to provide resources for the approved activities of the FONDEN Program. It also acts as the contracting authority for risk transfer mechanisms, including insurance and cat bonds.
- *The Revolving Fund.* This fund is designed to respond to the immediate needs of the affected population in the event of a disaster, as FONDEN's financial instrument for emergency response and the acquisition of aid supplies.

Collectively, these instruments assist the Government of Mexico in its efforts to respond quickly to emergency situations with humanitarian aid and to support post-disaster rehabilitation and reconstruction. Continuous changes are made to enhance the efficiency and effectiveness of FONDEN's instruments.

See Annex 4 for further details.

funds can work well, particularly when combined with a basket of other mechanisms and instruments (Box 3.4). Strict accountability mechanisms are also necessary to reduce the risk of misuse of funds.

In-year budget reallocations

Some short-term funding for emergency relief and early recovery is often secured via post-disaster in-year budgetary reallocations or, in some cases, via more general mid-year adjustments in the annual budget. Reallocations typically occur within the investment or recurrent budgets, rather than between them, and often within the same line agency. Similarly, local governments are often authorized to reallocate local discretionary resources in the aftermath of a disaster, although the level of funding involved varies between countries. Less frequently, funds are reallocated between

major budget headings. See Box 3.5.

Many governments draw on regular line agency recurrent funding, particularly maintenance budgets, on a near-routine basis to finance relatively small-scale disaster-related repairs. There may be substantial reallocations in kind as well, relating to the redeployment of government staff, vehicles, equipment, and supplies in support of humanitarian relief and early recovery efforts. Recurrent spending appropriations for salaries and wages are rarely, if ever, explicitly drawn upon but government employee earnings are sometimes docked to make compulsory donations to disaster funds.

Although reallocations are very common, however, very little is known about their scale, and there has been no systematic effort to record reallocations in the aftermath of a disaster in any ASEAN

Box 3.5. Reallocations in action

- In response to the 2010 floods, the Government of Thailand approved the diversion of 4 billion baht (US\$126 million) from its Strong Thailand budget to the response efforts, in addition to the 20 billion baht central budget already approved for this purpose.^{12,13}
- A number of Cambodian line agencies use part of their routine maintenance budgets to repair minor disaster-related damage on a near-annual basis.
- The Philippine Department of Agriculture (DA) has regularly transferred funding from initiatives such as its rice, corn, and high-value crop programs to support post-disaster recovery of the agricultural sector (Benson, 2008). Based on an analysis of these transfers over the previous five years, in 2008 the DA requested – but did not secure – the creation of a disaster standby fund to the tune of PhP 500 million (US\$11.3 million) to reduce further reallocations from its development activities (ibid).

¹² <http://reliefweb.int/node/373541>

¹³ The Strong Thailand program is off-budget and focuses on infrastructure projects and investment in agriculture, education and health.

state or in most other countries in the world. Admittedly, this is not a simple task as related approval procedures often rest internally, within a particular agency, and transfers may not be reported to higher authorities. Data on local government reallocations are particularly difficult to obtain. Nevertheless, it is important to have a sense of the scale of funding involved.

Associated opportunity costs depend on the scale of reallocations, the original intended purpose of the funding, and the extent to which the original allocation was sufficient to satisfy its purpose. Governments sometimes have funding available at relatively low opportunity cost due to delays in the implementation of new projects and programs that were envisaged in the annual budget. In certain other circumstances, however, opportunity costs may be extremely high. For instance, maintenance budgets are already considerably underfunded in many countries. In consequence, post-disaster reallocations can cause significant delays to planned maintenance, potentially imposing an economic cost on society (e.g., via prolonged travel times along poor roads), resulting in much higher subsequent repair costs and rendering the unrepaired infrastructure more vulnerable to future hazard events.

Meanwhile the net benefit of reallocated funds may be undermined if their release is delayed. In the aftermath of the September 2009 Western Sumatra earthquake in Indonesia, for instance, it was reported that lengthy procedures for the reallocation of budgets may have prevented local governments from restructuring their programs in a timely manner in support of the response efforts (Indonesia BNPB et al, 2009).

Longer-term realignment of investment budgets

Reconstruction efforts typically fall under the responsibility of planning and investment ministries, relevant line agencies, and their local government counterparts. They are built into public investment plans and related budgets over several years succeeding a disaster. These budgets are the main source of post-disaster reconstruction in most ASEAN Member States, except in the case of catastrophic events when substantial international assistance may be received (see below).

Reconstruction initiatives are often included under relevant sector and local government investment plans and budgets but not necessarily labeled as

reconstruction. Thus, again, it is extremely difficult to ascertain total related spending without intimate knowledge of these budgets. For instance, reconstruction of damaged roads may simply fall within the budget allocation for new roads. However, available evidence suggests that, as the principal source of financing for reconstruction in most countries, such funding is insufficient to support the completion of reconstruction efforts within just a few years. This may have serious adverse implications for the wider socioeconomic consequences of a disaster.

Associated opportunity costs may also be high, particularly where overall public resources are limited and the government is faced with a rapidly expanding population. There is often no significant adjustment in either the overall capital investment funding envelope or in allocations from this envelope for more severely-affected sectors and local governments in the aftermath of a disaster. Instead, reconstruction needs have to compete with prior national and local development goals. In consequence, disasters may force a substantial realignment in development investment plans if the reconstruction efforts receive significant funding from the capital investment budget.

Taxation

Fiscal instruments can be used to generate extra government revenue in the aftermath of a disaster and, conversely, via targeted tax breaks and holidays, to ease pressure on affected communities and businesses and to stimulate economic recovery. Post-disaster tax increases can take a number of months to approve and even longer for the resulting revenue to be collected, particularly where tax administration capabilities have been disrupted by a disaster. Thus, they are best suited to financing the tail end of early recovery efforts and reconstruction. Meanwhile, tax breaks imply some dip in revenue in the short term but, by encouraging recovery, may imply a net increase in government revenue over the longer term. In some situations, the optimal strategy may be to apply a combination

of both tax cuts and increases, using fiscal instruments to redistribute some of the economic burden of a disaster to non-affected areas.

In practice, post-disaster tax increases are politically unpopular. As such, there have been relatively few such increases anywhere in the world and possibly none at all in the ASEAN region. Where they have been applied, however, they have sometimes raised substantial resources for the disaster response efforts. See Box 3.6. The post-disaster application of tax cuts to stimulate economic recovery is somewhat more common, including in the ASEAN region. See Box 3.7.

Deficit financing

Governments can choose to finance part of their disaster response efforts via deficit financing, with corresponding increases either in the money supply or government borrowing (including via concessional loans from international financial institutions (IFIs)). Disasters can also result in the unintentional widening of a government's fiscal deficit by reducing revenue and/or, where expenditure controls are lax, by resulting in unapproved spending. In Myanmar, for instance, a slight widening of the fiscal deficit from 3.4 percent in FY 2008 to 3.7 percent in FY 2009 was partly attributed to disaster response spending following Cyclone Nargis in May 2008 (ADB, 2010). The deficit was financed via a combination of central bank money creation and the issue of treasury securities. In Cambodia, Typhoon Ketsana was similarly held in part responsible for a widening of the FY 2009 fiscal deficit. It was expected that this additional gap would be met through increased domestic and external borrowing and also that further borrowing would be necessary in subsequent years for reconstruction purposes (Cambodia Royal Government, 2010).

The appropriateness and implicit cost of deficit financing depends on prevailing macroeconomic circumstances and government macroeconomic, fiscal, and monetary policies at the time of a

Box 3.6. International experience - financing disaster response through taxation

- In the aftermath of severe floods and heavy rainfall in 2010 that caused total damage of up to \$5.2 billion, the Colombian Government issued a Presidential Decree reducing the threshold of the wealth tax from 3 billion to 1 billion pesos. This measure was expected to generate an additional 3.3 trillion pesos (US\$1.6 billion) in tax receipts for recovery purposes.¹⁴ Temporary disaster-related tax increases were also imposed by the Colombian Government in the wake of the 1985 Armero volcanic eruption and the 1999 Eje Catetero earthquake.
- Following the January 2011 Queensland floods, the Australian Government introduced a flood levy for 2011-2012 on middle and higher income taxpayers to help finance the reconstruction efforts. The levy was set at 0.5 percent on that part of an individual's income between \$50,001 and \$100,000 and at 1 percent on the portion over \$100,000. The ensuing revenue was expected to meet just under a third of the total Aus\$5.6 billion (US\$5.1 billion) public reconstruction bill.¹⁵
- Reconstruction costs incurred as a consequence of the 2010 earthquake in Chile are being met in part through temporary tax increases, including on taxes on corporations, tobacco, and real estate.¹⁶ The largest mining companies (together accounting for 94% of annual national production) also agreed to a voluntary 4 to 9 percent increase in royalties paid on mineral extraction through 2014, which is projected to generate over US\$1 billion in government revenue. The payments are voluntary because a 2005 royalty law bars changes before 2017.¹⁷

¹⁴ <http://colombiareports.com/colombia-news/news/13537-colombia-to-hike-taxes-16-bln-to-finance-flood-recovery.html>

¹⁵ <http://www.pm.gov.au/blog/questions-about-flood-levy-answered>

¹⁶ http://www.taxand.com/news/newsletters/Devastating_Earthquake_Leads_to_Changes_in_Tax_Measures

¹⁷ <http://finance.yahoo.com/news/Mining-giants-agree-to-pay-apf-2365065413.html?x=0>

Box 3.7. Stimulating recovery via tax reductions

- In the aftermath of the 2004 tsunami, the Government of Thailand offered tax relief, together with soft loans, to businesses to support the recovery process. Following the 2010 floods, affected firms were permitted to delay VAT, stamp duty and tax payments for several months and were granted an import duty exemption on machinery until December 2011 (World Bank, 2011b).
- In Lao PDR, agricultural land affected by disasters is exempt from annual land tax (IMF, 2007).
- Following the 2006 Yogyakarta earthquake in Indonesia, sub-national governments reduced property taxes by 50 percent for lightly damaged properties and by 75 percent for moderately damaged properties. The Yogyakarta municipal government reduced taxes for tourism-related businesses by 25 percent (Indonesia BNPB et al, 2009).

disaster. Domestic borrowing can crowd out private sector investment, including in reconstruction, if interest rates are forced up – an approach that may not be considered appropriate if a government is trying to stimulate long-term private sector growth. Meanwhile, monetary expansion may be inflationary and thus possibly unsuitable where rates of inflation are already high, particularly if there are indications that the disaster itself is forcing up the price of certain items (e.g., basic food items and construction materials).

Existing levels of domestic and external debt and a country's degree of access to international capital markets are also relevant. For instance, the Government of Indonesia currently has room to self-finance both post-disaster reconstruction activities and, if debt issuance is fast, short-term recovery activities through borrowing, following a dramatic reduction in its level of debt over the past decade, from around 95 percent to under 30 percent of GDP (World Bank, 2011a). See Annex 10.

International assistance

International disaster assistance accounts for a very small proportion of disaster response spending globally. Much of this assistance is received in response to extreme catastrophic events, rather than more frequent ones. Reflecting this general pattern, ASEAN Member States typically only formally request international assistance for major disasters, although existing NGOs and UN bilateral and multilateral agencies already on the ground may get involved in less severe events.

Efforts to raise international disaster support for ASEAN Member States through UN appeals from bilateral, multilateral and UN agencies and private donors have generated mixed results over the past decade, with the notable exception of the 2004 Indian Ocean tsunami and 2009 Lao Typhoon Ketsana appeals. See Table 3.2. Appeals have raised as little as 15 percent of the requested funding.

Post-disaster external assistance is not necessarily additional either. Instead, it may partly displace short- to medium-term flows of development support. For instance, a large portion of the IFIs' response to disasters has been provided via the reprogramming of planned projects and the reallocation of undisbursed funds from ongoing projects (Cummins and Mahul, 2008). Furthermore, there can be delays in disbursement of international assistance; absorption difficulties limiting the volume of aid that governments are able to receive; and issues around coordination with other response efforts, thereby undermining the effectiveness of available resources.

More positively, there have been some deliberate efforts to address some of these issues. Initiatives have been undertaken to improve coordination, including in the context of the 2004 Indian Ocean tsunami response in both Indonesia and Thailand. Various steps have also been undertaken to increase the speed of delivery of international assistance, including via the creation of the UN Central Emergency Response Fund (CERF)¹⁸ and the Asian Development Bank's (ADB's) Asia Pacific Disaster Response Fund.¹⁹ Meanwhile, the World Bank has sought to address issues of both timeliness and additionality by recently creating a crisis response window specifically for IDA countries. Under this facility, a portion of IDA resources has been set aside to provide additional funding to IDA countries, beyond their annual allocation, in the event of a major disaster.

¹⁸ The CERF is a stand-by fund established by the United Nations to enable more timely, reliable, equitable and coordinated humanitarian assistance to victims of natural disasters and other types of emergency.

¹⁹ The Asia Pacific Disaster Response Fund was established in March 2009. It provides up to US\$3 million quick-disbursing grant resources in the event of a disaster to meet immediate expenses incurred in restoring life-saving services to affected populations and to augment other aid flows in times of national crisis (ADB, 2009).

Table 3.2. UN disaster appeals for ASEAN Member States, 2000 - 2010^a

Country	Disaster	Year appeal launched	Funding requested US\$m	Percent received %
Indonesia	Java earthquake	2006	80	53
	West Sumatra earthquake	2009	38	42
Lao PDR	Floods	2008	10	46
	Typhoon Ketsana	2009	12	75
Philippines	Floods	2004	6	23
	Typhoon Durian	2006	48	15
	Typhoon Ketsana	2009	143	44
Regional appeal ^b	Indian Ocean Earthquake-Tsunami	2005	1,400	88

(a) Status as of 26 August 2011. No appeals were launched in 2000, 2001, 2002, 2003, 2007 or 2010. Appeals launched in response to situations of conflict are not shown.

(b) The appeal included specific requests for Indonesia and Thailand and various non-ASEAN states as well as some requests for regional funding. No specific funding was requested for Malaysia or Myanmar.

Source: UN OCHA Financial Tracking Services (<http://fts.unocha.org>)

Ex-Ante Practices and Arrangements

Contingent credit

Several international partners have made ex ante contingent credit available for disaster recovery and reconstruction purposes in recent years, facilitating more rapid access to potentially significant lending in the aftermath of a disaster.

In some cases, this line of credit has been included as part of a broader loan, including in Lao PDR and Viet Nam in the ASEAN region. In Lao PDR, a disaster contingency fund for post-disaster repairs was included as a component of a World Bank road sector project (Lao PDR NDMO, 2011). In the case of Viet Nam, the contingency funding was in the form of a US\$20 million component of a larger US\$86 million World Bank disaster risk management loan. The contingency component was intended to address a regular annual funding gap for the post-disaster reconstruction of small-scale rural public infrastructure. See Box 3.11. Additional financing of US\$75 million was approved in June 2010 for the contingency component alone.

In September 2011 the Philippines became the first ASEAN Member State to take out a stand-alone disaster contingency financing loan, in the amount of US\$500 million, under a relatively new World Bank facility specifically designed for this purpose. See Box 3.8. The Inter-American Development Bank has launched a similar facility for Latin America and the Caribbean. See Box 3.9.

Multi-year reserves

No ASEAN Member States have set up dedicated multi-year reserves to finance the cost of natural disasters. Such reserves can be efficient in covering losses caused by small but recurrent adverse natural events. They are usually politically difficult to justify, however, particularly where governments run a budget deficit. An interesting example is the Disaster Assistance Emergency Fund of the Republic of Marshall Islands in the Northern Pacific. Each year, the government sets aside a dedicated budget for this fund, which is matched by a grant contribution from the United States. In counterpart of this grant, the Government of the Republic of Marshall Island agrees to only use the funding in the event of a natural disaster.

Box 3.8. The World Bank contingent loan facility

The World Bank's Development Policy Loan (DPL) with catastrophe deferred draw down option (Cat DDO) was launched in 2008, offering a source of immediate post-disaster liquidity to serve as bridge financing while other resources (e.g. concessional funding, bilateral aid, or reconstruction loans) are mobilized. Borrowers have access to financing in amounts of up to US\$500 million or 0.25 percent of GDP, whichever is less. The Cat DDO has a 'soft' trigger, as opposed to a parametric trigger; funds can be drawn down upon the occurrence of a natural disaster resulting in the declaration of a state of emergency. The Cat DDO is only available for IBRD countries to date, but the World Bank is exploring the scope for its extension to IDA countries. Borrower countries are required to have an adequate integrated disaster risk management program in place, which is periodically reviewed by the World Bank.

See Annex 3 for further details.

Box 3.9. International Experience - IADB's Contingent Credit Facility

In February 2009, the Inter-American Development Bank (IADB) launched a US\$600 million Contingent Credit Facility for Natural Disaster Emergencies in Latin America and the Caribbean. This product provides IADB borrower countries contingent credit of up to US\$100 million or 1 percent of GDP, whichever is less, to cover urgent post-disaster financing needs until other sources of funding can be accessed. All IADB member countries are eligible to access this facility. Borrower countries are required to have an adequate integrated disaster risk management program in place, including measures relating to risk analysis, prevention, mitigation, emergency preparedness, and disaster response and provision for the adequate and sustainable financing of remaining risks.²⁰ Drawdown of funding is conditional on verification that the country has experienced an event of a certain type, location, and intensity as specifically described in the loan document (IADB, 2009). The trigger is linked to the percentage of population affected as estimated by a model developed by the reinsurer Swiss Re called the Affected Population Trigger.

²⁰ See <http://www.iadb.org/news/detail.cfm?Language=English&id=5125> and <http://www2.reliefweb.int/rw/rwb.nsf/db-900sid/LSGZ-7XQE9Y?OpenDocument> for further information.

Risk transfer

Risk transfer instruments transfer disaster risk to third parties, replacing the fiscal burden of periodically substantial disaster response needs with a relatively more predictable flow of expenditure in the form of annual premium payments.

In practice, there has been relatively little public use of risk transfer instruments in the ASEAN region. In a few countries, some local governments have insured their public buildings against natural hazards using traditional indemnity insurance. In

the Philippines, for instance, there is some partial all-peril property cover for public assets provided by the Government Service Insurance System General Insurance Group (GSIS), a state-owned entity. See Chapter 4. Local government units are required by law to purchase insurance from GSIS-GI, securing cover against all property in which the government has an interest (e.g., government offices, hospitals, schools, public markets). In practice, GSIS-GI estimated several years ago that around 30 percent of local government properties were actually insured, with highest coverage in Metro Manila, other cities, and richer municipalities (Benson, 2008). Moreover,

even those properties that are covered are considerably underinsured according to a recent brief survey of several local government units in the Philippines, in part because of budgetary constraints (World Bank-GFDRR, 2010). However, these resource issues may be addressed to some degree by recent legislative changes in the country that permit the use of local government disaster contingency funds to meet insurance premiums.

In Indonesia, at least two local governments are also known to have secured disaster insurance. Several governments have supported agricultural risk transfer schemes as well, involving both traditional indemnity insurance and, more recently, parametric insurance products, thereby potentially reducing public contingent liability. See Chapter 4. Meanwhile, there is some informal discussion underway concerning the possible establishment of a joint catastrophe bond for ASEAN Member States plus China.²¹ To date, however, no country in the region has made use of this newest generation of sovereign risk transfer products (e.g., catastrophe bonds).

Funding gap analysis

ASEAN Member States currently retain most of their sovereign disaster risk, as indicated above.

They rely heavily on annual budget appropriations and de facto post-disaster budget reallocations, the latter both for immediate relief and early recovery and for longer-term reconstruction. See Table 3.3. Available evidence suggests that humanitarian relief needs are currently largely met through these arrangements. Lower income countries in the region, however, regularly struggle to secure adequate and timely funding for early recovery and, in particular, reconstruction. Moreover, there is increasing concern about the rising fiscal burden of disaster response in many countries in the region due to increases in exposure and vulnerability. Any such trends are likely to be further fuelled by predicted increases in the

frequency and intensity of climatological hazards as a consequence of climate change. No country in the region currently has adequate financing arrangements in place to manage a major disaster event.

Funding gaps may be felt particularly acutely at the local level. Local governments typically have very limited revenue-raising capabilities of their own. Instead, they are dependent on the transfer of public resources from central government, both for reconstruction and other purposes. Local governments that receive most of their resources from central government in the form of non-earmarked block allocations can be particularly hard hit in the event of a disaster, as such allocations often fail to take disaster-related needs into account.

Precise estimation of funding gaps is by no means simple. It requires comprehensive data on public contingency liability for a range of hazards with varying return periods, on all existing disaster risk financing mechanisms (both formal and informal), and, in the case of ex post analysis, on actual flows of funding. See Box 3.10. Moreover, even where all identified disaster response, early recovery, and reconstruction needs are met, this does not necessarily mean that those needs have been met via the most cost-effective financing arrangement. Nevertheless, even simplified analysis, focusing solely on ex ante tools, is useful in providing some first approximation of funding gaps as a basis for reviewing and strengthening disaster financing arrangements. See Box 3.11. As noted above, it is also important to develop a clear picture of the likely relative spread of funding needs and resources over time, distinguishing between humanitarian relief, early recovery, and reconstruction phases of the response efforts and also between different hazard types. The timing of a disaster relative to the fiscal year should be taken into account in undertaking this temporal analysis. Should a disaster occur towards the beginning of a fiscal year, there may be a lapse of a year or more before significant funding can be disbursed for reconstruction in some countries.

²¹ <http://www.thejakartapost.com/news/2011/04/08/asean-launch-infrastructure-fund-year.html>

Box 3.10. Tracking budgetary resources for disaster response

Disaster resources need to be systematically tracked in order to effectively manage response efforts, to monitor potential gaps in financing for specific purposes, to support analysis of the costs and benefits of incremental disaster response spending relative to other national priorities, to draw lessons learned on possible improvements to existing disaster risk financing arrangements, and to support accountability. Ideally, expenditure on disaster risk reduction should also be tracked to inform structured, evidence-based decision-making around the appropriate balance and composition of risk reduction and post-disaster expenditure.

In practice, public spending on emergency relief, early recovery, and reconstruction is not systematically tracked on a regular, routine basis, either in the ASEAN region or in most other countries. The availability of data on local government expenditure is particularly limited and detailed information can often only be obtained directly from individual local government authorities. Notable exceptions include the ground-breaking tracking system established for Aceh and Nias by the Indonesian Government and the World Bank in the aftermath of the 2004 tsunami and the Philippine Government's tracking initiative relating to the response efforts following tropical storm Ondoy (Ketsana) and Typhoon Pepeng (Parma) in 2009. Both initiatives sought to track assistance from international partners, local civil society organizations, and the private sector as well as from government. These initiatives represent a major step forward. The next step is to institutionalize them into more permanent systems, as already planned in the Philippines.

Box 3.11. Assessing funding gaps – results for Viet Nam and the Philippines

Preliminary retrospective analysis of the funding gap in Viet Nam for the period 2000 to 2008 indicated that short-term recovery funding requirements were met in full through the annual government contingency budget (World Bank, 2010a).²² The analysis revealed, however, significant funding gaps for reconstruction in 2006, 2007, and 2008 based on the assumption that up to 1 percent of planned capital expenditure in the relevant budget years were reallocated for reconstruction. Most of these gaps were expected to be met through further significant allocations from the capital budget in subsequent years, placing a huge additional burden on these resources as well as delaying reconstruction. Looking forward, it was projected that there would be a future recovery funding gap in Viet Nam for disasters with a return period higher than 10 years and an annual average reconstruction funding gap. The 1-in-10 year government reconstruction funding gap was estimated at about VND 8,500 billion (US\$516 million), rising to around VND14,500 billion (US\$880 million) once every 50 years.

A simplified ex post funding gap analysis for the Philippines based on flows of government and private resources relative to losses following the 2009 typhoons Ondoy (Ketsana) and Pepeng (Parma) indicated that available funding covered only 1.5 percent of total economic damage and around 3 percent of total public sector disaster recovery and reconstruction spending requirements (World Bank, 2010b). Had local calamity funds been pooled, then total disaster risk financing available for disaster recovery and reconstruction work would have increased from under PhP 0.2 billion to PhP 14.3 billion, improving government response capacity considerably.

²² The analysis assumed that, on average, about 40% of the central contingency budget and 20% of the local contingency budget are available to finance post-disaster recovery activities. The state contingent liability due to natural disasters was estimated at 55% of the total reported damage estimates, using Central Committee Flood and Storm Control (CCFSC) data. It was further assumed that the government recovery and reconstruction expenditure requirements represent 25 and 30% respectively of total CCFSC damage estimates.

For further details see Appendix 3.

Table 3.3. Preliminary summary of fiscal risk management arrangements in ASEAN Member States^a

	Ex post						Ex ante				
	Annual budget allocations	In-year reallocations	Medium-term capital budget realignment	Tax increases	Deficit financing	International assistance	Contingnet credit	Insurance of public assets	Risk transfer		
									Public support of private policy holder insurance	Parametric sovereign insurance	Catastrophe bonds
Brunei Darusallam											
Cambodia											
Indonesia											
Lao PDR											
Malaysia											
Myanmar											
Philippines											
Singapore											
Thailand											
Vietnam											

(a) This table is based on the best information that the research team has been able to collate, but should be interpreted with due consideration to limitations arising from the secondary nature of the underlying sources. Note also that although many governments are purchasing some insurance for their assets, the number of buildings covered as a share of the total public asset portfolio is thought to be very limited.

A dramatic photograph showing the silhouettes of three firefighters in the foreground, looking towards a massive, intense fire that fills the background. The fire is bright yellow and orange, with thick smoke rising. The firefighters are wearing helmets and gear, and their forms are dark against the bright light of the flames.

Private Catastrophe Risk Insurance Markets

This chapter describes the current state of private insurance markets in ASEAN Member States for property catastrophe risk insurance, agricultural insurance, and disaster microinsurance. Private insurance markets for residential and business property risks, agricultural risks, and the low-income segments of the population can contribute significantly to regional resilience against disaster shocks. Where these markets are developed and covering a significant component of post-disaster losses, they contribute in three key areas: (i) reducing the contingent liability of the state by reducing the need for post-disaster assistance; (ii) reducing the contingent liability of the state by transferring some of the cost of rebuilding of government assets (where those assets are insured); and (iii) disseminating risk information and providing financial incentives to invest in risk reduction activities. The private insurance sector can also contribute to the development and enforcement of safer building codes. This chapter looks at some of the challenges these markets are facing and their potential for development. International experience is drawn upon for comparison. A more detailed discussion is provided in Appendices 4 to 7.

Private Property Catastrophe Insurance

Market overview

Property catastrophe risk insurance markets in ASEAN Member States are characterized by low penetration. In general, wealth and insurance penetration correlate such that the lower the gross national income per capita, the lower the non-life insurance penetration. Insurance penetration for catastrophic perils is limited by the relatively limited development of markets for non-life insurance more generally. All but two of the ASEAN Member States sit below the Asia regional average for non-life insurance penetration of 1.55 percent of GDP, and all ASEAN Member States are significantly below non-life insurance penetration levels for developed markets in North America (4.51 percent) and Eu-

rope (3.07 percent).²³ However, the rate of growth of ASEAN non-life insurance markets is promising at an estimated 6 percent²⁴ for 2009. See Figure 4.1 and Figure 4.2.

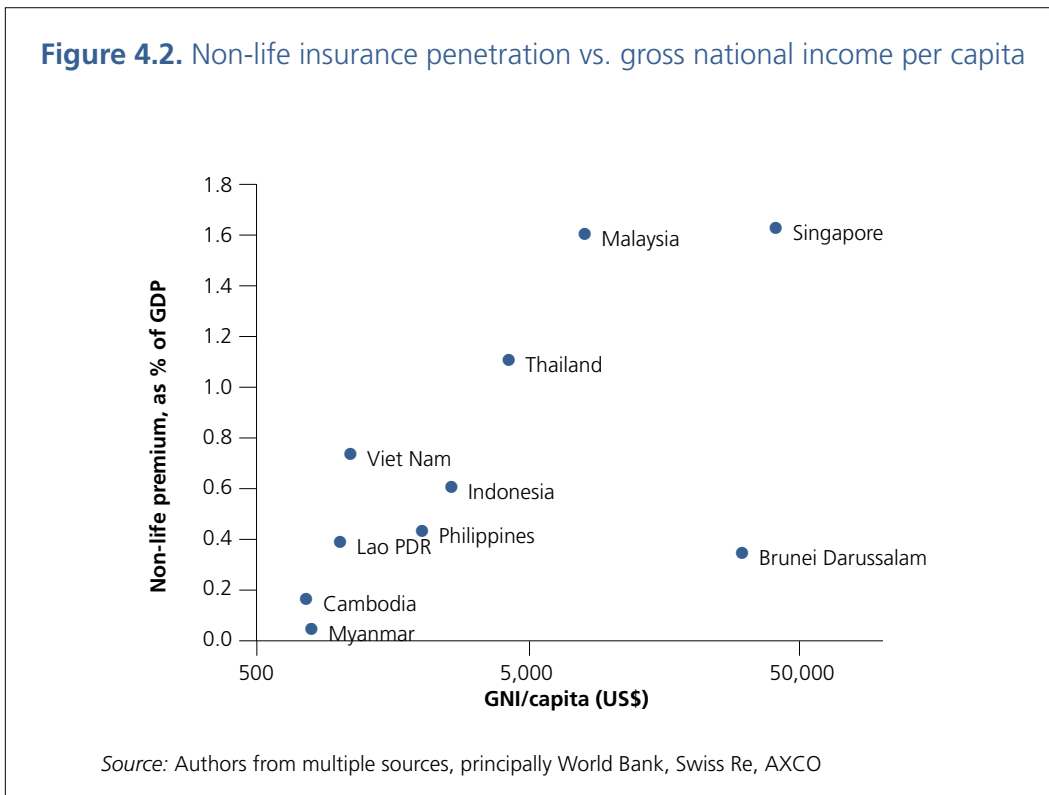
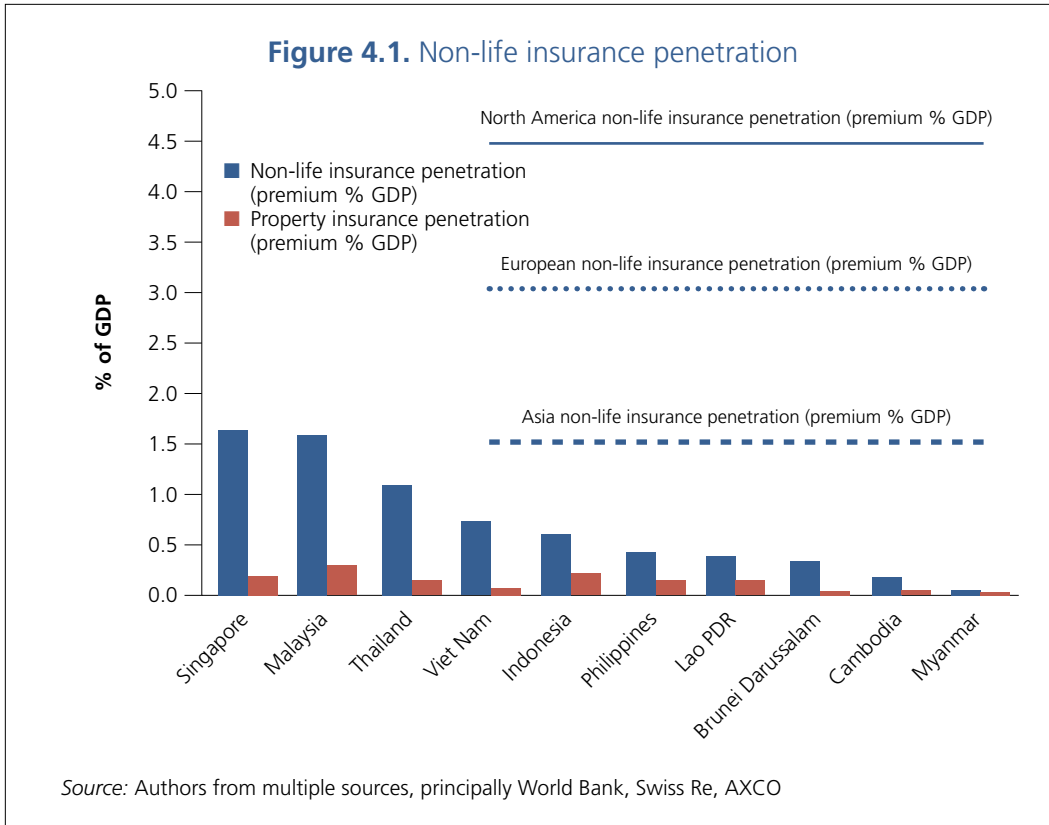
Catastrophe coverage is typically provided through either an extension for a fire policy for small risks or through an ‘all-risks’ policy covering larger commercial and industrial assets. Cover is widely available for catastrophe risk. In most ASEAN Member States, however, standard homeowners insurance does not cover catastrophic perils. Policies can be extended to cover these perils, usually subject to additional premium. Penetration for catastrophe risk insurance tends to be higher for commercial and industrial facilities through all-risks policies.

The percentage of standard property damage ‘fire’ policies extended to cover catastrophic perils varies significantly by peril and country, but is generally low. Estimates indicate that, typically, less than 10 percent of property damage policies include cover for catastrophic perils²⁵ in the ASEAN region. The lowest incidence of catastrophe risk coverage is for flood, where underwriters tend to be geographically selective in granting cover – deeming particular zones to be uninsurable. It is noted that data on the level of uptake of catastrophe risk insurance in ASEAN Member States are very limited and spread across a wide range of different types of sources.

²³ Insurance penetration figures from Swiss Re Sigma, 2009 data

²⁴ Non-life premium growth from Swiss Re Sigma, 2009 data, (inflation adjusted) for Singapore, Malaysia, Thailand, Indonesia, Philippines, Viet Nam. Data for remaining countries unavailable.

²⁵ Three of ten ASEAN Member States are known to have a higher percentage of policies extended. Singapore is an exception, where more than 90 percent of policies are extended to cover catastrophe risk, in part due to insurers’ low perception of the risk. Figures for the Philippines vary between 20 and 80 percent. Brunei also sits above 10 percent, with an estimated 30 to 50 percent (sources AXCO, Guy Carpenter, AM Best).



The market share of state-owned insurance companies has decreased significantly in recent years and is expected to decline further in the near-term. However, the state share of the insurance market remains strong in Indonesia, Myanmar, and Lao PDR. In Myanmar, state-owned Myanma Insurance holds a monopoly over the market, while state-owned enterprises in Indonesia are ranked in the top two by market share for both insurance and reinsurance (PT Asuransi Jasa Indonesia²⁶ and Reasuransi Internasional Indonesia). In Lao PDR, the state increased its share in insurer Assurances Generales du Lao PDR (AGL) to 49 percent in 2000. AGL holds an estimated 80 percent of the market for non-life insurance. Aside from Lao PDR, privatization has been the general trend in the region, with aggressive programs recently carried out in Viet Nam and Cambodia to significantly reduce state control of the market.

International insurers (and reinsurers) have an increasing presence in the region, largely uninhibited by government restrictions on foreign ownership of domestic operators. International insurers are present in almost all ASEAN Member States through domestic branches or as joint ventures with, or major shares in, domestic insurers. A number of countries have no restrictions on foreign ownership. Thailand, Malaysia, and Singapore have all relaxed their limits on foreign ownership of non-life insurers in recent years. Singapore removed the 49 percent restriction on foreign ownership of insurers in 2000, and Malaysia increased the permitted threshold for foreign equity for insurers/takaful²⁷ operators to 70 percent in 2009. Thailand also increased permitted foreign equity for non-life insurers from 25 to 49 percent in 2008, but, at the current permitted 49 percent, is one of the most restricted ASEAN markets for foreign companies. With capital requirements tightening in a number of countries, it is anticipated that more domestic companies will be looking to in-

ternational partners (principally insurers) for injections of capital.

The market for Shariah-compliant insurance (takaful) is growing significantly in the region. Takaful markets in Malaysia and Indonesia – including non-life takaful through which catastrophe risk is covered – are growing rapidly. These products are also a feature of insurance markets in Brunei Darussalam, Thailand, and Singapore. See Figure 4.3.

Areas of challenges and potential for growth

The purchase of property catastrophe risk insurance is not mandated by law, but low voluntary demand is bolstered by insurance requirements from lending institutions. Banks in a number of countries make the purchase of an insurance policy a condition of lending²⁸ (such as Malaysia, Singapore, and Viet Nam), and in some cases the mandatory insurance policy must include cover for catastrophic perils. Mortgages are likely to be a source of significant growth for catastrophe risk insurance in the Philippines, where damage from the 2009 typhoons has resulted in a move by lending institutions to make catastrophe risk insurance compulsory with home loans. Previously, only a standard fire policy was required. Growth is also predicted in Indonesia, where property earthquake insurance linked to mortgages is anticipated to be a key driver of a rise in catastrophe risk insurance penetration²⁹.

The only mechanism for pooling property catastrophe risk in the region is through specialist earthquake reinsurer PT Maipark in Indonesia, although pools are being considered in

²⁶ Note that plans to privatize PT Asuransi Jasa Indonesia have been made public by the government, but no confirmed timeline was available at the time of publication of this report.

²⁷ Takaful is Shariah-compliant insurance.

²⁸ There are two models for catastrophe insurance linked to mortgages. In one model, the policy covers the loan amount and is typically paid directly to the lender in the event of a catastrophe destroying/damaging the asset. In the second, the insurance covers the full value of the property and is typically paid directly to the mortgagor. Proof of this insurance is required in order to borrow.

²⁹ Fitch Ratings.

Figure 4.3. Selected ASEAN Takaful markets

<p style="text-align: center;">Malaysia Takaful Market</p> <p style="text-align: center;">0.60% GDP</p>	<p style="text-align: center;">Indonesia Takaful Market</p> <p style="text-align: center;">0.05% GDP</p>	<p style="text-align: center;">Brunei Darussalam Takaful Market</p> <p style="text-align: center;">0.23% GDP</p>
<p>Malaysia is one of the largest takaful markets globally, despite non-life takaful premiums only accounting for 7% of the non-life market in 2009. This share is set to increase; Malaysian takaful is growing significantly faster than the rest of the insurance market with a rate of 30% in 2009.</p> <p>The number of takaful operators in Malaysia is also growing, and international (re)insurers are looking for entry opportunities, with recent entrants including HSBC and Tokio Marine. 12 takaful and retakaful operators are registered with the Malaysian Takaful Association.</p>	<p>Although takaful penetration lags significantly behind Malaysia at 0.05% of GDP in 2009 (for life and non-life), growth has been strong, with a growth rate of 70% reported for 2009. With the current low level of penetration and the largest muslim population in the world, the market is likely to increase significantly in the near term.</p> <p>The takaful market is fragmented, with few dedicated operators (3 in 2008) but more than 30 conventional insurers offering takaful products through takaful windows.</p>	<p>Overall takaful (life and non-life) penetration was 0.23% of GDP in 2009 with slow growth.</p> <p>Takaful holds a larger portion of the non-life insurance market in Brunei than any other ASEAN Member State, with premiums broadly on a par with conventional non-life insurance in 2009.</p> <p>Takaful penetration is, however, largely due to growth in motor insurance, with conventional insurance dominating for all other lines, including property cover.</p>

Source: Authors, with penetration and growth figures from Ernst and Young Global Takaful Report (2011)

other ASEAN Member States.³⁰ Specialist reinsurer Maipark was established by the Government of Indonesia as a joint undertaking of all general insurance and reinsurance companies to improve market capacity for underwriting earthquake risk. All domestic companies writing earthquake risk must cede a portion, ranging between 5 and 25 percent depending on risk location, to Maipark. In the Philippines, a proposal for a catastrophe risk insurance pool is being considered by the National Disaster Risk Reduction and Management Council and the Department of Finance and has gained support from industry players, including the National Reinsurance Corporation. Re-

ports indicate that a pool is also under consideration for typhoon and flood risk in Viet Nam³⁰.

The development of property catastrophe insurance pools in the region could contribute to sustainable growth in catastrophe risk insurance penetration. The Turkish Catastrophe Insurance Pool (TCIP) provides an example of how a pooling facility combined with mechanisms for enforcing compulsory insurance purchase can contribute to a significant increase in take-up rates for catastrophe risk insurance. This pool was designed to deal with a lack of local insurance market capacity for underwriting earthquake risk and low voluntary demand for earthquake policies. The TCIP has produced a six-

³⁰ Pools exist for agricultural and specialized engineering and energy risks in ASEAN Member States but general property catastrophe risk is only pooled through the Maipark mechanism.

³¹ AM Best Southeast Asia Life and Non-Life Market Review 2010

fold increase in earthquake insurance penetration since its inception in 2000. See Annex 7. The World Bank provided technical and financial assistance in the establishment of this facility.

Excessive fragmentation in ASEAN non-life insurance markets has pushed pricing down in a number of countries. Many ASEAN non-life insurance markets are characterized by fragmentation, with the Philippines, Indonesia, Thailand, and Singapore all counting more than 50 non-life (or composite) insurers operating within their markets. The high levels of competition generated by the large number of operators has pushed pricing down, in some cases below mandatory or advisory tariffs. Declining pricing has been seen across the region and price adequacy, particularly for catastrophe risk, is known to be a concern in the majority of ASEAN Member States. Market consolidation is, however, anticipated as a result of regulators rolling out staggered programs of increasing minimum capital requirements. The implementation of risk-based capital regimes planned or underway in a number of countries will also push under-capitalised insurers into changes of ownership. See Figure 4.4.

Figure 4.4. Non-life insurance market participants

	Non-life insurers			
	Monopoly	Less than 10	10 to 50	More than 50
Philippines				
Indonesia				
Thailand				
Singapore				
Malaysia				
Vietnam				
Lao PDR				
Brunei Darussalam				
Cambodia				
Myanmar				

Source: Authors

Mandatory or advisory tariffs for catastrophe risk are in place in six of the ten ASEAN Member States. Enforcement of these tariffs has proved

a challenge. Malaysia, the Philippines, Indonesia, Viet Nam, Thailand, and Cambodia have mandatory or advisory minimum tariffs in place for catastrophic perils. In Indonesia, however, only earthquake premiums are controlled and there are no mandatory tariffs for flood, which is also a large contributor to losses. Reports indicate that regulators in Malaysia and Indonesia have had the most success in ensuring observance of mandatory tariffs. In contrast, regulators in the remaining countries have struggled to enforce tariffs, even where mandatory, due to pressures of competition between insurers.

The catastrophe risk insurance of public assets has been limited in the region. Where insurance is purchased, state-owned (or part-owned) insurance companies are often used. This is known to be the case for at least four ASEAN Member States: Audley Insurance in Brunei Darussalam; GSIS in the Philippines; Dhipaya in Thailand; and monopoly insurer Myanmar Insurance in Myanmar. Governments may want to consider developing programs of insurance for public assets in collaboration with the private sector to reduce the public share of contingent liability with respect to natural disasters and to develop the technical capacity of the domestic market to underwrite catastrophe risk.

With the exception of Singapore and Malaysia, there is very little domestic reinsurance capacity within the region and premium outflows are large. Insurers rely heavily on international reinsurance capacity. Mandatory cessions are being used by governments to promote retention of risk within domestic markets and to build domestic reinsurance capacity. Regulators must balance the need to develop local market financial and technical reinsurance capacity with the benefits that result from strong connections to international reinsurers. The international reinsurance community can (and has been seen to) inject and promote technical capacity by, for example, providing access to catastrophe models and mandating that insurers track and report on catastrophe accumulations by zone. See Figure 4.5.

Figure 4.5. Reinsurance Cession Agreements

Reinsurance cession agreements		
▶ Cambodia	→	20% to Cambodia Re by Law
▶ Indonesia	→	2.5% mandatory cession to Reasuransi Internasional Indonesia (see also Maipark)
▶ Malaysia	→	2.5% to 5% voluntary cession to Malaysian Re
▶ Philippines	→	10% mandatory first option to National Reinsurance Corporation
▶ Thailand	→	multiple agreements, including 5% voluntary cession (most classes of risk) to Thai Re
▶ Viet Nam	→	20% mandatory cession to Vinare resently abolished

Source: Authors from multiple sources including national insurance regulators and AXCO insurance market reports

New channels for distribution are emerging in the more developed markets but intermediaries still dominate distribution of catastrophe risk insurance, with agents dealing principally with smaller risks (such as personal lines insurance) and brokers placing larger risks (principally commercial and industrial). Distribution of insurance through retail banks – notably homeowners insurance – is growing and is already significant in Thailand and Singapore. Direct sales channels account for a significantly smaller portion of premiums in the region. Branch networks and telemarketing account for the majority of these direct sales, with internet sales only a feature of the Singaporean market.

The promotion of cost efficient distribution channels is one mechanism through which governments can increase insurance penetration. The Malaysian insurance regulator – Bank Negara Malaysia – is encouraging direct sales through a program of premium rebates for consumers who purchase personal lines insurance (such as homeowners cover) through direct means such as walk-ins, the internet, direct mailing, or telemarketing. Informal financial networks – such as Indonesian *arisans*³² –

also hold promise as distribution networks for property catastrophe risk insurance to lower-income segments of the population.

Regulation of catastrophe risk insurance

Prudent regulation of insurers is of particular importance for catastrophe risk. This is because insurers underwriting catastrophe risk can be exposed to large correlated losses across a portfolio and higher volatility in claims. Regulators therefore face a particular challenge with respect to these insurers: defining an adequate capital buffer such that obligations to policyholders are met in the event of a high volume of claims without adversely impacting the competitiveness of the industry. The World Bank is currently providing technical assistance to the Moroccan Insurance Regulator to build the risk-carrying capacity of the domestic insurance market. See Box 4.1.

Regulatory monitoring and control of exposure accumulations to catastrophe risk is not widely adopted in the ASEAN region. Tracking and reporting of catastrophe accumulations by zone, however, is standard practice for business-as-usual by insurers in a number of countries, as reinsurers require this information. Monitoring of such exposures forms part of the regulatory system in the Philippines, where the Insurance Commission mandates reporting of catastrophe accumulations and also maintenance of a minimum amount of catastrophe

³² Multiple sources. Note that these arrangements change periodically, hence this information may have changed since time of drafting and is principally drawn from secondary sources.

³³ Arisans are informal systems similar to cooperatives used by small numbers of people to pool and manage financial resources. They are principally used as savings and health and life insurance mechanisms for low-income segments of the

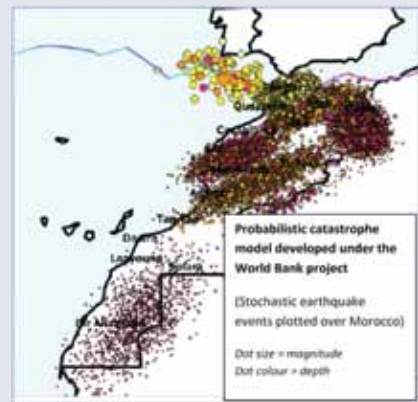
population that are excluded from the formal financial services sector.

Box 4.1. Establishing compulsory catastrophe insurance in Morocco

The Government of Morocco is in the process of finalizing a catastrophe insurance law to shift the country from an ex post to an ex ante financing model. The law will introduce a nationwide compulsory insurance scheme through automatic extension of all property (and personal liability) policies to cover catastrophe risk. The World Bank is providing technical assistance to the Moroccan Insurance Regulator in the implementation of this law. The project focuses on design and pricing for the compulsory insurance and the development of tools and methodologies to assess domestic insurance market capacity to absorb risk from the new scheme.

The development of probabilistic catastrophe and actuarial models is a key component of the project, and supports the implementation of the law in a number of ways:

- It allows creation of a risk-based pricing scheme for the compulsory insurance to ensure commercial viability and sustainability and to discourage construction in risk-prone areas;
- It allows risk-based supervision of the domestic insurance market with respect to catastrophe risks through use of PML model outputs; and
- Additionally, it will be used in the medium-term development of a catastrophe insurance scheme for public assets.



excess-of-loss protection by insurers and reinsurers (equal to 5 percent of their aggregate net exposure to earthquake/flood/typhoon). There is a need for more regulators to introduce reporting requirements for catastrophe accumulations, particularly where catastrophe scenarios/modeling do not play a role in the determination of solvency capital requirements.

Limited access to probabilistic catastrophe models for earthquake, typhoon, and flood for ASEAN territories is a factor limiting effective monitoring and control of exposure accumulations to catastrophe risk. The development of independent third-party models is required to overcome this problem. See Box 4.2.

Box 4.2. Monitoring catastrophe risk in Kazakhstan

In 2010, the World Bank launched a project with the insurance supervisor in Kazakhstan to develop a system of partial risk-based supervision for domestic insurers (which are highly exposed to earthquakes), in response to concerns around solvency of the domestic market. The project seeks to apply international best practice in the monitoring and control of catastrophe risk – such as the European Solvency II directive. See Appendix 4.

In addition to technical assistance in designing the regulation, the World Bank funded the development of a probabilistic catastrophe model for use by the regulator. The model outputs city-level loss coefficients representing a 200-year catastrophe event that can be applied to insurers' city-specific exposures.

A key project output was a methodology to assess aggregate catastrophe net risk retentions of insurers on the basis of a 200-year catastrophe event. Based on the results obtained in applying this methodology, the insurance supervisor will impose a regulation on the maximum aggregate net retention level of catastrophe risk accumulation, effectively monitoring and controlling the risk of extreme losses.

Regulation in the ASEAN region has been evolving over recent years, with more countries working toward frameworks of supervision that determine capital requirements based on some measure of the level of risk assumed by the insurer. Setting solvency capital requirements with reference to individual companies' portfolios of risk is prudent and creates a more enabling environment under which insurers have the space to grow in a sustainable fashion. It should be noted that the definition of a 'risk-based' capital regime will vary from country to country. While there may be general agreement that some measure of 'insurance risk' should be captured within a model of solvency supervision, there is less uniformity in exactly how that insurance/underwriting risk should be captured.

Five countries among the ASEAN Member States class their regulatory systems for insurance as risk-based capital (RBC) regimes³⁴. See Figure 4.6.

Singapore and Malaysia have the longest implemented RBC frameworks, while implementation of these regimes is still a work in progress in Indonesia and the Philippines. In Thailand, the Office of the Insurance Commission (OIC) has been drafting a RBC framework using lessons learned from the European Solvency II framework and other established RBC regimes. The OIC's effort to implement the new RBC regime is ongoing. While a RBC regime recognizes the need to consider risk assumed in solvency supervision, and is therefore an improvement on earlier systems, without explicit treatment of catastrophe risk (such as through probabilistic or scenario modeling) the risk of extreme events is not accounted for and international best practice not represented.

Regulators in those countries with large Muslim populations (principally Malaysia, Indonesia, and Brunei Darussalam) face the additional challenge of regulating the takaful market. See Box 4.3.

Figure 4.6. ASEAN RBC frameworks as reported by Insurance Regulators³⁵

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
Insurance Supervisor	Autoriti Moetari Brunei Darussalam	Department of Financial Industry of the Ministry of Economy and Finance	Otoritas Jasa Keuangan	Ministry of Economy, Planning and Finance	Bank Negara Malaysia	Supervisory Board, Ministry of Finance and Revenue	Insurance Commission	Insurance Supervision Department of the Monetary Authority of Singapore	Office of the Insurance Commission	Ministry of Finance
RBC Framework	No	No	Yes	No	Yes	No	Yes	Yes	Drafted	No

Source: Authors, based on sources originating from national insurance regulators

³⁴ RBC as defined by the regulator in each respective country.

³⁵ Note that the Indonesian Parliament approved a bill creating the new regulator OJK Otoritas Jasa Keuangan in October 2011

Box 4.3. Regulating Takaful

As liabilities under Takaful systems are defined differently than those under traditional insurance, and permitted assets for investment are also different, regulators need to develop principles of supervision for Takaful operators in parallel to those for the traditional insurance market.

The risk sharing nature of Takaful insurance poses a particular challenge, where policyholders potentially share in any insufficiency of funds to cover claims payments. For example, to protect consumers in both Malaysia and Indonesia, regulators have formally introduced a requirement for Takaful operators to extend loans from the shareholders fund in the event of any deficit in funds to cover claims payments.

Malaysia is moving forward with the most advanced regulatory framework for Takaful in the region, in 2011 it developed a concept paper for Takaful-specific RBC guidelines. The country has further promoted development of the Takaful sector through specific tax exemptions for operators and the establishment of a Shariah Advisory Council within the financial regulator, Bank Negara Malaysia.

Agricultural Insurance

Importance of agriculture and natural hazard exposure in ASEAN Member States

Agriculture is an important socioeconomic sector in ASEAN Member States. In Cambodia, Lao PDR, Myanmar, and Viet Nam, more than two thirds of the populations are classified as rural and agriculture is the main source of employment. As of 2009, the agricultural sector contributed between 21 and 48 percent of national GDP in Viet Nam and Myanmar, respectively. Although contributing 15 percent or less of GDP, agriculture is also a very important source of rural livelihoods in Indonesia, the Philippines, Thailand, and Malaysia. Conversely, Singapore and Brunei Darussalam are very small geographic territories with predominantly urban populations. Agriculture is a very insignificant economic activity in these two countries.

Paddy rice is the main staple crop grown in the ASEAN region, harvested on two-thirds of the total arable area in the region. Other significant food crops include maize and coffee. Industrial plantation crops such as oil palm, rubber, and coconut are also very important, particularly in Indonesia, Malaysia, and Thailand. Livestock, especially poultry, pigs, cattle, and buffalo, form a key component

of the small-scale mixed farming systems of many ASEAN Member States. Fresh water and brackish-water aquaculture (fish farming), mainly for shrimp, tilapia, and carp, are also very important.

In most ASEAN Member States the agricultural sector faces moderate to severe exposure to tropical cyclones (typhoons) and/or tornados. Other natural hazards affecting ASEAN agriculture include seasonal flooding, accentuated by La Niña, and drought associated with El Niño dry patterns, during which risks of wildfire are also higher. To a certain extent, extreme low-frequency, high-impact events such as earthquakes and tsunamis also impact agriculture. Agriculture in the Philippines, Viet Nam, Myanmar, and Thailand is very exposed to tropical cyclone damage in certain periods of the year. The Philippines, Viet Nam, Lao PDR, Myanmar, and Cambodia periodically experience severe flood damage to agricultural crops and livestock. Excess rainfall, which is often associated with typhoons, also leads to problems of flash flooding, landslides, and mudslides, most notably in the Philippines and Viet Nam. During the El Niño or dry phase, much of the region is highly exposed to drought, particularly in the Philippines, Indonesia, Malaysia, Viet Nam, and Thailand, leading to major losses in rain-fed crops. During El Niño dry phases, wild fires are a severe hazard to the industrial plantation crops and natural and commercial forestry, espe-

cially in Indonesia and Malaysia.

ASEAN Member States with significant agricultural sectors will be strongly affected by the impacts of climate change. A recent study shows that changing precipitation patterns, more frequent extreme droughts and floods, and consequent water stress will negatively impact agriculture³⁶. Climate change tends to bring greater uncertainty over crop production and yields. For traditional agricultural indemnity-based insurance and weather index insurance, the challenge will be to build climate change impacts into the design and rating of these products.

Availability of agricultural insurance and institutional features in ASEAN Member States

The history of agricultural insurance in the ASEAN region dates back to the late 1970s and early 1980s when governments in several countries introduced public sector crop insurance programs. Governments in three ASEAN Member States – the Philippines, Thailand, and Viet Nam – implemented public-sector, fully-intervened agricultural insurance systems in the 1970s and 1980s. Other Asia-Pacific countries introducing public sector agricultural insurance during the same period included China, India, Bangladesh, Sri Lanka, and the Democratic People's Republic of Korea.

Globally, public sector agricultural insurance programs have shown poor financial performance. Programs in the Asia-Pacific region and in South East Asia have typically performed very poorly financially. In general, these programs were designed and implemented to meet social as opposed to commercial objectives: premium rates were often capped at below the technically required levels; where programs were voluntary they often suffered from major problems of moral hazard and adverse selection; and the programs were usually very expensive to implement and administer. Many of these schemes incurred ma-

nor underwriting losses and most were discontinued by 2000, with the exception of programs in India, the Philippines, and Sri Lanka (Hazell, Pomarada and Valdes 1986; Hazell 1992; Mahul and Stutley 2010).

In 2011, agricultural insurance is available in five ASEAN Member States: the Philippines, Thailand, Viet Nam, Malaysia, and Indonesia, either commercially or on a pilot scale. There is, to the best of the authors' knowledge, no agricultural crop or livestock insurance in the important agricultural producing countries of Cambodia, Lao PDR, or Myanmar. Nor is it available in Brunei Darussalam or Singapore.

The Philippines is the only country in the ASEAN region where public sector agricultural insurance continues to operate in 2011. The Philippines Crop Insurance Corporation (PCIC) is the only public sector crop and livestock insurer operating in the region. The Philippines is also the only ASEAN Member State with a long, uninterrupted history of crop insurance; named-peril insurance and multiple-peril crop insurance (MPCI) have been underwritten by the national insurer, PCIC, for over 30 years. See Table 4.1.

Other ASEAN Member States have very small private sector crop and/or livestock insurance markets, and the current trend is for governments to promote subsidized public-private partnerships (PPPs). In 2011, private sector agricultural insurance is available in four ASEAN Member States, namely the Philippines, Thailand, Viet Nam, and Malaysia, but has not achieved significant penetration. In parallel, governments in three ASEAN Member States are promoting subsidized PPPs which are underwritten by the private insurance sector. In Indonesia, the 2009 pilot crop and livestock insurance scheme is being conducted by the Ministry of Agriculture (MoA); in Thailand, a new Rice Disaster Relief Top-up scheme was introduced in 2011; and in Viet Nam, the government has expressed intentions in 2011 to launch a subsidized privately delivered crop, livestock, poultry, and aquaculture insurance under a PPP institutional framework. See Table 4.1 and Boxes 4.4. and 4.5.

³⁶ AIT-UNEP RRC.AP, 2011.

Table 4.1. Institutional framework for agricultural insurance in ASEAN Member States

	Philippines	Thailand	Viet Nam	Malaysia	Indonesia
Public	X				
Private	X	X	X	X	
PPP		X	X		X

Source: Authors

Agricultural insurance penetration in the ASEAN region

Agricultural insurance has achieved very little penetration in ASEAN Member States to date.

The Philippines had the highest penetration rate in 2009 (ratio of premium subsidies to agricultural GDP), standing at 0.012 percent. Other ASEAN Member States had penetration rates of less than 0.01 percent. The highest agricultural insurance penetration rates for the Asia-Pacific region were in countries such as Australia (0.57 percent of agricultural GDP), New Zealand (0.39 percent), Japan (1.75 percent), China (0.4 percent), South Korea (0.5 percent), and India (0.22 percent) instead. These countries either have well developed insurance markets,

have strong public support for agricultural insurance, or operate compulsory crop-credit insurance schemes.

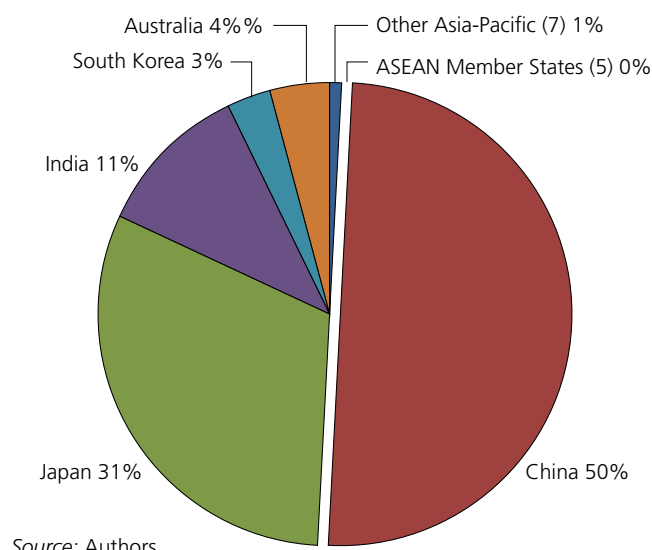
Reflecting limited penetration, the size of the agricultural insurance sector, in terms of total premium volume, in the five ASEAN Member States that offer such insurance is currently very small relative to other Asia-Pacific countries. In 2009 (the latest available figures), ASEAN Member States accounted for less than 0.1 percent of the total agricultural insurance premium volume in the Asia-Pacific region. China had the largest agricultural insurance market, accounting for 50 percent of total premiums, followed by Japan (31 percent) and India (11.5 percent). See Table 4.2 and Figure 4.7.

Table 4.2. Agricultural insurance premiums 2009 by ASEAN Member State (US\$ million)

Crop	2009 Premium (US\$ million)	% of 2009 total premium
ASEAN Member States		
Indonesia*	1	0.00%
Malaysia*	1	0.00%
Philippines**	3	0.10%
Thailand**	0.04	0.00%
Vietnam*	0.1	0.00%
SUB-TOTAL ASEAN	5.14	0.10%
China*	1,958.68	49.90%
Japan**	1,200.00	30.60%
South Korea**	115.81	3.00%
Australia*	144	3.70%
Other Asia-Pacific (7)**	48.59	1.30
TOTAL ASIA-PACIFIC	3,923.22	100.00%

Source: * Solloway 2010; ** Authors

Figure 4.7. 2009 Agricultural insurance premium (% of Total)



Classes and products of agricultural insurance available in ASEAN Member States

Traditional indemnity-based crop insurance products are available in the Philippines and Indonesia. PCIC offers named-peril insurance and multiple-peril crop insurance (MPCI), as already noted, while Indonesia recently introduced a pilot MPCI program.

There is currently a high level of interest in index insurance in ASEAN Member States. In 2011, Thailand launched a hybrid area-based crop insurance program for rice under the Rice Disaster Relief Top-up scheme. See Box 4.4. In the Philippines, PCIC has also recently launched a new rice area-yield index insurance (AYII) pilot program for rice producers located in Leyte Province. In Viet Nam, there are two AYII programs for rice which are currently awaiting implementation: a government-subsidised PPP AYII scheme for rice and a separate private commer-

cial AYII pilot, also for rice, which is linked to bank seasonal credit to rice farmers. See Box 4.5. Weather index insurance (WII) is now in its fifth year of implementation in Thailand, including under a maize rainfall deficit scheme and a separate rice rainfall deficit program. Both of these programs show potential for scaling up. Further pilot WII programs have been designed and are awaiting implementation on a pilot scale in the Philippines, Indonesia, and Viet Nam. Commercial forestry and plantation crop insurance products (e.g., for oil palm, rubber) are available, but only on a very restricted scale, in Indonesia, Malaysia, the Philippines, and Viet Nam. See Table 4.3.

Livestock insurance is relatively under-developed in the ASEAN region and currently is only implemented on a commercial scale in the Philippines. Livestock accident and mortality insurance has been underwritten for nearly 30 years in the Philippines, both through PCIC and a private pool of livestock insurers. In Viet Nam, private sector livestock insurance has been available for a number of years through Boa Viet and Groupama insurance companies, but is only underwritten on a very small scale. A livestock mortality and theft insurance program was introduced on a pilot basis in Indonesia in 2009/10, though the status of the program in 2011 is unknown. Malaysia designed a livestock insurance product in 2008 which has been put on hold³⁷. Livestock epidemic disease insurance is currently underwritten in the Philippines, and Viet Nam has ambitious plans to launch a subsidised epidemic disease insurance program in selected regions for cattle, pigs, poultry, and aquaculture. See Table 4.4 and Box 4.5.

³⁷ In Malaysia, the Tani Malaysia Livestock Pool has designed both livestock and poultry insurance covers but the program is on hold pending agreement between insurers and their reinsurers on the basis of cover and other terms and conditions. See the Malaysia country profile in Appendix 5 for further details.

Box 4.4. Thailand Rice Disaster Relief Top-up Crop Insurance Scheme 2011

In 2011, the Government of Thailand elected to establish an insurance scheme linked to its existing disaster relief program. In the event of a disaster, the government pays disaster relief of THB 606 per rai (0.4 acre). This relief will be topped up by an additional payment ranging from THB 500 to THB 1400 per rai depending on the number of days between planting and the loss occurrence. Claims are only payable on areas where a total loss has been declared. Premiums will be subsidized by the government to the extent of 50 percent of the total payable. The government has set the maximum subsidy that the Bank of Agriculture and Agricultural Cooperatives (BAAC) can award to participating farmers at a total of THB 3.99 billion (US\$132 million). This assumes that every farmer buys cover. For 2011, the government expected 15 percent of the country's rice farmers to join the scheme.

Perils Covered

Flood or excessive rainfall, drought, frost, windstorm/typhoon, fire, and hail.

Locations Covered

All farmers in Thailand are eligible to be included in the scheme, although the insured areas are likely to reflect BAAC's current loan portfolio. For 2011, 1.1 million rai, of the total area under rice production of 57 million rai, were expected to be insured, resulting in a 2 percent insurance penetration rate. This implied a total sum insured of THB 1.54 billion (US\$51 million) and a premium income of THB 13.1 million (US\$437,000).

Distribution

The cover is being distributed to farmers through BAAC.

Insurers

A pool of eight local insurance companies and nine reinsurance companies will each cover a portion of the risk on a quota share basis.

Claims

Claims are paid out to any farmers whose land is within an area that has been declared a disaster area. Once the Governor of the Province has declared a disaster, individual farmers may then apply for disaster compensation. The farmer completes a claim form. The farmer must also have title to the land and is usually requested to provide a photograph of the damage.



Table 4.3. Types of crop insurance products available in ASEAN Member States in 2011

Country	Traditional indemnity based				Index based		
	Named Peril	MPCI	Crop Greenhouse	Forestry	Area Yield	Weather	Remote Sensing
Indonesia		✓*		✓		✓*	
Malaysia				✓			
Philippines	✓	✓	✓	✓	✓*	✓*	✓*
Thailand					✓	✓	
Viet Nam				✓	✓	✓*	
Total	1	2	1	4	3	4	1

Notes:

✓ Insurance product available on a commercial basis

✓* Insurance product is either being implemented on a pilot basis or is still awaiting launch

Source: Authors

Table 4.4. Types of livestock insurance products available in ASEAN Member States in 2011

Country	Traditional indemnity insurance			
	Livestock Accident & Mortality	Livestock Epidemic Disease	Poultry	Aquaculture
Indonesia	✓*			
Malaysia	✓*		✓*	
Philippines	✓	✓		
Thailand				
Viet Nam	✓	✓*	✓*	✓*
Total	4	2	2	1

Notes:

✓ Insurance product available on a commercial basis

✓* Insurance product is either being implemented on a pilot basis or is still awaiting launch

Source: Authors

Public sector support to agricultural insurance in ASEAN Member States

Governments in ASEAN Member States provide very high levels of agricultural insurance premium subsidies on their public sector and PPP programs, including for the Philippines's PCIC rice and maize scheme (premium subsidies of 65 to 80 percent), the Indonesian pilot crop and livestock insurance program in West and Central Java (100 percent premium subsidies in year 1), and the 2011 Thailand Rice Disaster Relief Top-up scheme (50 percent

premium subsidy). The Government of Viet Nam is also intending to provide very high levels of premium subsidies on its planned 2011 PPP insurance programs for crops, livestock, poultry, and aquaculture.

Agricultural insurance in Thailand receives major support from government and is currently one of the most dynamic agricultural insurance markets in the ASEAN region. Between 1978 and 1990, Thailand operated public sector MPCI and livestock insurance programs, both of which were terminated.

Box 4.5. Government of Viet Nam subsidized pilot agricultural insurance program 2011–13

The Ministry of Agriculture and Rural Development (MoARD) and the Ministry of Finance (MoF) plan to launch a pilot agricultural insurance program in conjunction with the insurance sector in Viet Nam between 2011 and 2013. The objectives of this program are to protect rural livelihoods, to improve the efficiency of the insurance market, and to enable farmers to recover more rapidly following natural disasters and/or epidemic disease outbreaks.

Insured classes:

The pilot program will include the following classes:

- Crop insurance: rice
- Livestock insurance: cattle and pigs
- Poultry insurance
- Aquaculture insurance: fin fish, prawns, and shrimp.

Pilot provinces:

The pilot crop insurance program for rice will be implemented in Nam Dinh, Thai Binh, Nghe An, Ha Tinh, Binh Tuan, An Giang, and Dong Thap provinces.

The pilot livestock and poultry insurance programs will be implemented in Bac Ninh, Nghe An, Dong Nai, Vinh Phuc, Hai Phong, Thanh Hoa, Binh Dinh, Binh Duong, and Hanoi provinces.

Insured perils:

Crop insurance will cover catastrophe perils such as typhoon (wind storm) and flood, drought and frost, and specific pests and rice diseases (e.g. brown plant hopper disease).

Livestock insurance will cover epidemic diseases in cattle and pigs such as blue-ear disease and foot and mouth disease (FMD).

Poultry insurance will cover epidemic diseases including avian flu.

Aquaculture insurance will cover natural perils such as storm and flood and fish and prawn diseases.

Premium subsidies:

The following premium subsidy levels will apply:

- Poor rural farming households: premium subsidies of 90-100 percent
- Other farmers: premium subsidies of 60 percent
- Agricultural production organizations: premium subsidies of 20 percent



- In 2006, a pool of local insurance and reinsurance companies introduced the country's first pilot WII program for rainfall deficit in maize production with technical assistance from the World Bank. This purely voluntary WII program, which carries no premium subsidy, has been implemented for four full years through the Bank of Agriculture and Agricultural Cooperatives. The program has achieved sound underwriting results and is starting to achieve scale-up.
- In addition, since 2009, Sompo Japan Insurance Company (SJIT) has been underwriting a pilot drought WII program for rice growers in selected northern districts of Thailand; this program is also showing encouraging results.
- The Government of Thailand is highly committed to promoting agricultural insurance and in 2011 has introduced a new subsidized Thailand Rice Disaster Relief Top-up crop insurance scheme, as already noted, which is linked to the existing national disaster relief scheme for rice. This program is being implemented through a pool of eight local insurance companies and nine reinsurance companies and is being promoted by government through the provision of 50 percent premium subsidies. This natural disaster-linked crop insurance scheme may have wider applicability in the ASEAN region.

In 2011, Viet Nam drew up proposals for a new subsidized PPP agricultural crop, livestock, poultry, and aquaculture insurance program which will be insured by the private commercial insurance sector with backing from leading international reinsurers. The government has committed itself to the provision of very high levels of premium subsidies in order to promote this scheme between 2011 and 2013. See Box 4.5.

Further details of the experience with and performance of public, private, and PPP agricultural insurance in the Asia-Pacific Region are contained in

Appendix 5, along with detailed profiles on the agricultural insurance markets in each of the ten ASEAN Member States.

Disaster Microinsurance

Microinsurance is an insurance product designed specifically for low-income populations.

Microinsurance products include life and non-life covers as well as blend covers. For the purpose of this report, disaster microinsurance refers to a non-life cover for property, financial assets, or livelihoods that is specifically designed to pay out upon occurrence of a natural disaster. A growing range of disaster microinsurance covers are being developed, including property and contents, livelihood, loan, and microenterprise, among others.³⁸

Microinsurance provides low-income populations with an efficient, reliable risk management tool.

The objective of microinsurance is to prevent vulnerable low-income populations from falling into poverty upon occurrence of an external shock, for example, the death of the family breadwinner or a personal accident. Thus, microinsurance acts as a backstop against cyclical poverty resulting from recurrent external shocks. Disaster microinsurance can be particularly useful because it provides cover against systemic risks that make traditional risk-coping strategies, such as borrowing from relatives or local moneylenders, impossible or very costly. See Box 4.6.

Microinsurance can also increase low-income populations' willingness to engage in riskier but more profitable activities.

For example, loan repayment microinsurance can enable microentrepreneurs to take on credit to grow their enterprises; these products often cover the principal and interest

³⁸ A range of agricultural insurance products targeted at marginal and subsistence farmers have been developed. While these products provide cover against extreme weather and natural disasters, they are considered agricultural insurance products. Discussion of these activities in ASEAN is found in the agricultural insurance section.

Box 4.6. Microinsurance protects coastal populations in India

In November 2008 Cyclone Nisha struck India and Sri Lanka, causing losses for thousands of families. In the coastal Tamil Nadu state of India, which was impacted by the cyclone, partners Bajaj Allianz, an insurance company, and CARE India, a NGO, had been offering a general insurance policy covering a range of risks since March 2008. The policy provided a defined payout in case of total or partial disability, hospitalization, loss or damage to household or other assets, and death. Within days of the cyclone, the partners received more than 16,000 claims dispersed across 44 villages. The cyclone resulted in claims settlements totaling over US\$1.16 million. These were settled by the end of January 2009.

The payouts increased the interest of the community in insurance. According to R. Devaprakash, Director of the Tsunami Response Program at CARE India in Chennai, “Many poor people didn’t understand why they should pay money for insurance. Now they realize the value of their investments. And it’s psychological as well: they are not depending on aid from some agency; they are the ones who have taken control. This will really help spread the idea of microinsurance here.”

While the payouts highlighted the potential benefits of microinsurance as financial protection against natural disasters, they also exposed the difficulty of pricing microinsurance products without adequate risk data and the challenges of claims adjustment. See *Appendix 6*.

Source: Allianz 2010.

of the loan and also sometimes provide the micro-entrepreneur with a payout in the case that the covered event occurs. The Microinsurance Catastrophe Risk Organization (MiCRO), for example, provides disaster mandatory group catastrophe insurance to 50,000 microentrepreneur borrowers in Haiti. See *Appendix 6*.

Microinsurance and disaster microinsurance in the ASEAN region

Disaster microinsurance is as of yet undeveloped in ASEAN Member States, with the exception of the Philippines and Indonesia, where it is at early stages of development. Thus, this report discusses disaster microinsurance development in the context of the development of the broader microinsurance sector. International experience suggests that the development of financial services for low-income populations tends to begin with micro-finance sector development (e.g., credit and savings), followed by microinsurance market development. Typically, credit-life and life products appear

in early stages of microinsurance development, often bundled with access to credit. In time, product diversification occurs and products tailored to the contextual needs of specific low-income populations become available. See *Box 4.7*.

It is important to note that data on and assessments of (disaster) microinsurance markets contained in this report should be interpreted as suggestive and not absolute. Very limited data are available on the current outreach of (disaster) microinsurance products in ASEAN Member States; what data do exist are from diverse sources and different years.

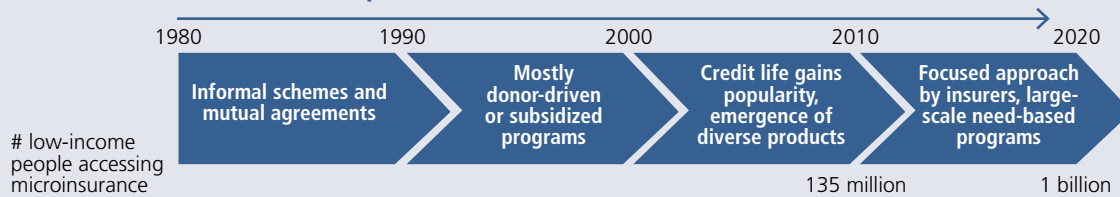
Market Overview

The landscape of microinsurance markets across ASEAN Member States is highly variable. The two largest microinsurance markets in the ASEAN region are the Philippines and Indonesia and they are likely to remain so in the near term due to a variety of factors.³⁹ Microinsurance is also present at some level

Box 4.7. Development of Microinsurance

Microinsurance markets, although not termed as such, have existed in some countries since the late 19th and early 20th centuries. It was not until the 1990s, however, that the international community took significant interest in the development of microinsurance schemes as social protection strategies. In the 2000s more private sector interest emerged. The first microinsurance product to achieve significant scale was credit life insurance, which is understandable both because low-income households consistently identify health and life risks as their greatest concerns (Churchill 2006), and because credit life is one of the simplest microinsurance products to develop.

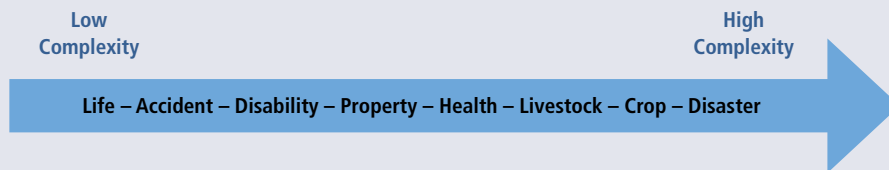
Microinsurance market development



Source: Timeline adapted from Swiss Re 2010; insured population Lloyd's estimates (2010).

Today, innumerable microinsurance schemes exist around the world, providing a rapidly evolving set of microinsurance products to an estimated 135 million people (Lloyd's 2010). However, this number represents less than 5 percent of the world's low-income population – evidently, access to microinsurance remains limited. Furthermore, although diverse product lines have been developed, they have limited outreach. The vast majority of microinsurance coverage remains life insurance and accidental death and disability.

Microinsurance Product Supply Complexity Spectrum



Source: Authors.

A 2007 Microinsurance Centre study estimated that around eight million low-income people outside China were accessing property microinsurance. With the inclusion of the All-China Federation of Trade Unions (ACFTU) workers, this number rose to 36.2 million people. This estimate included crop, home, livestock, and 'other possessions' insurance.

of development, ranging from nascent policy and pilot work to blossoming market growth, in Cambodia, Lao PDR, Malaysia, Myanmar⁴⁰, Thailand, and Viet Nam. There is no evidence that microin-

surance is available or under development in Brunei Darussalam or Singapore. Although limited data on poverty are available for Brunei Darussalam and Singapore, their 2009 GDP per capita of US\$27,3903

³⁹ Factors include but are not limited to: the degree of development of micro-financial services sectors, population size, and supportive regulatory system in the Philippines.

⁴⁰ According to UNDP Myanmar, the NGO PACT Myanmar

has introduced a variant of an insurance product under the UNDP-supported Beneficiary Welfare Program. No further information on this program was available at the time of drafting.

and US\$36,758 (World Bank 2011), respectively, and small populations suggest that microinsurance is less relevant in these economies and that government safety nets may be able to protect vulnerable low-income populations. See Table 4.5

Table 4.5. Microinsurance experience in ASEAN Member States

Country	Experience with microinsurance	Experience with disaster microinsurance
Brunei Darussalam	n/a	n/a
Cambodia	X	–
Indonesia	XXX	X
Lao PDR	X	–
Malaysia	X	–
Myanmar	X	–
Philippines	XXXX	XX
Singapore	n/a	n/a
Thailand	XX	–
Viet Nam	XX	–

Key:
 No experience: –
 Very limited: X
 Limited: XX
 Moderate: XXX
 Strong: XXXX
 Very Strong: XXXXX

Source: Authors

The Philippines and Indonesia are the only ASEAN Member States where disaster microinsurance initiatives have been identified in preparing this report. In both countries, disaster microinsurance is in the early stages of development, with insurance providers beginning to test market potential through public-private partnerships (PPPs) in the past three to four years. The Philippines’ experience is more advanced and, given its supportive microinsurance regulations and highly exposed population to multiple hazards, its disaster microinsurance market is likely to develop earlier than that of Indonesia. In Indonesia, however, multiple efforts are advancing to develop earthquake microinsurance, which could provide an opportunity for increased outreach of disaster microinsurance. See Appendix 6.

Microinsurance supply chain

Informal and formal microfinance institutions (MFIs) and community-based organizations (CBOs) offered the first microinsurance products to appear in ASEAN markets. Different types of MFIs or CBOs dominate depending on the market, but often the appearance of microinsurance has arisen as financial service providers have recognized demand for microinsurance services and/or a need to protect their microlending portfolio. In Cambodia, MFIs are one of the leading providers of formal financial services to the poor and are taking the first steps to provide microinsurance, many in conjunction with partner NGOs (Alip et al 2009). In Viet Nam, informal microfinance providers and community groups began by delivering life, credit-life, and health microinsurance with a self-insurance model (Banking with the Poor 2008). In many cases, especially in early microinsurance development, the MFI or CBO directly provides microinsurance, acting as the risk carrier. It is also common for MFIs and CBOs to distribute microinsurance products to their members while passing the risk to an insurance partner; this model is appearing more frequently in the ASEAN region as private insurers become more interested in microinsurance.

Formal insurers and reinsurers play an increasingly important role in the development of microinsurance in the ASEAN region, especially disaster microinsurance. In the majority of ASEAN Member States, private insurers have demonstrated their interest in developing the microinsurance market, both for commercial and social reasons (including at least Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam). In many of these countries, insurance industry associations are cooperating with the government to develop appropriate microinsurance products and regulations.

⁴¹ Community-based organizations, as described by the International Association of Insurance Supervisors, include mutuals, mutual benefit organizations, friendly societies, cooperatives, burial societies, fraternal societies, risk pooling organizations, and self-insurance schemes.

International (re)insurers and brokers are also beginning to participate in the more developed ASEAN microinsurance markets.⁴² In Indonesia, for example, Allianz underwrites two group microinsurance products that are distributed through MFIs and CBOs. In the Philippines, Munich Re reinsures a parametric credit portfolio protection underwritten by the umbrella cooperative and licensed composite insurer Cooperative Life Insurance and Mutual Benefit Services (CLIMBS). See Box 4.8. International (re)insurers are also testing alternative distribution channels. For example, Zurich Financial is underwrit-

⁴² There are some examples of international insurers providing microinsurance in ASEAN Member States for many years. Assurances Générales du Laos (ALG), for example, was established as a joint-venture between the Ministry of Finance of Lao PDR and Allianz in 1990. From 1991 to 1994, AGL tested microinsurance products in ten villages in Lao PDR with NGO partners (Allianz AG, GTZ, and UNDP 2006).

ing property catastrophe microinsurance for Holcim Ltd. that will be available for purchasers of Holcim construction materials or fertilizers⁴³. These international players bring extensive expertise and risk-carrying capacity to the market that can facilitate increased supply of more complex products such as disaster microinsurance.

Disaster Microinsurance market potential and demand

Over 222 million people live on less than \$2 per day in ASEAN Member States, the income segment often considered the target market

⁴³ The policies will cover damages from earthquakes, tsunamis, fires, windstorms and riots. The policies are free to homebuyers for the first year and annual premiums cost less than \$10 in subsequent years.

Box 4.8. Meso-level parametric catastrophe insurance in the Philippines

A public-private partnership in the Philippines involving Munich Re, German aid organization Gesellschaft für Internationale Zusammenarbeit (GIZ), and the Cooperative Life Insurance and Mutual Benefit Services (CLIMBS), an umbrella cooperative and licensed composite insurer, aims to mitigate the effects of extreme weather events on the financial stability of cooperatives and other microfinance providers and to protect their credit portfolios. The ultimate goal of the partnership is to pass on insurance benefits to cooperative and MFI members.

Under this partnership, Munich Re reinsures parametric credit portfolio protection underwritten by CLIMBS for its member cooperatives. The product utilizes separate indices for each Philippine municipality and its development therefore entailed extensive data collection, analysis, and evaluation. Each municipality has a wind speed and a rainfall index that categorize both parameters' intensity into a 10-, 15- or 20-year reoccurrence event. If a cooperative operating in a given municipality experiences extreme weather conditions that exceed the index set for that municipality, then the weather event triggers a payout for the cooperative. The level of payout is determined as a percentage of the insured portion of the cooperative's loan portfolio, the actual percentage depending on the event intensity and its corresponding category class. The payout also provides a small payment to cooperative members, with individual allocations determined by the relevant cooperative.

GIZ and Munich Re invited CLIMBS to join the strategic alliance in part because of its strong outreach in the country. Composed of over 1,600 primary cooperative members, CLIMBS can act as the crucial link to overcome the significant challenge of distribution. In turn, the catastrophe protection policy reduces cooperatives' exposure to systemic default risk, enhancing their lending capacity and liquidity in critical times and making loans affordable to their members. Secondly, for cooperative members, the policy protects their equity and investments in the cooperatives by enabling them to rebuild their livelihoods after an extreme weather event. It thus prevents low-income households from slipping into poverty.

Source: Munich Re 2011.

for commercial and social microinsurance. See Table 4.6. This estimate does not include Brunei Darussalam, Myanmar, or Singapore and is based on data for 2009 and earlier. Of this segment of the population, at least 133 million live above the international poverty line of \$1.25⁴⁴ and below \$2⁴⁵ per day, which the private sector often considers the target market segment for commercial microinsurance products. The poorest income segment, living on less than \$1.25 a day and totaling some 89 million people, is considered better suited to government and/or donor-financed social safety nets, including social insurance.⁴⁶

⁴⁴ Denoted in 2005 international dollars (incorporating purchasing power parity).

⁴⁵ The identified target income group for microinsurance varies between organizations. Note that thresholds both above and below \$2 per day have been set by organizations operating in this field.

⁴⁶ The segmentation of the microinsurance market into commercial and social segments is not intended to suggest that those lying in the commercial range of US\$1.25-2 per day do not or should not benefit from publically-supported microinsurance. Instead, this segmentation is made because it is unlikely that the private sector will be able to address the disaster insurance needs of the lowest income segment. Instead, if it does benefit from insurance, this lowest income group will depend entirely on government/donor support.

This estimate is only suggestive of the ASEAN population that could benefit from increased availability of microinsurance, and must be interpreted as such. Where microinsurance is available, take-up rates for voluntary products are often low due to a variety of constraints, both on the demand side (e.g., lack of financial literacy among low-income populations) and the supply side (e.g., products whose designs do not address the needs of the low-income market). The challenges for disaster microinsurance are even more acute due to issues such as risk prioritization by low-income populations and the complexity of disaster microinsurance provision, among others⁴⁷. Thus, extrapolating the population that would purchase (disaster) microinsurance from these estimates is very difficult.

Natural disasters are reported as a priority risk in one of four ASEAN Member States for which risk prioritization surveys are available. The most common priority risks reported in these surveys are health and death (Churchill 2006). See Table 4.7. Although some variation in risk prioritization across

⁴⁷ It should be noted that even in industrial countries with well-developed non-life insurance sectors, voluntary purchase rates for residential disaster insurance covers tend to be low.

Table 4.6. Microinsurance Target Markets in ASEAN Member States (2009 or latest year available)

Country	Population under \$2/day	Population under \$1.25/day	Population in commercial range*
Brunei Darussalam	n/a	n/a	n/a
Cambodia	8,365,027	4,189,916	4,175,111
Indonesia	116,362,150	43,003,403	73,358,747
Lao PDR	4,171,483	2,142,625	2,028,858
Malaysia	623,520	0	623,520
Myanmar	n/a	n/a	n/a
Philippines	41,392,396	20,788,181	20,604,215
Singapore	n/a	n/a	n/a
Thailand	17,957,469	7,318,516	10,638,953
Viet Nam	33,602,705	11,433,648	22,169,058
Total	222,474,750	88,876,289	133,598,461

* The commercial range considered in this report is US\$1.25 to US\$2.00 per day.

Note: Values presented for 2009 or latest available value for the period 2006-2009. Note: n/a = not available

ASEAN Member States is likely, it is probable that these rankings are fairly consistent across countries given similar results internationally. While natural disasters are not the most prioritized risk by low-income populations in the ASEAN region, there has been increasing emphasis by the international community on the need to protect low-income populations against financial losses from natural disasters (Swiss Re 2010).

Table 4.7. Priority risks of low-income households in selected ASEAN Member States

Country	Priority risk
Indonesia	Illness, unforeseen/prohibitive educational expenses, poor harvest
Lao PDR	Illness, livestock disease, death
Philippines	Death, old age, illness
Viet Nam	Illness, natural disaster, accidents, illness/death of livestock

Source: Various sources summarized in Churchill, 2006

The role of the government

Many governments in the ASEAN region are taking action to facilitate the development of microinsurance markets, especially through public-private partnerships (PPPs). The interest of ASEAN governments in promoting microinsurance market development has contributed to its growth and encouraged increased interest from the private sector. Some examples include:

- **Cambodia:** In 2010, the Ministry of Economy and Finance (MEF) began granting permission for the piloting of microinsurance products, and in 2011, the MEF began a dialogue on its draft microinsurance regulation with the General Insurance Association of Cambodia.
- **Malaysia:** The government has initiated the country's first microinsurance/microtakaful scheme, *1Malaysia Micro-Protection Plan* (1MMPP), which it launched in 2010. The product is offered by participating insur-

ers and takaful operators and is distributed through branches of selected banks and development financial institutions.

- **Viet Nam:** A 2010 Memorandum of Understanding between the Office of Insurance Commission and the Ministry of Interior set out an agreement to cooperate to improve the availability of microinsurance products around the country.

PPPs are driving the development of disaster microinsurance in the Philippines and Indonesia. This experience is consistent with that in other countries where disaster microinsurance is being developed. See Appendices 6 and 7. In the Philippines, PPPs involving a range of partners have progressed in three important areas: (i) development of a microinsurance regulatory framework and national strategy; (ii) product development and innovation; and (iii) national financial literacy campaign. In Indonesia, PT Asuransi Maipark, owned by all of the country's general insurance and reinsurance companies, is leading an initiative to develop an earthquake microinsurance product, Kartu Gempa.

The Philippines is the first ASEAN Member State to approve and implement a comprehensive microinsurance regulation⁴⁸, although planning and drafting of microinsurance regulations are underway in some other ASEAN Member States. See Box 4.9 and Table 4.8. Well-designed regulatory frameworks for microinsurance are important in creating a conducive and enabling environment for microinsurance market development. Recent case studies on insurers in India, South Africa, and the Philippines, for example, found that government regulations requiring or encouraging commercial insurers to serve low-income and rural communities influenced insurers' decisions to expand into this market (Angove and Tande 2011). The International

⁴⁸ The Philippine insurance code is currently being reviewed, and it is expected that microinsurance provision will be revised.

Association of Insurance Supervisors (IAIS) has released two papers providing regulators in emerging markets with guidance on microinsurance regulation: *Issues in regulation and supervision of microinsurance*, which outlines principles, standards and guidance on developing microinsurance markets and *Issues paper on the regulation and supervision of mutuals, cooperatives, and other community-based organizations in increasing access to insurance markets*, which assists regulators in addressing insurance administrators, distributors, and providers that may fall outside of commonly regulated institutions in insurance.

Given the complexity of disaster microinsurance provision, appropriate regulations are particularly important for its development. Regulations need to address both distributors of disaster microinsurance and disaster microinsurance providers; often, either or both of these are informal (i.e., unregulated). Supportive regulation that promotes a risk-based approach, for example, with minimum capital requirements for microinsurers, can help to formalize providers. Disaster microinsurance regulation can also ensure, for example, recognition of appropriate products and efficient claims handling following a disaster.

Table 4.8. Microinsurance regulation in ASEAN Member States

Country	Insurance Regulator	Microinsurance Regulation
Brunei Darussalam	Autoriti Monetari Brunei Darussalam	n/a
Cambodia	Department of Financial Industry of Ministry of Economy and Finance	Regulation approved, not yet implemented
Indonesia	Otoritas Jasa Keuangan - OJK ⁴⁹	No; in October 2011, Government announced microinsurance regulation would be developed during 2012
Lao PDR	Ministry of Economy, Planning, and Finance	No
Malaysia	Bank Negara Malaysia	No
Myanmar	Supervisory Board, Ministry of Finance and Economy	No
Philippines	Insurance Commission	Yes
Singapore	Insurance Supervision Department of the Monetary Authority of Singapore	n/a
Thailand	Office of the Insurance Commission	Regulated as an activity line; products considered on a case-by-case basis
Viet Nam	Ministry of Finance	Partial framework in place, not complete

Source: Authors

⁴⁹ In October 2011, Indonesia's Parliament approved a bill creating a new regulator OJK Otoritas Jasa Keuangan to supervise financial institutions including insurers and reinsurers

Box 4.9. Key Features of the Philippine Microinsurance Regulatory Framework

- Links premium/contribution and the maximum sum of guaranteed benefits to the daily minimum wage for non-agricultural workers in Metro Manila, the manner and frequency of payments coinciding with their cash flow.
- Allows only regulated entities to provide microinsurance, with a special regulatory space specifying a guarantee fund, capitalization and appropriate risk-based capital for microinsurance, when necessary. Mutual benefit associations (MBAs) wholly engaged in microinsurance are required to have a lower guarantee fund, and cooperative insurance societies lower capitalization.
- Mandates market conduct, reducing the period of claims settlement to a maximum of ten days and of suicide exclusion to one year, and requiring a refund of the premium if a suicide claim is not compensable.
- Qualifies three delivery channels:
 - Licensed insurance providers;
 - Licensed agents and brokers of commercial insurance companies;
 - Microinsurance agents.
- Agents selling only microinsurance are not required to take the regular insurance agents' license examination but must attend and pass a microinsurance training program. MFIs and cooperatives may be licensed as agents provided they sell microinsurance products to their clients only.
- Undertakes initiatives to formulate performance standards and promote financial literacy, with a special focus on the rights and responsibilities of the insured and providers.

Source: Report of the 6th International Microinsurance Conference 2010.



**Recommendations for
Regional Disaster Risk Financing
and Insurance Strategy for
ASEAN Member States**

Five main recommendations are presented, building on the review of the state of disaster risk financing and insurance in ASEAN Member States and international experience. These recommendations aim to contribute to an open dialogue between ASEAN governments, international financial institutions such as the World Bank and Asian Development Bank, and donor partners on efficient and cost-effective financial strategies for increased economic and fiscal resilience of ASEAN Member States against natural disasters, as part of their broader disaster risk management and climate change adaptation agendas. The five recommendations aim to offer a framework for a regional agenda on disaster risk financing and insurance. Each ASEAN Member State may want to prioritize and tailor those recommendations based on its own needs.

Levels of Engagement

Strategies and instruments for financial protection against natural disasters can be applied at multiple levels within and beyond a country, including regional, national, provincial, and municipal levels. The most appropriate level (or levels) for engagement will depend on country-specific conditions such as the level of fiscal autonomy of provincial and municipal governments and the specific perils

being addressed (localized versus regional). However, international experience shows that institutional arrangements that combine both central and decentralized financial responsibility for disaster risk have had particular success as they create incentives for risk reduction at the local levels and give provinces/municipalities access to powers of central government, such as strong coordinating and financial capacity and easier access to financial markets. See Annex 4. The need to consider strategies and instruments at the sub-national level is made more urgent by the high concentrations of population and exposure resulting from the prevalence of “Mega Cities” in the ASEAN region. See Box 5.1. Strategies at the sub-national level can be designed to make allowances for the uneven distribution of exposure throughout each ASEAN Member State.

Recommendations 1 to 3 apply equally to municipal, provincial, and national levels, although a regional approach would offer particular advantages in the development of risk information and modeling systems (Recommendation 1). Note also that those recommendations pertaining to risk pooling (such as the development of an insurance scheme for public assets) would benefit from scale to allow for maximum diversification ben-

Box 5.1. The Asian Development Bank’s (ADB) DRM efforts in Asia

ADB is developing an Integrated Disaster Risk Management (IDRM) framework that incorporates elements of disaster risk reduction (DRR), climate change adaptation (CCA), and disaster risk financing (DRF). The purpose of the IDRM framework is to recognize linkages and synergies across many areas of DRM and to leverage these synergies to craft risk management solutions for member countries. ADB is paying particular attention to the disaster management needs of urban areas. A combination of factors, including urban migration, concentrated economic development, expanded infrastructure, and climate change, has given rise to the need to develop urban-specific IDRM strategies and instruments.

With the support of the Japan Fund for Poverty Reduction (JFPR), ADB has begun work with the governments of the Philippines, Indonesia, and Viet Nam to launch disaster finance programs for two cities in each country. The programs will start with urban risk profiling, which will support the development of city selection criteria through a collaborative process involving key government agencies and development partners. Following city selection, DRF options will be developed and tested through consultations and workshops to assess feasibility and market acceptance. DRF options may include disaster liquidity mechanisms, critical asset and infrastructure insurance, and social protection programs directed at households and small business involving microinsurance or microfinance. The three projects are scheduled for completion in 2014.

efits and economies of scale. Recommendation 4 is targeted at the national level as it pertains to private markets and Recommendation 5 discusses a regional approach.

Recommendation 1: Develop Risk Information and Modeling Systems to Assess the Economic and Fiscal Impacts of Natural Disasters

The recent flagship report Natural Hazards, Unnatural Disasters: The Economics of Effective Prevention highlights the importance of open data in the process of effective disaster risk management. Few countries collect critical risk data and even fewer have the means to readily share that information. Data on po-

tential hazards and losses that could arise from these hazards are critical for the assessment and management of the potential economic and fiscal burden arising as a consequence of natural disasters.

ASEAN Member States could develop a regional risk information platform, including a geo-referenced exposure database and regional catastrophe risk models for major perils. This platform could build on ongoing national initiatives, such as the development of an earthquake model in Indonesia, and regional and international initiatives such as the Global Earthquake Model, the Pacific Risk Information System, and the Open Data for Resilience Initiative. See Box 5.2 and Box 5.3. Existing national datasets and the ASEAN Economic Ministers (AEM) initiative to identify regional initiatives that furnish risk data could also be leveraged.

Box 5.2. Pacific Risk Information System: The largest collection of geospatial information for the Pacific Island Countries

The Pacific Risk Information System (PRIS) has been developed under the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI).

The initiative aims to provide Pacific Island Countries (PICs) with disaster risk modeling and assessment tools for enhanced disaster risk management and to engage in a dialogue with PICs on integrated financial solutions to increase their financial resilience to natural disasters and climate change. PCRAFI is a joint initiative between the Secretariat of the Pacific Community (SPC/SOPAC), the World Bank, and the Asian Development Bank, with financial support from the Government of Japan and the Global Facility for Disaster Reduction and Recovery (GFDRR) and technical support from Air Worldwide and New Zealand GNS Science.

The PRIS is the result of a three-year effort to collect detailed information on assets, population, hazards, and risks. Physical inspections of more than 80,000 buildings and digitization and inference from satellite imagery of more than 3 million buildings and assets have been undertaken to create an exposure dataset of buildings, major infrastructure, major crops, and population. The PRIS also includes the most comprehensive regional historical hazard catalogue (115,000 earthquake and 2,500 tropical cyclone events) and regional historical loss database ever developed for major disasters.

As part of the project, country-specific catastrophe risk models have been developed for earthquakes (including tsunamis) and tropical cyclones (including storm surge), providing the PICs with a financial tool to assess their economic and fiscal exposure to natural disaster and develop cost-effective disaster risk financing and insurance strategies.

The Pacific Geonode, an open-source web-based platform, has been developed to provide visualization of risk through maps showing the geographic distribution of potential losses as well as other risk assessment products.

*Source: PCRAFI (2011)
See Annex 8.*

Box 5.3. Open Data for Resilience Initiative (Open-DRI)

OpenDRI is an initiative of the Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank aimed at reducing the impact of disasters by empowering decision-makers with better information and the tools to support their decisions. Tools are currently being offered to 25 countries around the world to improve disaster and climate change resilience. Examples of OpenDRIs include:

Haitidata: A free, open-source software tool for risk assessment in Haiti that allows organizations and individuals to share disaster-related data and information.

Risk-in-a-Box: A suite of open source tools that close the loop between sharing data and actionable information to support resilient decision-making. Currently being developed for Indonesia earthquake risk in collaboration with government stakeholders, GFDRR, Australia-Indonesia Facility for Disaster Reduction and local partners including PT Maipark.

Source: GFDRR

The regional risk assessment and modeling platform would offer ASEAN Member States, among other DRM applications, financial tools to assess the economic and fiscal impact of natural disasters. It would also assist the Ministries of Finance in the design of cost-effective national disaster risk financing and insurance strategies, including appropriate annual budget allocations for potential disaster events and disaster risk transfer components (such as insurance). The Government of Mexico, for example, developed the disaster risk assessment tool, R-FONDEN, to assess the Federal Government's con-

tingent liability with respect to natural disasters and to design its national disaster risk financing strategy implemented by the National Disaster Fund, FONDEN. See Box 5.4. The platform could build on regional data sources currently in existence.

The regional risk assessment and modeling platform could also offer tools for regulators to implement risk-based supervision of domestic insurers and reinsurers and to monitor rate adequacy for catastrophe risk insurance products.

Box 5.4. R-FONDEN: The financial catastrophe risk model of the Ministry of Finance in Mexico

The Government of Mexico developed a catastrophe risk model called R-FONDEN for its national disaster fund, FONDEN. This probabilistic risk model offers catastrophe risk analysis for four major perils (earthquake, floods, tropical cyclones, and storm surge) for infrastructure in key sectors (education, health, roads, and low-income housing) at national, state, and sub-state level. The analysis can be performed on a scenario-basis or on a probabilistic basis.

R-FONDEN takes as input a detailed exposure database (including details of buildings, roads, and other public assets) and produces as outputs risk metrics including AEL and PML. This model is currently used by the Ministry of Finance, in combination with actuarial analysis of historic loss data, to monitor the disaster risk exposure of FONDEN's portfolio and to design disaster risk transfer strategies, such as the placement of indemnity-based reinsurance and the issuance of catastrophe bonds.

Recommendation 2: Develop Disaster Risk Financing and Insurance Strategies at the National and Sub-national Levels

A comprehensive national disaster risk financing and insurance strategy should be part of the overall fiscal risk management strategy of the state. It should aim to (i) manage the budget volatility potentially associated with natural disasters and (ii) provide insurance coverage against natural disasters for key public assets. Particular effort should also be taken to ensure that the poorest and most vulnerable segments of society receive sufficient disaster-related support and that the disaster risk financing and insurance strategy reinforces risk reduction principles.

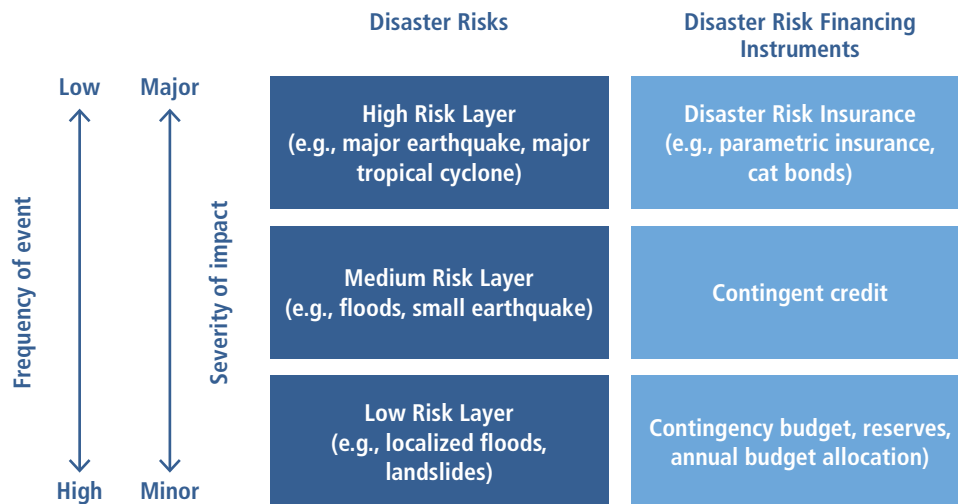
Financial management of the national budget against natural disasters

ASEAN Member States could develop national disaster risk financing and insurance strategies, building on a risk-layering approach in conjunction with a risk reduction strategy. This risk-layering approach is based on an optimal mix of risk retention (through reserves/contingency budgets and contingent credit) and risk transfer (such as insurance). Local, as well as national, governments need to ensure that they have sound disaster risk financing and insurance strategies in place. See Annex 1 for further details and Appendix 9 for a comparative analysis of risk financing and risk transfer products.

Immediate post-disaster needs could be financed through an optimal combination of financial instruments. Figure 5.1 depicts a three-tiered financial strategy described below.

- **Low risk layer:** An annual budget allocation/contingency budget could finance recurrent disaster losses. An annual budget appropriation, combined with some minor post-disaster budget reallocations, could finance recurrent losses such as those occurring as a consequence of localized floods or landslides.
 - **Medium risk layer:** Contingent credit could finance more severe, but less frequent, disasters. This budget instrument would allow governments to draw down funds quickly after a natural disaster. The World Bank offers a contingent credit line, the Development Policy Loan with Catastrophe Deferred Drawdown Option (DPL with Cat DDO), to IBRD countries. See Box 5.5 and Annex 3. Governments could also adjust their medium-term investment plans to release some resources for post-disaster response.
 - **High risk layer:** Low frequency, high severity risks could be transferred to the international capital/reinsurance markets through catastrophe reinsurance, cat bonds and/or cat derivatives. Disaster risk transfer instruments, such as disaster insurance, would finance major disasters. Governments could purchase parametric insurance against major disasters like earthquakes or tropical cyclones. Payouts would be disbursed based on parametric triggers, such as the magnitude of an earthquake or the intensity of a tropical cyclone. This type of insurance is transparent and allows for fast claims settlement (usually within two to four weeks).
- A “bottom-up” disaster risk financing approach should be considered.** Governments should first secure financing for recurrent events (bottom risk layer) through risk retention (reserves and/or contingent credit) and then move up to increase their levels of financial resilience through disaster risk transfer instruments.
- Additional financial capacity could be secured through parametric insurance.** ASEAN governments could complement their reserves and/or contingent credit with parametric insurance. Parametric insurance products are insurance contracts that make payments based on the intensity of an event (for example, wind speed, earthquake intensity) rather than the actual loss. Parametric insurance contracts tend to disperse funds faster than tradi-

Figure 5.1. Three-tier financial strategy against natural disasters



Source: World Bank Disaster Risk Financing and Insurance Program, 2010.

Box 5.5. World Bank Catastrophe Deferred Drawdown Option

The World Bank's Development Policy Loan (DPL) with catastrophe draw down options (Cat DDO) offers a source of immediate liquidity that can serve as bridge financing while other resources (e.g. concessional funding, bilateral aid, or reconstruction loans) are being mobilized after a natural disaster. Borrowers have access to financing in amounts up to US\$500 million or 0.25 percent of GDP (whichever is less). The Cat DDO has a "soft" trigger, as opposed to a "parametric" trigger; funds can be drawn down upon the occurrence of a natural disaster resulting in the declaration of a state of emergency. See Annex 3 for additional details.

tional insurance and allow risk to be transferred in the absence of traditional insurance market infrastructure (such as claims verification). Importantly, it is therefore possible to transfer risk where there are no independent means of assessing actual incurred losses to the insured party (in this case the government). See Box 5.6 and Appendix 8.

In very specific cases, ASEAN governments could complement their disaster risk transfer strategies by issuing catastrophe bonds against extreme losses caused by specific perils. Catastrophe bonds are index-linked securities that secure financial resources on the capital markets to be disbursed in the event of the occurrence of pre-defined

Box 5.6. Parametric insurance

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 instruments allow for fast claims settlement (usually within two to four weeks) and are less exposed to moral hazard and adverse selection. However, parametric products are exposed to basis risk – that is, the possibility that claims payments may not perfectly match individual losses. Careful design of index insurance parameters is important to help reduce basis risk.

natural disasters. Cat bonds generally cover the highest level of risk and are mainly issued for specific perils with an annual probability of occurrence of 2 percent or less (that is, a return period of 50 years or more). Mexico issued cat bonds in 2006 and in 2009. See Box 5.7 and Annex 5.

Strategies should incorporate comprehensive tracking systems to monitor the flow of all public spending in response to disasters, including the source of related funding. Systematic tracking systems are essential in order to effectively manage disaster response efforts, identify gaps in funding, support accountability, and draw lessons learned for potential improvements in disaster risk financing arrangements.

National disaster risk financing and insurance strategies should be tailored to the specific circumstances of individual countries. These include a country's level of income, the disaster risks faced, the scale and nature of public contingent liability, government fiscal capacity, and the level of access to international capital markets. See Box 5.8. In developing disaster risk financing and insurance strategies, public responsibilities in the event of a disaster will also need to be clearly defined.

Individual disaster risk financing and insurance strategies also need to take account of the speed with which each instrument can be activated. The selected basket of instruments needs to reflect the likely temporal distribution of relief, early recovery, and reconstruction needs for different types of hazards.

National insurance programs of public assets

National disaster risk financing and insurance strategies should include insurance programs for public assets. Public assets, such as schools, hospitals, roads, and bridges, can be severely affected by natural disasters and are currently largely uninsured for catastrophe risk in ASEAN Member States. Insurance programs for these assets would allow governments to reduce their fiscal exposure to natural disasters by transferring these risks to private insurance markets.

In some middle-income countries where fiscal resources and access to post-disaster capital are limited, governments require by law that public assets have property insurance coverage against natural disasters. This is the case in Latin American countries such as Costa Rica, Mexico, and Colombia. In practice, however, most public assets remain uninsured or under-insured, in part because public managers are reluctant to spend part of their limited budget on insurance premiums and often lack basic information to select cost-effective insurance coverage.

A disaster risk insurance program for public assets could be established in each ASEAN Member State in collaboration with the private insurance industry to promote disaster insurance of public assets. This program would offer technical assistance to public entities in the design of their catastrophe insurance coverage of public assets. Standardized terms and conditions for the property insurance policies would be developed in collaboration

Box 5.7. Mexican Catastrophe Bond MultiCat

In 2009, the Government of Mexico issued a four-tranche cat bond (totaling US\$290 million) with a three-year maturity under the World Bank's MultiCat Program. The issuer is a Special Purpose Vehicle (SPV) that indirectly provides parametric insurance to the government's Natural Disaster Fund (FONDEN) against earthquake risk in three regions around Mexico City and against hurricanes on the Atlantic and Pacific coasts. The cat bond will repay the principal to investors unless an earthquake or hurricane triggers a transfer of the funds to the Mexican government. See Annex 5 for additional details.

Box 5.8. Regional Insurance Facility for Central America (RIFCA) of the Inter-American Development Bank, in cooperation with Swiss Re

The Inter-American Development Bank (IADB), in cooperation with Swiss Re, has developed the Regional Insurance Facility for Central America (RIFCA) to mitigate the economic impacts of natural disasters in the countries of Central America and the Caribbean. RIFCA has a decentralized structure in which each participating country will be sole owner of a captive but will share administration services with other RIFCA participants. Countries will individually transfer risk to the international reinsurance and capital markets, although countries will be able to enter into collective arrangements that would enable them to jointly place reinsurance in the international market.

The coverage provided will be parametric, five-year, reinstatable catastrophe cover for one or more perils. Cover will be provided in two layers, both using the Swiss Re Affected Population Trigger. This trigger is a modeled estimate of the size of the population affected by a natural disaster, based on population data and data on the event's intensity parameters and location. IADB's Contingent Credit Facility (discussed in Box 3.9), which can provide up to US\$100 million of contingent financing, will comprise the lower layer of coverage. The insurance coverage will sit directly above this layer. Because this insurance will use the same parametric coverage as the contingent credit, the overall coverage provided is "seamless."

The first country to participate in RIFCA is the Dominican Republic, where IADB has provided a US\$100 million contingent loan, US\$50 million for earthquake and US\$50 million for hurricane, including rainfall. The insurance cover is currently being finalized, with issuance targeted for spring 2012. IADB and Swiss Re plan to expand the Facility to other countries in Central America in the near future.

with the private insurance industry. This would assist public managers in identifying their risk exposure and their insurance needs. The program could also structure a national insurance portfolio of public assets to

be then placed on the private (re)insurance market. See Box 5.9. A national approach to insuring public assets would allow for economies of scale and diversification benefits, thus lowering premiums.

Box 5.9. Insurance of public assets in Costa Rica

As part of the comprehensive disaster risk financing strategy of the Government of Costa Rica (GoCR), Law 7232 requires public managers to identify the risk exposure of public assets and take action to reduce related financial impacts, including via the purchase of insurance. In practice, however, only a few public assets are properly insured against natural disasters.

The GoCR is therefore in the process of establishing a dedicated vehicle, the Catastrophe Risk Transfer Vehicle (CRTV), to offer disaster risk insurance for public assets. The CRTV is expected to be managed by the public insurance company, INS.

The CRTV builds on the developing private property insurance market; it allows domestic insurance companies to compete for the underwriting of public assets and provides domestic insurers with incentives to pass the disaster risks to the CRTV through highly competitive reinsurance rates. The CRTV will then aggregate those disaster risks, retain the first losses through its reserves, and pass the excess losses to the international reinsurance markets.

Recommendation 3: Establish National Disaster Funds

The existing process for securing and disbursing public funding in the event of a disaster is slow in most ASEAN Member States. Recent experience in ASEAN Member States shows that it can take several months to begin drawing down funds for early recovery purposes and often well over a year before reconstruction funds begin flowing on a significant scale. This can result in delays in recovery and reconstruction, with adverse implications both for affected communities and the wider macro-economy.

A National Disaster Fund (NDF) could be established in ASEAN Member States as a mechanism for the rapid financing of post-disaster operations.⁵⁰ A dedicated financial vehicle could be established in each ASEAN Member State to finance post-disaster recovery and reconstruction programs. Building on the experience of the Mexican disaster fund FONDEN, the National Disaster Fund (NDF) would (i) conduct transparent and efficient damage assessments of public assets; (ii) mobilize immediate funding post disaster; and (iii) execute the funds in close collaboration with relevant line ministries and public agencies. The NDF would be established under both the Ministry of Finance and the National Disaster Management Office (NDMO). The NDF would include the following windows:

- An Emergency Fund designed to respond to the immediate needs of a population affected by a natural disaster, hence supporting the NDMO;
- A Program for Reconstruction, providing financial support to rehabilitate and reconstruct physical assets. The Program would focus on the reconstruction of public infrastructure and low-incoming housing.

- An NDF Trust, providing resources for post-disaster recovery and reconstruction activities approved by the Program (e.g., for economic recovery). It could also act as the contracting authority for risk transfer mechanisms, including insurance.

The NDF could build up multi-year reserves. The NDF could build up reserves from the unspent portions of its annual budget allocations over time in order to increase its retention capacity. The NDF could potentially be further supplemented by revenue generated from temporary post-disaster tax increases, particularly in middle- and higher-income countries, targeted on geographical areas and sectors of an economy that have been relatively unaffected by the disaster event.

The NDRF could purchase disaster risk transfer instruments in order to leverage its financial capacity in case of a disaster. Government regulation would be required to allow the NDF to pay disaster insurance premiums out of its annual budget allocation. With this approval, the NDF would be responsible for designing and implementing a comprehensive disaster risk financing and insurance strategy that could include contingent debt agreements, the purchase of indemnity and parametric insurance, and the issuance of catastrophe bonds or alternative risk transfer mechanisms.

Such funds could also be considered at sub-national levels, such as provincial or municipal levels, to assist local governments in the financial management of natural disasters. These sub-national funds could then be pooled into a larger fund managed by the local governments. Disaster risk transfer instruments could be accessed collectively by the pool.

⁵⁰ It is acknowledged that such a fund may be more relevant for middle-income countries like the Philippines, Indonesia, or Viet Nam. Further investigation should be conducted for low-income countries like Cambodia, Lao PDR, and Myanmar.

Recommendation 4: Promote Private Catastrophe Risk Insurance Markets

The promotion of catastrophe risk insurance of private assets would allow ASEAN governments to reduce their (usually implicit) contingent liability for natural disaster losses. Three key areas for development could be considered by ASEAN governments: (i) the development of an enabling insurance regulatory and supervisory framework; (ii) the development of risk market infrastructure; and (iii) the facilitation of disaster risk pooling. All three areas are relevant, at various levels, for property catastrophe risk insurance, agricultural insurance, and disaster microinsurance.

Enabling regulation for catastrophe risk insurance

Regulators could work toward developing regulatory regimes that control exposure to catastrophe risk using a full risk-based approach, for example, taking into account probable maximum losses (PMLs) to insurers' portfolios. While regulatory systems in the region are evolving and, as they develop, largely recognizing the need to consider the level of risk assumed by an insurer when determining capital requirements, there is a specific need to strengthen monitoring and control of insurers' exposure accumulations to catastrophe risk. The evolution from non-risk based supervision to an approach that considers PMLs would be a medium-term goal involving a number of steps, including working with the domestic insurance market to help insurers and reinsurers create internal exposure data collection and management systems that would ultimately allow for identification, quantification, and control of catastrophe risk exposure. The regional risk information platform described above would help the insurance regulator supervise and monitor this line of business. See Box 5.2. Some ASEAN Member States (such as Thailand) have already begun this process of regulatory improvement.

Regulation could be used to support the growth of emerging insurance products that have the

potential to increase insurance penetration and reach low-income populations. Such products include index-based insurance (increasingly used in agricultural insurance to protect farmers and herders against major disasters), disaster microinsurance, and takaful (Shariah-compliant insurance) which utilize novel delivery channels and novel mechanisms for risk transfer. Explicit inclusion of these products under regulatory frameworks is required to promote their larger-scale use and to ensure that sustainable growth is coupled with consumer protection. Governments may also want to consider setting "softer," more enabling regulation for certain products. This could include tax-breaks, lower minimum capital requirements, and an expansion of the list of permitted distributors (for example, inclusion of microfinance institutions).

Regulators may also want to consider how they can support insurers in maintaining rate adequacy with respect to catastrophe risk insurance products.

Developing risk market infrastructure

Risk market infrastructure refers mainly to goods and services that will aid the development of a cost-effective, affordable, and sustainable insurance market. It includes product development, risk assessment and pricing methodologies, loss adjustment procedures, and distribution channels.

The need to develop risk market infrastructure is particularly strong for disaster microinsurance. Distribution and claims-handling challenges that plague many microinsurance schemes are present in the ASEAN region. Although some countries have a strong MFI/CBO presence to support distribution of microinsurance, there is still a need for innovation in distribution channels to reach a larger segment of the target population. For example, alternative channels such as the use of mobile phones to distribute products should be considered.

Governments may want to consider how they can partner with the international donor com-

Box 5.10. The Southeastern Europe and the Caucasus Catastrophe Risk Insurance Facility (SEEC CRIF)

The Southeastern Europe and the Caucasus Catastrophe Risk Insurance Facility (SEEC CRIF) project is facilitating the development of national catastrophe and weather risk markets in SEEC through the design and introduction of innovative, low-cost insurance products, insurance business production technologies, regulatory reform, consumer education, and provision of reinsurance services. The project is supported by the World Bank, UNISDR, the European Commission, the Swiss State Secretariat for Economic Affairs, and the Global Environment Facility.

SEEC CRIF is being implemented through the creation of a specialty government-owned catastrophe risk reinsurer, Europa Reinsurance Facility Ltd. (Europa Re), with the view to improving access to weather risk and catastrophe risk insurance for millions of households, small businesses, and governments in the Facility's member states. Established in 2009 in Switzerland, Europa Re employs an independent Board of Directors and is managed by a professional management team. SEEC member governments are Europa Re's shareholders; currently, Albania, the Former Yugoslav Republic of Macedonia, and Serbia have joined the Facility, with others in discussions to join.

Europa Re is currently completing probabilistic high resolution regional earthquake and flood risk models for the SEEC member countries. The models will be used for the purposes of underwriting and pricing flood and earthquake risk in these countries. It is also developing a web-based underwriting and risk pricing platform that will provide insurers with automated real-time underwriting, pricing, and reinsurance decisions for all risks assumed through the sales of approved catastrophe insurance products in member countries. This platform will allow participating insurers to keep track of all policies issued through the portal and will enable them to report, and Europa Re to settle, insurance claims. Finally, Europa Re will utilize the platform to track its risk accumulations by location and type of risk.

munity and private insurance sector to develop public goods and services that will contribute to sustainable market growth.

The Southeastern Europe and the Caucasus Catastrophe Risk Insurance Facility (SEEC CRIF) provides an interesting example of how governments and international donors can collaborate to create public or shared market goods for insurance. For the SEEC CRIF facility, catastrophe models and an underwriting platform have been developed to facilitate market development. See Box 5.10.

Facilitating disaster risk pooling

Risk pooling can allow domestic insurers to access international reinsurance and capital markets on better terms. By aggregating risks into one single insurance portfolio, insurers can approach the international reinsurance market with a larger, more diversified portfolio, which should lead to lower reinsurance prices and reduced transaction costs.

Risk pooling provides a point of entry for financial and technical support to the market.

. By aggregating risks through a vehicle or facility, a single point of entry is created through which the international donor community and/or the government can inject financial and technical capacity to support the risk. This point of entry can be used to develop capacity of the domestic market to underwrite catastrophe risks while simultaneously protecting the domestic insurance market from the threat of insolvency due to large correlated losses.

Turkey provides an interesting example of a pooled 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 and low voluntary demand for earthquake insurance. The Government of Turkey worked in collaboration with a number of partners

including the World Bank to establish a compulsory earthquake insurance scheme to increase uptake and to create a pool for earthquake risk that would build the capacity of the domestic insurance market to underwrite earthquake risk while isolating it from the

risk of insolvency from an extreme event. Domestic insurers underwrite catastrophe risk but pass the risk onto the pool which is supported by risk capital from the international reinsurance community, the government, and donors. See Box 5.11.

Box 5.11. Turkish Catastrophe Insurance Pool

The Turkish Catastrophe Insurance Pool (TCIP) is a public sector insurance company that is managed on technical and commercial insurance principles. The 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.

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 per annum, and a 2 percent of sum insured deductible. Premium rates are based on construction type (two types) and property location (differentiating between five earthquake risk zones) and vary from less than 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. Since inception, TCIP has averaged a penetration rate of about 20 percent, or 3 million domestic dwellings. See Annex 7 for further details.

Recommendation 5: Strengthen Regional Cooperation on Disaster Risk Financing and Insurance

Regional cooperation on disaster risk financing and insurance is critical to ensure cost-effective financial management of natural disasters. Donor partners, International Financial Institutions such as the World Bank and Asian Development Bank, and private stakeholders such as international reinsurers and brokers should assist ASEAN Member States in building a regional framework and infrastructure for the financing of natural disasters. Regional cooperation is essential in three areas: (i) risk information, assessment, and modeling; (ii) knowledge exchange and capacity building; and (iii) regional vehicles to leverage international reinsurance and capital markets.

A dedicated regional program on Disaster Risk Financing and Insurance could be established to support the implementation of these activities.

The development objective of this program would be to reduce the financial vulnerability of ASEAN Member States to natural disasters by improving their financial response capacity in the aftermath of

disasters while protecting their long-term fiscal balances. Instead of working on a country-by-country basis, this would allow a programmatic approach to disaster risk financing and insurance. This program could even be extended to other Asian countries.

Regional disaster risk information, assessment, and modeling systems

Regional investment in disaster risk information, assessment, and modeling systems would be more cost-effective than an individual country approach and would promote regional cooperation in the management of risk. A regional approach to the development of catastrophe models makes particular sense. Disasters cross borders. Hence, typhoon risk should be modeled using a basin-wide approach and seismic risk according to fault lines that may span multiple countries. Considerable cost savings could be achieved through this approach. This approach is aligned with the ongoing effort of ASEAN Economic Ministers (AEM) to identify and leverage regional initiatives that furnish risk data.

The resulting risk assessments could be used to develop country-specific financial disaster risk profiles that, in turn, could be used as the basis for dialogue with and between Ministries of Finance in ASEAN Member States on the necessity to include natural disaster risks in their fiscal risk analyses.

Regional knowledge advisory services and capacity building programs

Capacity building and knowledge advisory services are essential to assist ASEAN Member States in the development of disaster risk financing and insurance services. A regional platform should facilitate knowledge sharing among ASEAN Member States and also with other countries beyond the ASEAN region.

Regional vehicles to leverage international reinsurance and capital markets

Major natural disasters are not necessarily limited to a single country and the financial response to trans-

boundary disasters should therefore be regional as well. Regional risk financing vehicles could assist ASEAN Member States in designing and implementing their national disaster risk financing and insurance strategies. Significant economies of scale may be created when risk financing solutions are developed at the regional level. These include both potential risk pooling benefits and reduced operating costs. These vehicles can also efficiently leverage the international reinsurance and capital markets. There may be political benefits related to increased regional cooperation as well.

Such financing vehicles can assist governments in managing potential fiscal volatility linked to major disaster risks in a cost-effective manner. See Box 5.12. They can also help domestic insurance companies to develop and to implement cost-effective and affordable property catastrophe risk insurance products.

Box 5.12. Caribbean Catastrophe Risk Insurance Facility

The Caribbean Catastrophe Risk Insurance Facility (CCRIF) offers a successful example of a regional catastrophe pool. The CCRIF is the result of two years of collaborative work between CARICOM governments, key donor partners, and the World Bank Group. The Facility became operational on June 1, 2007. Since then, the Facility has disbursed more than US\$30 million to the participating Caribbean countries affected by natural disasters to help them finance their immediate post-disaster expenditures.

The CCRIF functions as a mutual insurance company controlled by participating governments. The Facility was initially capitalized by participating countries, with support from donor partners.

CCRIF helps Caribbean countries lower the cost of insurance by pooling risks. Insured countries pay an annual premium commensurate with their own specific risk exposure and receive compensation based on the level of coverage agreed upon in the insurance contract upon the occurrence of a major disaster. A portion of the pooled risk is retained through reserves, which helps to reduce the cost of insurance premiums. The CCRIF transfers the risks it cannot retain by purchasing reinsurance and catastrophe swaps.

Coverage provided by the Facility is parametric in nature. Unlike traditional insurance settlements that require an assessment of individual losses on the ground, parametric insurance relies on a payout disbursement contingent on the intensity of an event (e.g., wind speed, ground acceleration). These instruments pay out faster than traditional triggers but have associated basis risk – that is, risk that the payout does not match losses sustained on the ground.

See Annex 6.

Glossary

Adverse Selection	Adverse selection occurs when potential insurance purchasers know more about their risks than the insurer does, leading to participation by high risk individuals and nonparticipation by low-risk individuals. Insurers react by either charging higher premiums or not insuring at all.
Average Expected Loss	Expected loss per year when averaged over a very long period (for example, 1,000 years). Computationally, AEL is the summation of products of event losses and event occurrence probabilities for all stochastic events in a loss model.
Alternative Risk Transfer	Refers to any non-traditional form of insurance risk transfer. Catastrophe bonds are a form of ART.
Basis Risk	The risk associated 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.
Captive Insurance	The arrangement whereby a subsidiary company provides insurance or reinsurance for its parent.
Catastrophe	A severe, usually sudden, disaster that results in heavy losses.
Catastrophe Bond	A high-yielding, insurance-linked security providing for payment of interest and/or principal to be suspended or cancelled in the event of a specified catastrophe, such as an earthquake of a certain magnitude or above within a predefined geographical area.
Catastrophe Model	A computerized model generating a set of simulated events to calculate losses arising from a catastrophe.
Catastrophe Swap	A contract used by investors to exchange (swap) a fixed payment for a certain portion of the difference between insurance premiums and claims.
Claim	An insurer's application for indemnity payment after a covered loss has occurred.
Combined Ratio	The sum of acquisition and administrative expenses and claims and insurance benefits incurred divided by premiums earned.
Direct Loss	Recovery cost of the damaged assets.
Diversification	Development of a portfolio with a variety of assets in terms of geographical or sectoral spread, or credit quality. In general, risk is reduced as portfolio diversification increases.
Exposure	The amount (sum insured) exposed to the insured peril(s) at any one time.
Facultative Reinsurance	The reinsurance of individual risk at the option of the reinsurer and the ceding company, whether under a treaty or by negotiation.
Hard Reinsurance Market	A market situation where the supply of reinsurance coverage is restricted and prices rise.
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.
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 objects insured just before the loss, subject to the adequacy of the sum insured.
Indirect Losses	Economic consequences of the damaged assets (e.g., foregone revenue).
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 Captive	An insurance company that is owned and controlled by its insureds.
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.

Layer	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.
Limit	Maximum indemnity payout specified in the insurance policy.
Loss on Line	Annual expected loss as a percentage of the policy limit.
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.
Parametric Insurance	A form of insurance that makes indemnity payments based not on an assessment of the policyholder's individual loss, but rather on measures of a parametric index that is assumed to proxy actual losses.
Premium	The monetary sum payable by the insured to the insurers for the period (or term) of insurance granted by the policy. $\text{Premium} = \text{premium rate} \times \text{amount of insurance}$ Also, the cost of an option contract paid by the buyer to the seller.
Premium Rate	The price per unit of insurance, normally expressed as a percentage of the sum insured.
Price Multiple	Ratio of the rate on line to the loss on line.
Probable Maximum Loss (PML)	The largest loss believed to be possible for a certain type of event in a defined return period, such as 1 in 100 years or 1 in 250 years.
Rate on Line	Insurance premium as a percentage of the policy limit
Reinsurance	Insurance purchased by an insurer. 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. Reinsurance has many advantages, including 1) leveling the results of the insurance company over a period of time; 2) limiting the exposure of individual risks and restricting losses paid out by the insurance company; 3) possibly increasing an insurance company's solvency margin (percent of capital and reserves to net premium income), hence the company's financial strength; and 4) 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 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.
Risk Pooling	The aggregation of individual risks to manage 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.
Risk Retention	The process whereby a party retains the financial responsibility for loss in the event of a shock.
Risk Transfer	The process of shifting the burden of financial loss or responsibility for risk financing to another party, through insurance, reinsurance, legislation, or other means.
Soft Reinsurance Market	A market situation where the reinsurance coverage supply is plentiful and prices decline.
Systemic Risk	Risk that impacts the entire financial system, rather than individual sectors. Exposure to systemic risk cannot be avoided through diversification.
Total Economic Losses	Sum of direct and indirect losses.

List of Annexes

Annex 1.	Disaster Risk Financing and Insurance Framework	88
Annex 2.	Financial Risk Assessment of ASEAN Member States	91
Annex 3.	World Bank Development Policy Loan with Catastrophe Deferred Drawdown Option	100
Annex 4.	Mexican Natural Disaster Fund FONDEN	102
Annex 5.	Catastrophe Bonds in Mexico	108
Annex 6.	Caribbean Catastrophe Risk Insurance Facility	110
Annex 7.	Turkish Catastrophe Insurance Pool	112
Annex 8.	Pacific Catastrophe Risk Assessment and Financing Initiative	113
Annex 9.	Probabilistic Catastrophe Modeling	115
Annex 10.	Borrowing Capacity of ASEAN Member States	117

Volume 2: Technical Appendices

Available online at www.worldbank.org/fpd/drifi and www.gfdrr.org/gfdrr/drifi.
See “Publications” page of either website.

Volume 2 of the report includes 10 supporting technical appendices. This volume complements the main report but is published as a separate input document. It compiles background notes and papers drafted for the preparation of the main report. The team has made every attempt to verify the contents presented, but the information should be interpreted with due consideration to its limitations resulting from the fact that indirect sources have been used where primary sources were not available and that the collective knowledge in this area is limited. An overview of the contents of Volume 2 is presented here.

- Appendix 1.** Disaster Risk Exposure Profiles of ASEAN Member States
- Appendix 2.** Disaster Risk Management Profiles of ASEAN Member States
- Appendix 3.** Fiscal Risk Management of Natural Disasters by ASEAN Governments
- Appendix 4.** Property Catastrophe Risk Insurance Markets
- Appendix 5.** Agricultural Insurance in ASEAN Member States
- Appendix 6.** Disaster Microinsurance: Selected Case Studies and Profiles of ASEAN Member States
- Appendix 7.** Catastrophe Microinsurance – The Need and the Challenge, Finding Solutions
- Appendix 8.** Parametric Insurance – Basic Concepts
- Appendix 9.** Comparison of Ex-Ante Disaster Risk Financing and Transfer Instruments

Annex 1. Disaster Risk Financing and Insurance Framework

To help countries reduce their (over-)reliance on post disaster external assistance, the World Bank has promoted a disaster risk financing and insurance 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 a 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. At the same time, authorities can jumpstart reconstruction, particularly of key public infrastructure (including bridges, hospitals, and schools). Finally, 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 complements other disaster risk management activities and protects 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 commercial 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 disaster-related 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.

Source of Financing Post-Disaster

Governments have access to various sources of financing following a disaster. These sources can be categorized as ex-post and ex-ante financing instruments. Ex-post instruments are sources that do not require advance planning. They include budget reallocations, domestic credit, external credit, tax increases, and donor assistance. Ex-ante risk financing instruments require pro-active advance planning

and include reserves or calamity funds, budget contingencies, contingent debt facilities and risk transfer mechanisms. Risk transfer instruments are instruments through which risk is ceded to a third party, such as traditional insurance and reinsurance, parametric insurance (where insurance payouts are triggered by pre-defined parameters such as wind speed of a hurricane) and Alternative Risk Transfer (ART) instruments, such as catastrophe (cat) bonds.

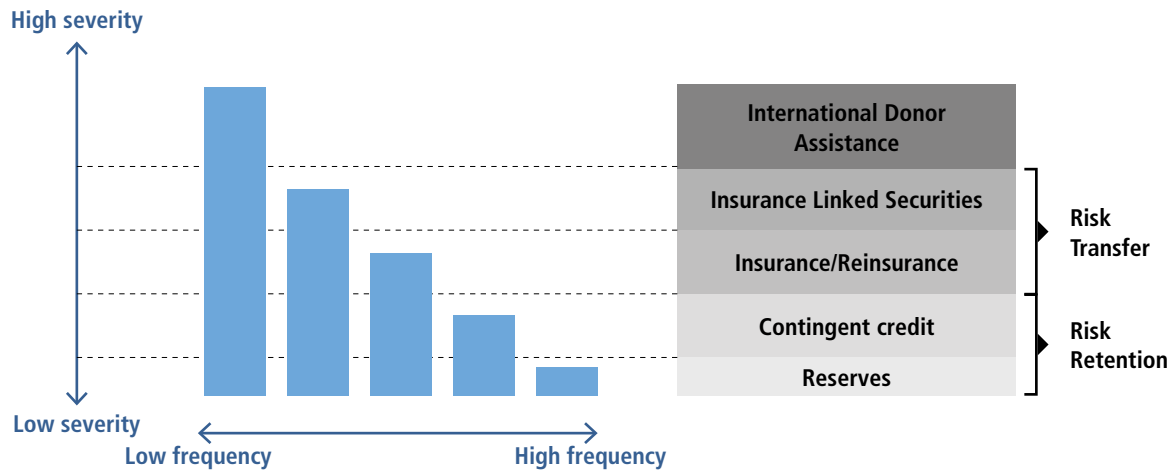
These various financial instruments are available at different periods of time after a disaster (Figure A1.1). A time-sensitive analysis is therefore required to support the design of a cost-effective disaster risk financing strategy.

Figure A1.1. Availability of Financial Instruments Over Time

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

Source: Ghesquiere and Mahul, 2007

Figure A1.2. Catastrophe risk layering



Source: Authors.

Among the ex post (post-disaster) financing tools, contingency budget is the first to be immediately available in the aftermath of a disaster. 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. They include national disaster reserve funds, contingent credit and insurance. 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.

Catastrophe risk layering can be used to design a risk financing strategy (see Figure A1.2). Budget contingencies together with reserves are the cheapest source of ex-ante risk financing and will generally be used to cover recurrent losses. Other sources of financing such as contingent credit, emergency loans and possibly insurance should enter into play

only once reserves and budget contingencies are exhausted or cannot be accessed fast enough. Finally, international post-disaster donor assistance plays a role after the occurrence of an extreme natural disaster.

A “bottom-up” approach is recommended: the government should first secure funds for recurrent disaster events and then increase its post-disaster financial capacity to finance less frequent but more severe events. The level of fiscal resilience to natural disasters, which drives the optimal financial strategies against natural disasters, is a decision to be taken by the government based on economic and social considerations.

A comparative analysis of ex ante risk financing and risk transfer instruments is provided in Appendix 9.

Annex 2: Financial Risk Assessment of ASEAN Member States

Socioeconomic Setting

ASEAN covers a total area of 4.47 million square kilometers and has a total population of 593 million. Ten countries comprise ASEAN, namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam, extending from south of China, east of India, and north of Australia. Indonesia is the largest country in the region in terms of land extension, comprising 42 percent of total area, followed by Myanmar, which accounts for 15 percent of the ASEAN area (Table A2.1). Brunei Darussalam and Singapore are the smallest countries in the region and together account for less than 0.12 percent of total ASEAN land area. Indonesia, the Philippines, and Viet Nam have the largest populations in the region, accounting for 72 percent of the total ASEAN population. The geographically small Singapore stands as the most densely populated country, and Lao PDR is the most sparsely populated country in the region.

ASEAN nations span a geographically and economically diverse region. Extending through high hills and rugged mountains, elevated plateaus, highlands, floodplains, coastal plains, and deltas, the ASEAN region is also home to large river systems such as the Mekong and the Ayeyarwady, and major water bodies such as Tonle Sap and Lake Toba (ASEAN DRM, 2010).

On average, the service sector is the main contributor to the ASEAN regional economy, with an average GDP contribution of 44 percent, followed by the industrial sector, which accounts for an average 38 percent of national GDP, and the agricultural sector, accounting for 19 percent. ASEAN Member States range, however, from relatively diversified economies such as Brunei Darussalam, Indonesia, and Malaysia, with 71 percent, 50 percent, and 44 percent of their GDP provided by the industrial sec-

tor, through mainly agricultural economies, such as Myanmar, Lao PDR, and Cambodia, where agriculture accounts from 35 to 49 percent of GDP. In terms of economic development, ASEAN Member States vary from high income countries, namely Brunei and Singapore, through lower middle income countries, specifically Indonesia, the Philippines, and Thailand, to low-income countries, namely Cambodia, Lao PDR, Myanmar, and Viet Nam.

A large part of the ASEAN population lives in riverine plains, deltas, and coastal plains, and is highly vulnerable to periodic and extensive hazards such as flooding, drought, and low-frequency, high-impact hazards such as tsunami and cyclones. Furthermore, ASEAN is one of the most exposed regions in the world to multiple natural hazards such as typhoons (tropical cyclones), floods, droughts, earthquakes, tsunami, volcanic eruptions, landslides, and forest fires; ASEAN also faces agricultural and resource risks as well as risks associated with rapid urbanization, migration, and socioeconomic change. (See ASEAN Disaster Risk Profile section and country disaster risk profiles.)

Methodology

A preliminary financial risk assessment has been conducted for the purposes of this report following the World Bank methodology, based on a combination of historical and simulated disaster losses. Historical disaster loss data, as reported by EM-DAT CRED, provide information on past geophysical and hydro-meteorological events that exceeded a defined threshold of severity. Simulated catastrophe losses are computed from probabilistic catastrophe risk models for the perils of earthquake and typhoon, providing information about catastrophic losses caused by simulated major natural disasters of varying severity. Willis along with members from the Willis Research Network contributed simulated catastrophe losses for this analysis.

Historical loss data for high-frequency, low-impact natural disasters such as drought, floods, and for-

Table A2.1. ASEAN regional and country socioeconomic characteristics

Country	Land Area (sq. Km)	% of ASEAN region	Population	% of ASEAN region	Population Density (per sq. km)	Urban Population % (2008)	GDP (2010 US\$)	Agricultural GDP (%)	Industry GDP (%)	Service GDP (%)
Brunei Darussalam*	5,270	0.1	388,190	0.1	67	75	10,732	0.7	71	28
Cambodia*	176,520	4	14,494,293	2	80	22	11,343	35	24	41
Indonesia	1,811,570	42	240,271,522	41	126	53	706,558	16	50	35
Lao PDR	230,800	5	6,834,345	1	29	32	7,491	35	27	39
Malaysia	328,550	8	25,715,819	4	78	71	237,804	10	44	46
Myanmar**	653,520	15	48,137,741	8	71	33	20,089	43	20	37
Philippines	298,170	7	97,976,603	17	327	66	199,589	14	32	55
Singapore	700	0.02	4,657,542	1	6,682	100	222,699	0	28	72
Thailand	510,890	12	65,998,436	11	129	34	318,847	12	43	45
Viet Nam	310,070	7	88,576,758	15	267	28	103,572	21	40	39
ASEAN**	4,326,060	100	593,051,249	100	786	51	1,838,725	19	38	44

Note: * Myanmar Agricultural GDP is for 2004, Industry and Service GDP for Brunei Darussalam and Cambodia is for 2007 and 2008 respectively.
 ** Population density, urban population, and GDP value added by sector for ASEAN is the average of individual country figures.

Source: World Bank, IMF, and ASEAN DRMI.

est fires for 1996-2010 were extracted from the EM-DAT CRED data. Loss data collected by EM-DAT are expressed in current US dollars in the year of the disaster event. Losses were therefore multiplied by a factor equivalent of GDP_{2010}/GDP_{year} to account for changes in exposure through time, as well as for price inflation¹. Statistical analysis and inference based on historical data was performed and complemented with probabilistic catastrophe model-generated results to calculate average expected losses (AELs) and probable maximum losses (PMLs). These risks metrics were calculated as if a disaster of a given magnitude or return period were to occur in

¹ Previous disaster risk assessments of the ASEAN regions have followed a historical approach in computing AEL and PML metrics. This study complements the historical analyses with probabilistic models for a more accurate analysis of country risk profiles. Further differences between risk metrics reported in this and previous analyses might stem from the adjustment made to historical loss data to account for changes in economic exposure and price inflation through time, which was not taken into account in previous analyses.

2010, with each country's exposure and prices corresponding to that year. For Myanmar, the absence of catastrophic models for earthquake and hurricane necessitated a slightly different approach, described below together with the results for other countries.

Country Risk Profiles

Brunei Darussalam Financial Risk Assessment

The country has annual expected losses of US\$0.35 million. However, it is important to emphasize that this AEL is associated with one single historical event reported during the estimation period, a forest fire that occurred in 1998, and might not reflect actual expected economic losses faced by the country as a result of natural catastrophes.

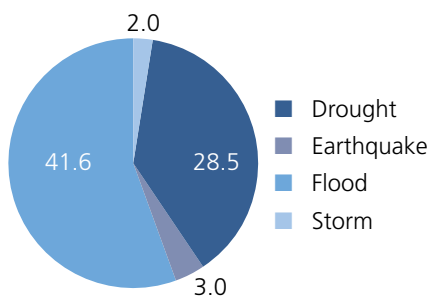
Brunei is rarely exposed to large disaster events such as typhoons, earthquakes, or severe flooding, but risks of landslides in flood-prone or hilly areas are

serious. Previous studies indicate that the country has suffered multiple natural disasters in recent years, including floods, landslides, fire outbreaks, and haze, as well as strong winds (ASEAN DRMI, 2010). However, the country lacks a systematic data management system, including the recording of historical events. Thus, it is possible that economic losses resulting from natural disasters are under-reported, and that risk metrics computed with historical incomplete data might be underestimated. Given that neither complete historical data nor simulated catastrophic loss data are available for Brunei Darussalam, PMLs are not reported in this study.

Cambodia Financial Risk Assessment

Cambodia experiences annual expected economic losses (AEL) of US\$74.2 million stemming from natural disasters. Floods are the predominant risk in Cambodia, with annual expected losses of US\$41.6 million or 55 percent of total AEL (Figure A2.1). Droughts are the second most important risk in the country with annual expected economic losses of US\$28.5m, accounting 28 percent of total AEL. Storm and earthquakes represent 4 percent and 3 percent of total AEL, respectively. On average, each year Cambodia experiences estimated losses equivalent to 0.7 percent of its GDP as a consequence of natural disasters.

Figure A2.1. Annual Expected Loss for Cambodia by Peril (US\$ Millions)

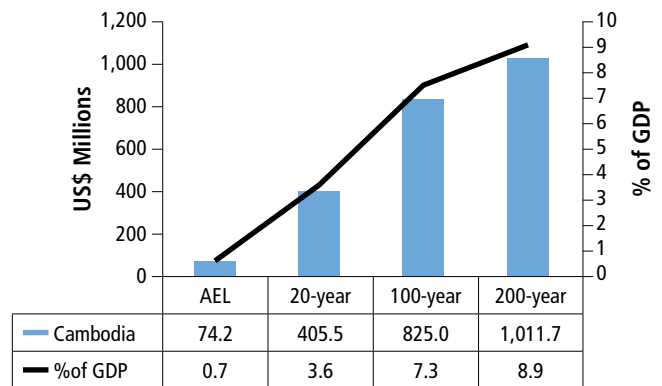


Source: Authors, original data EM-DAT CRED and WRN

It is estimated that Cambodia will experience a maximum economic loss of US\$405 million, equivalent to 3.6 percent of its GDP, once over a 20-year pe-

riod. Cambodia faces estimated maximum losses of US\$825 million in a 100-year period, equivalent to 7.3 percent of GDP. More extreme losses, such as a large earthquake or storm, occurring once every 200 years would cause losses of US\$1 billion, or 8.9 percent of GDP. (See Figure A2.2.)

Figure A2.2. Estimated Economic Losses for Cambodia



Source: Authors, original data EM-DAT CRED and WRN

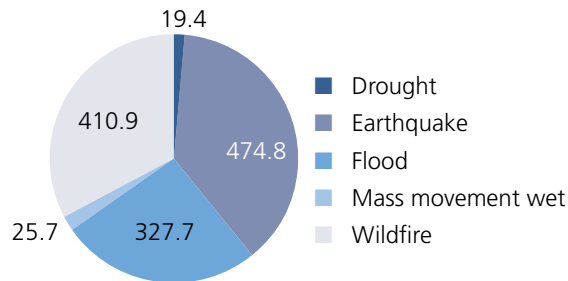
Indonesia Financial Risk Assessment

As one of the most disaster-prone countries in the world, Indonesia faces annual expected economic losses of US\$1.3 billion as a consequence of natural hazards. Multiple natural disasters impact the country periodically, of which earthquake or seismic activity pose the highest risk, causing annual average losses of US\$474.8 million or 37 percent of total AEL (See Figure A2.3). Wildfires and floods also pose significant risks for Indonesia, causing average losses of US\$410.9 and US\$372.7 million and accounting for 32 percent and 29 percent of total AEL, respectively. On average, the country experiences economic losses equivalent to 0.2 percent of its GDP as a result of natural disasters (See Figure A2.4).

It is estimated that Indonesia experiences losses of US\$4.7 billion (equivalent to 0.7 percent of GDP) once every 20 years. Average annual losses and higher frequency losses (20-years) are usually triggered by high frequency events, such as small earthquakes or seismic activity, floods, and wildfire. On the oth-

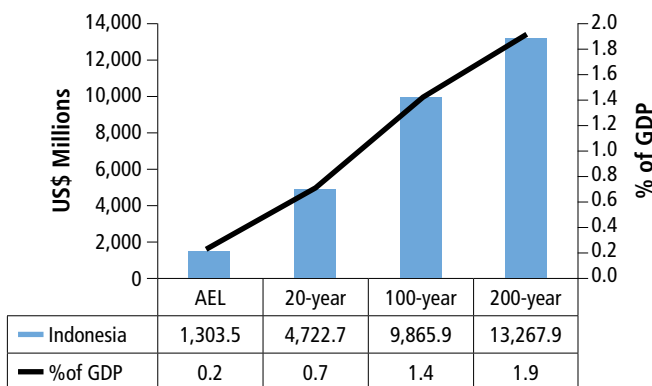
er hand, high-impact extreme events such as large earthquakes occurring once in 100 years can bring about economic losses of US\$ 9.9 billion, equivalent to 1.4 percent of the country's GDP (See Figure A2.4).

Figure A2.3. Annual Expected Loss for Indonesia by Peril (US\$ Millions)



Source: Authors, original data EM-DAT CRED and WRN

Figure A2.4. Estimated Economic Losses for Indonesia



Source: Authors, original data EM-DAT CRED and WRN

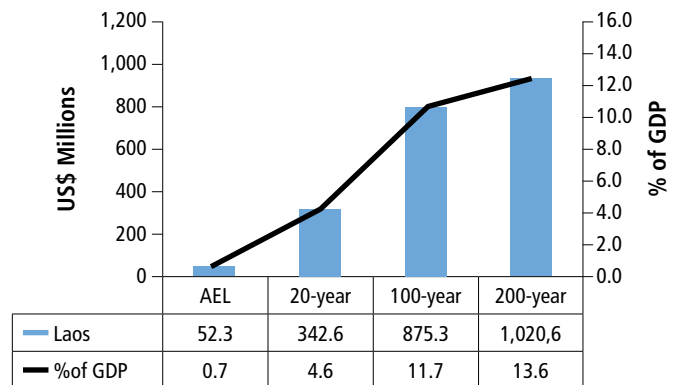
Lao PDR Financial Risk Assessment

Annual expected losses total US\$52.3 million, equivalent to 0.7 percent of GDP. Cyclones or tropical storms are by far the most important natural hazard affecting Lao PDR, alone accounting for US\$52 million of the total AEL. Floods account for the remaining US\$0.3 million (See Figure A2.5).

It is estimated that Lao PDR will experience losses of up to US\$342.6 million as a consequence of natural hazards once every 20 years, equivalent 4.6 percent of GDP. A more extreme 100-year event would

cause up to US\$0.9 billion economic losses, or 11.7 percent of the country's GDP, while a 200-year storm or flood would result in maximum losses of US\$1 billion, equivalent to a substantial 13.6 percent of GDP.

Figure A2.5. Estimated Economic Losses for Lao PDR

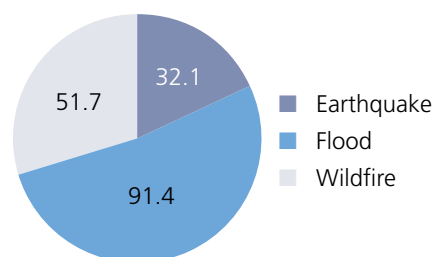


Source: Authors, original data EM-DAT CRED and WRN

Malaysia Financial Risk Assessment

On average, Malaysia faces annual economic losses of US\$174.6 million caused by natural catastrophes, equivalent to less than 0.1 percent of the country's GDP (Figure A2.7). Floods are the most important hazard affecting Malaysia, with annual economic losses of US\$91.4 million (52 percent of total AEL), followed by earthquakes and wildfires, which together account for 48 percent of total AEL (See Figure A2.6).

Figure A2.6. Annual Expected Losses for Malaysia by peril (US\$ Millions)

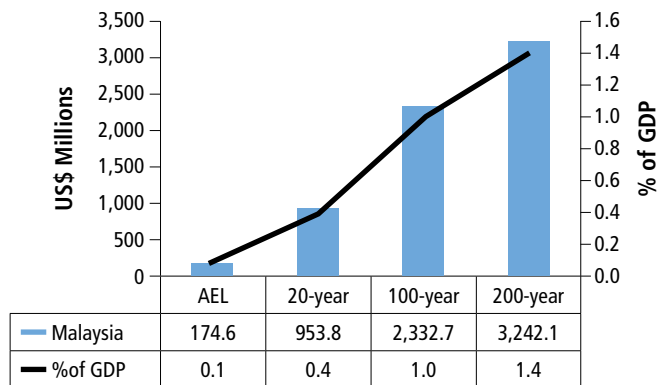


Source: Authors, original data EM-DAT CRED and WRN

Malaysia faces a 20-year PML of US\$0.9 billion, equivalent to 0.4 percent of GDP. More extreme

losses brought about by low-frequency, high-impact events, such as large floods or earthquakes, can generate losses of up to US\$2.3 billion once in a 100-year period and of up to US\$3.2 billion once every 200 years, equivalent to 1 percent and 1.4 percent of GDP respectively.

Figure A2.7. Estimated Economic Losses for Malaysia



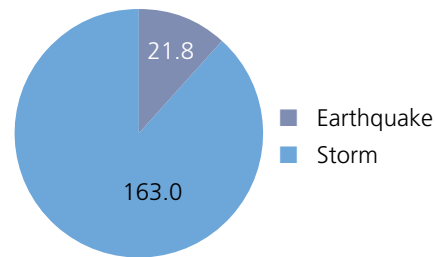
Source: Authors, original data EM-DAT CRED and WRN

Myanmar Financial Risk Assessment

Due to limited historical economic loss time series data and limited availability of simulated losses from catastrophic probabilistic models, estimated AELs and PMLs for Myanmar are unlikely to reflect the true risk faced. However, an analysis of available historical data for Myanmar suggests that the annual expected loss is approximately US\$184.8 million, equivalent to 0.9 percent of the country’s GDP. This figure has been calculated by multiplying the historical annual average loss incurred between 1996 and 2010, after adjusting for price and exposure changes, of US\$368 million, by an adjustment factor equal to the average number of people affected by natural hazards in Myanmar over the period 1963-2010 divided by the average number of people affected by natural hazards in Myanmar between 1996-2010. This adjustment was made using EM-DAT data on people affected adjusted to allow for changes in population over the period. The annual expected loss of US\$184.8 million is lower than the historical average loss of US\$368 million for 1996 to 2010 because the

longer EM-DAT time series for the number of people affected suggests that the 2008 Cyclone Nargis was a relatively severe event that seems unlikely to reoccur once every fifteen years. Due to data limitations the probable losses the country might experience as result of catastrophes are not reported in the analysis.

Figure A2.8. Annual Expected Losses for Myanmar by peril (US\$ Millions)

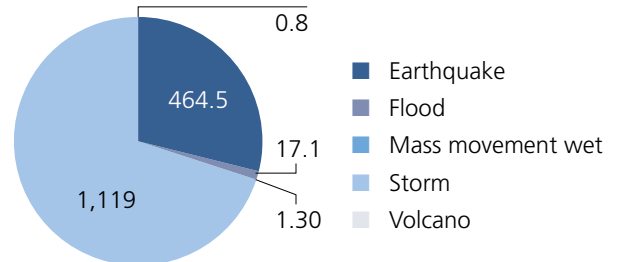


Source: Authors, original data EM-DAT CRED and WRN

Philippines Financial Risk Assessment

As one of the top global disaster hot spots, the Philippines faces US\$1.6 billion annual expected losses triggered by multiple natural hazards (See Figure A2.10). The most damaging peril affecting the Philippines is tropical storms or typhoons, which cause annual expected losses of US\$1.1 billion or 71 percent of the country’s total AEL. Earthquakes or seismic activity pose the second highest risk, with annual expected losses of US\$464.5 million or 29 percent of the total AEL. Other hazards impacting the country include floods, landslides, volcanic eruptions, and droughts.

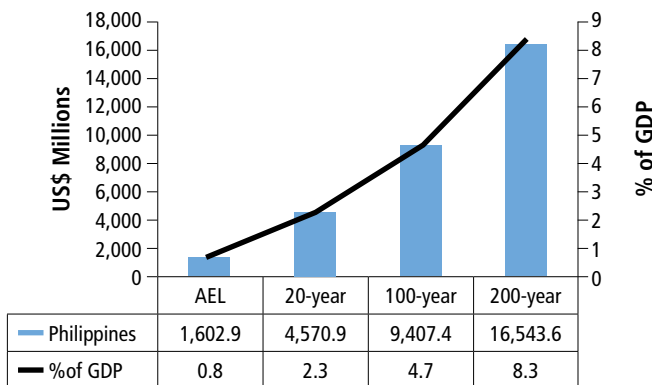
Figure A2.9. Annual Expected Loss for the Philippines by peril (U.S. Millions)



Source: Authors, original data EM-DAT CRED and WRN

It is estimated that the Philippines experiences as much as US\$4.6 billion economic losses once every 20 years as a result of natural hazards. This 20-year probable maximum loss represents a significant 2.3 percent of the country's GDP. More extreme events, such as 100-year and 200-year disasters can have devastating consequences for the Philippines, with estimated losses of up to 4.7 percent and 8.3 percent of the country's GDP, respectively.

Figure A2.10. Estimated Economic Losses for the Philippines



Source: Authors, original data EM-DAT CRED and WRN

Singapore Financial Risk Assessment

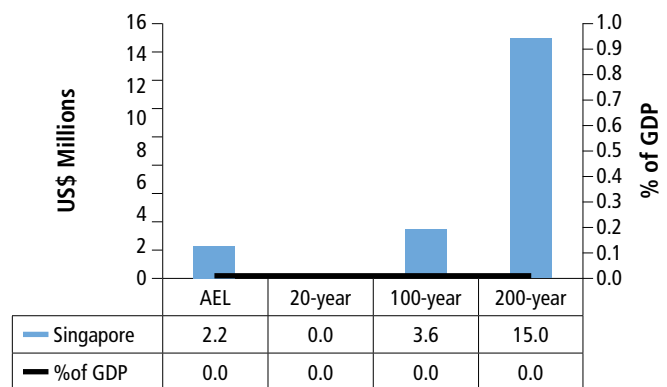
Singapore is one of the ASEAN Member States least exposed to natural hazards. No economic loss from natural hazards is reported by EM-DAT during the estimation period. Nevertheless, simulation losses resulting from earthquake catastrophic models indicate that the country could potentially experience annual expected losses of US\$2.2 million as a result of seismic activity or earthquakes. However, this AEL is minimal in proportion to the country's economy, and represents less than 0.1 percent of the country's GDP². (Figure A2.11.)

It is estimated that Singapore will experience US\$3.6 million in economic losses as a consequence of a

² Figures in percentage terms are capped at 0.1 percent. When annual expected economic losses or probable maximum losses represent less than 0.1 percent of a country's GDP, a "less than 0.1 percent" value is reported.

100-year earthquake event and as much as US\$15 million as a consequence of a 200-year earthquake event. Even a very extreme earthquake event occurring once every 200 years would have relatively minimal economic consequences for Singapore, causing losses equivalent to less than 0.1 percent of GDP. This reflects both the country's relatively low exposure and its strong economic position.

A2.11. Estimated Economic Loss for Singapore

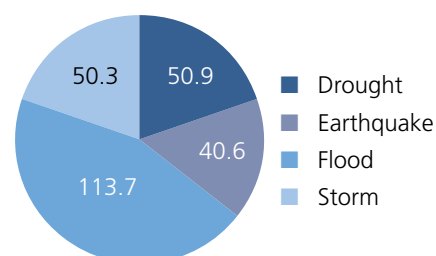


Source: Authors, original data EM-DAT CRED and WRN

Thailand Financial Risk Assessment

Thailand faces expected economic losses of US\$255.6 million every year. These losses represent less than 0.1 percent of the country's GDP, and are mainly driven by floods and storms, which account for 44 percent and 20 percent of total AEL respectively. Earthquakes or seismic activity and droughts are also highly damaging perils for Thailand, jointly accounting for 36 percent of the country's total AEL (Figure A2.12).

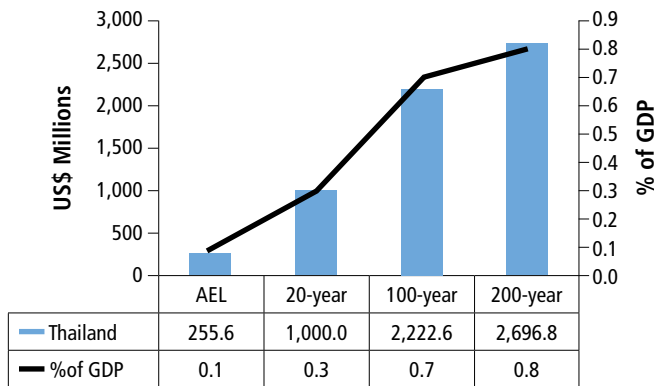
Figure A2.12. Annual Expected Loss for Thailand by Peril (U.S. Millions)



Source: Authors, original data EM-DAT CRED and WRN

It is estimated that Thailand will suffer US\$1 billion losses, equivalent to 0.3 percent of GDP, once in a 20-year period. An extreme catastrophic event such as a 1-in-200 year storm will cause economic losses of up to US\$2.7 billion, equivalent to 0.8 percent of the country's GDP.

Figure A2.13. Estimated Economic Losses for Thailand



Source: Authors, original data EM-DAT CRED and WRN

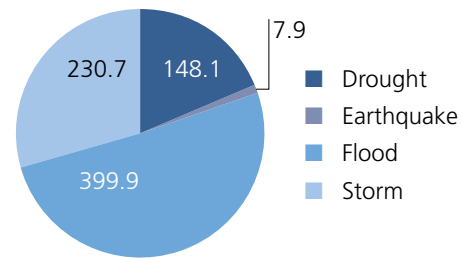
There is an important caveat to Thailand's financial risk assessment relating to the scarcity of scientific flood probabilistic models. The 2011 flooding in Thailand tragically demonstrated the catastrophic potential of floods, with economic damages estimated at US\$22 billion, more than eight times the 200-year loss estimated for the country using the current methodology. This finding points out the imprecise assessment of flood risk in this report and highlights the need for the development of catastrophic flood models for the ASEAN region (See Box 2.3 for details).

Viet Nam Financial Risk Assessment

As one of the most disaster-prone countries in the Asian-Pacific region, Viet Nam faces annual expected economic losses of US\$0.8 billion resulting from multiple natural hazards, including storms, floods, droughts, and earthquakes. Floods present the highest risk in the country, with an annual expected loss of US\$399.7 million, or 51 percent of the total AEL, followed by storms and droughts, respectively ac-

counting for 29 percent and 19 percent of the AEL (Figure A2.14).

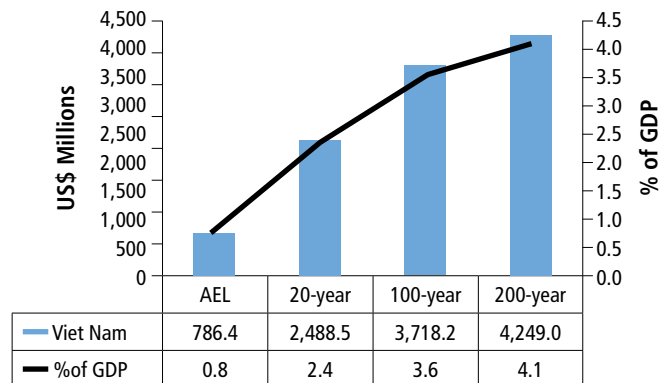
Figure A2.14. Annual Expected Losses for Viet Nam by peril (U.S. Millions)



Source: Authors, original data EM-DAT CRED and WRN

Viet Nam is estimated to incur economic losses of as much as US\$2.4 billion, equivalent to 2.4 percent of GDP, as a result of natural disasters occurring once every 20 years. For more extreme 1-in-100 events, such as a major storm or flood, the country is estimated to suffer losses of up to US\$3.7 billion, equivalent to 3.6 percent of GDP. For even more severe catastrophic events occurring 1-in-200 years, the estimated losses climb to US\$4.2 billion, equivalent to 4.1 percent of the country's GDP (Figure A2.15).

Figure A2.15. Estimated Economic Losses for Viet Nam



Source: Authors, original data EM-DAT CRED and WRN

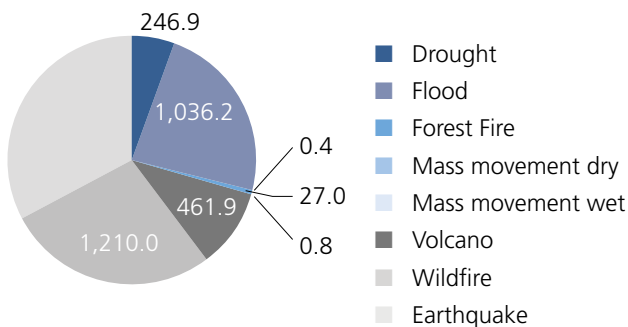
Regional Financial Risk Assessment

Every year, on average, the ASEAN region has expected economic losses from natural disasters esti-

mated at US\$4.4 billion, equivalent to 0.2 percent of regional GDP. Storms are the most serious hazard impacting the region, with an annual expected loss of US\$1.5 billion or 33 percent of the total AEL. Earthquakes or seismic activity are the second most costly events, with an AEL of US\$1.2 billion or 27 percent of the regional AEL. Floods are in third place, presenting an AEL of US\$1 billion, or 22 percent of the total AEL. Other important hazards causing economic losses in the ASEAN region include droughts and wildfires.

ASEAN Member States can be classified into three risk groups according to their annual expected loss as a percentage of national GDP: high risk countries comprising Myanmar, the Philippines, Viet Nam, Lao PDR, and Cambodia; medium risk countries comprising Indonesia, Thailand, and Malaysia; and low risk countries, namely Brunei Darussalam and Singapore.

Figure A2.16. Annual expected loss for ASEAN by peril (US\$ million)

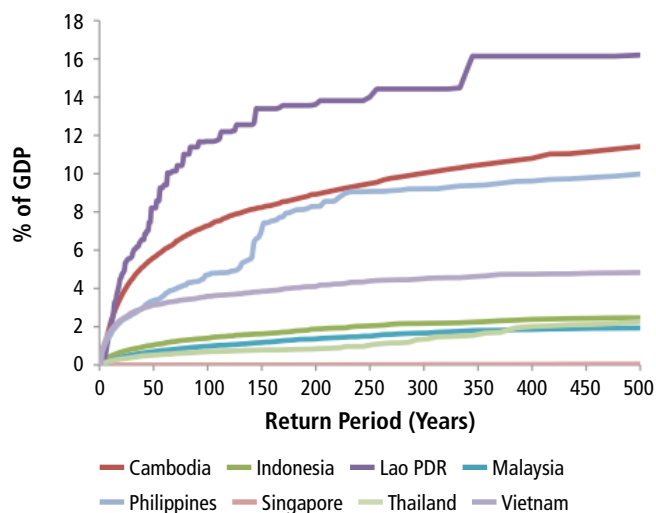


Source: Authors, original data EM-DAT CRED and WRN

ASEAN Member States can be further classified into three groups according to their risk across different probable maximum losses, thereby taking into consideration the risk of severe events (Figure A2.17). High-risk countries as measured in terms of PML as a percentage of GDP include Lao PDR, Cambodia, and the Philippines. These three countries have the highest estimated economic losses as a percentage of GDP for 20-year return period or less frequent losses. A second group of countries, comprising Viet

Nam, Indonesia, Thailand, and Malaysia, face medium risk of natural disaster losses relative to GDP, with Indonesia facing highest relative risks for all return periods, and Thailand following in rank for 400-year or less frequent relative losses. Lastly, Singapore faces a low risk of natural disaster losses as percentage of its GDP for all return periods.

Figure A2.17. ASEAN Member States Disaster Risk Profile

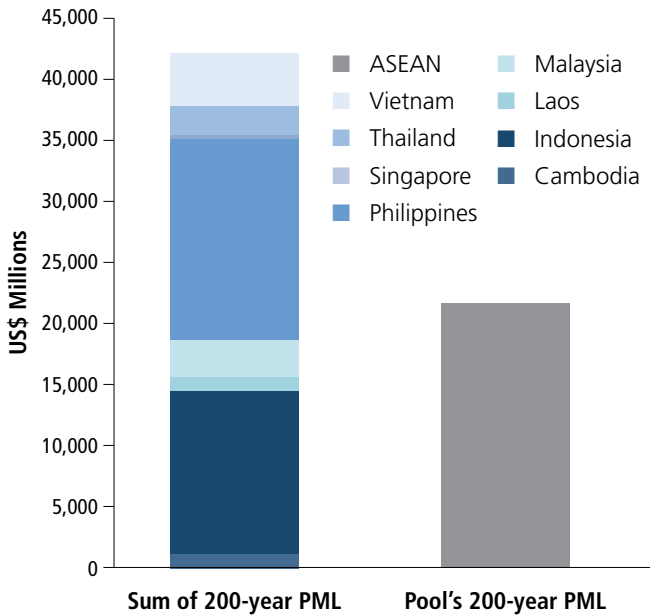


Source: Authors, original data EM-DAT CRED and WRN

Note: Loss exceedance probability as a percentage of national GDP. LEC are not computed for Brunei Darussalam and Myanmar due to limited loss data.

The ASEAN region can benefit from regional risk diversification. Figure A2.18 illustrates the benefits of risk pooling across countries and perils in the ASEAN region. The sum of 200-year probable maximum losses for ASEAN Member States totals US\$42.1 billion without risk pooling. In comparison, the 200-year probable maximum loss with risk pooling amounts to US\$21.6 billion. This 48.5 percent reduction could translate into significant savings in the cost of risk transfer (e.g., insurance premiums) if a regional pooled risk transfer mechanism, rather than a series of individual country mechanisms, is developed.

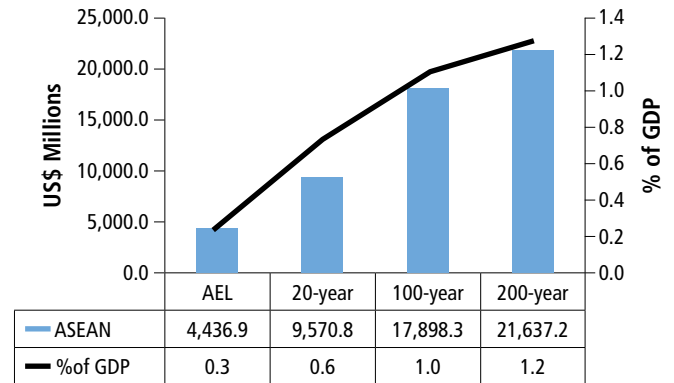
Figure A2.18. Benefits of Regional Risk Pooling



Source: Authors, original data EM-DAT CRED and WRN

Taking the benefits of risk pooling, it is estimated that the ASEAN region will experience economic losses of up to US\$9.6 billion, equivalent to 0.5 percent of regional GDP, as a result of natural disasters once every 20 years. More extreme natural events, such as catastrophes occurring once in 100 years or once in 200 years are estimated to incur regional economic losses of up to US\$17.9 billion and US\$21.6 billion, respectively, equivalent to 1 percent and 1.2 percent of regional GDP (See Figure A2.19).

Figure A2.19. Estimated Economic Losses for the ASEAN region



Source: Authors, original data EM-DAT CRED and WRN

Annex 3. World Bank Development Policy Loan with Catastrophe Deferred Drawdown Option

The World Bank's Development Policy Loan with Catastrophe Deferred Drawdown Option (Cat DDO) is a contingent credit line that provides immediate liquidity to IBRD member countries in the aftermath of a natural disaster. It is part of a broad spectrum of World Bank Group disaster risk financing instruments available to assist borrowers in planning efficient responses to catastrophic events.

The Cat DDO helps develop a country's capacity to manage the risk of natural disasters and should be part of a broader preventive disaster risk management strategy. The Cat DDO complements existing market-based disaster risk financing instruments such as insurance, catastrophe bonds, reserve funds, etc.

In order to gain access to financing, the borrower must implement a disaster risk management program which the Bank will monitor on a periodic basis.

Key Features

The Cat DDO offers a source of immediate liquidity that can serve as bridge financing while other resources (e.g. concessional funding, bilateral aid or reconstruction loans) are being mobilized after a natural disaster. The Cat DDO ensures that the government will have immediate access to financing following a disaster, which is when a government's post-disaster liquidity constraints are at their highest.

Borrowers have access to financing in amounts up to US\$500 million or 0.25 percent of GDP (whichever is less). The Cat DDO has a "soft", as opposed to a "parametric" trigger, which means that funds become available for disbursement upon the occurrence of a natural disaster resulting in the declaration of a state of emergency.

The Cat DDO has a revolving feature; amounts repaid during the drawdown period are available for subsequent withdrawal. The three-year drawdown period may be renewed up to four times, for a total maximum period of 15 years.

Pricing Considerations

The Cat DDO carries a LIBOR-based interest rate that is charged on disbursed and outstanding amounts. The interest rate is the prevailing rate for IBRD loans at time of drawdown. A front-end fee of 0.50 percent on the approved loan amount and a renewal fee of 0.25 percent also apply.

The Cat DDO provides an affordable source of contingent credit for governments to finance recurrent losses caused by natural disasters. The expected net present value of the cost of the Cat DDO is estimated to be at least 30 percent lower than the cost of insurance for medium risk layers (that is, a disaster occurring once every three years). This cost saving can be even higher when the country's opportunity cost of capital is greater.

Major Terms and Conditions of the Catastrophe Risk Deferred Drawdown Option	
Purpose	To enhance/develop the capacity of borrowers to manage catastrophe risk. To provide immediate liquidity to fill the budget gap after a natural disaster. To safeguard on-going development programs.
Eligibility	All IBRD-eligible borrowers (upon meeting pre-approval criteria)
Pre-approval criteria	Appropriate macroeconomic policy framework The presentation of existence of a disaster risk management program.
Loan Currency	EUR, JPY and USD
Drawdown	Up to the full loan amount is available for disbursement at any time within three years from loan signing. Drawdown period may be renewed up to a maximum of four extensions.
Prepayment Terms	Must be determined upon commitment and may be modified upon drawdown while prevailing maturity policy limits.
Lending Rate	Like regular IBRD loans, the lending rate consists of a variable rate plus a spread. The lending rate is reset semi-annually, on each interest payment date, and applies to interest periods beginning on those dates. The base rate is the value of the 6-Month LIBOR at the start of an interest period for most currencies, or a recognized commercial bank floating rate reference for others.
Lending Rate Spread	The prevailing spread, either fixed or variable, for regular IBRD loans at the time of each drawdown. 1. Fixed for the life of the loan: Consists of IBRD's projected funding cost margin relative to LIBOR, plus IBRD's contractual spread of 0.50%, a risk premium, a maturity premium for loans with average maturities greater than 12 years, and a basis swap adjustment for non-USD loans. 2. Variable resets semi-annually: Consists of IBRD's average cost margin on related funding relative to LIBOR plus IBRD's contractual spread of 0.50% and a maturity premium for loans with average maturities greater than 12 years. The variable spread is recalculated on January 1 and July 1 of each year. The calculation of the average maturity of DDOs begins at loan effectiveness for the determination of the applicable maturity premiums, but at withdrawal for the remaining components of the spread.
Front-End Fee	0.50% of the loan amount is due within 60 days of effectiveness date; may be financed out of the loan proceeds.
Renewal Fee	0.25% of the undisbursed balance.
Currency, Conversions, Interest rate, Conversions Caps, Collars, Payment Dates, Conversion Fees, Prepayments	Same as regular IBRD loans.
Other Features	Country Limit: Maximum size of 0.25% of GDP or the equivalent of US\$500 million, whichever is smaller. Limits for small states are considered on a case-by-case basis. Revolving Features: Amounts repaid by the borrower are available for a drawdown, provided that the closing date has not expired

Annex 4. Mexican Natural Disaster Fund FONDEN

Mexico is highly exposed to multiple natural hazards and has a long history of disaster events. Located along the world's "ring of fire," where 80 percent of the world's seismic and volcanic activity takes place, Mexico is a seismically active country. It is also located in one of the few regions of the world that can be affected simultaneously by two independent cyclone regions, the North Atlantic and the North Pacific regions. Around 40 percent of Mexico's territory and a total of 31.3 million people are exposed to storms, hurricanes, and floods. Climate change is expected to contribute to an increase in both the frequency and severity of hydrometeorological hazards.

To address its vulnerability to adverse natural events, Mexico has developed a comprehensive institutional approach to natural disasters. Following two devastating earthquakes in 1985, resulting in 6,000 deaths and direct losses in excess of US\$4 billion, the Federal Government of Mexico established a National System of Civil Protection (*Sistema Nacional de Protección Civil* - SINAPROC) in 1986 as the main mechanism for inter-agency coordination of disaster efforts. SINAPROC provides an organized group of civil protection structures, functional relations, methods, and procedures involving all levels of government and engaging with the private sector and non-governmental and civil society organizations. Responsibility for SINAPROC rests with the Ministry of the Interior.

A National Center for Disaster Prevention (*Centro Nacional de Prevención de Desastres* - CENAPRED) was established as well as the technical arm of civil protection and, again, located within the Ministry of the Interior. CENAPRED's primary objective is to promote the application of technologies for the prevention and mitigation of disasters, provide technical training, and disseminate and promote preparedness and self-protection measures amongst at-risk populations. It also provides technical confirmation of the occurrence of hazard events.

The Fund for Natural Disasters (FONDEN)

Despite developing an institutional approach to disasters, all levels of government in Mexico were still initially required to reallocate funding intended for planned capital investments to post-disaster reconstruction on a relatively regular basis, as and when disasters occurred. These reallocations resulted in delays and a scaling back of development initiatives and provided a relatively slow means of fund disbursement for recovery. In response, legislation was therefore passed in 1994 requiring federal, state, and municipal assets to be privately insured. In 1996, the government went a stage further and created the Fund for Natural Disasters (FONDEN) in the Ministry of Finance.

FONDEN is a disaster risk financing and insurance vehicle. Its main purpose is to provide immediate financial support to federal agencies and local governments recovering from a disaster for: (i) emergency assistance; (ii) reconstruction of public infrastructure (including restoration of forestry and other natural resources); and (iii) reconstruction of low income homes. FONDEN is also responsible for carrying out studies on risk management and contributing to the design of risk transfer instruments.

Main Features of FONDEN

FONDEN was originally established as a budgetary tool through which federal funds were annually allocated for expected expenditure on post-disaster response. In 1999, a catastrophe reserve fund, known as the FONDEN Trust Fund, was also established through which any unspent portion of this annual budgetary appropriation could be accumulated. Disaster losses occurring as a consequence of geophysical perils including earthquake, volcanic eruption, tsunami, landslide and hydrological perils including drought, hurricane, excess rainfall, hail storm, flood, tornado, wildfire are eligible for FONDEN support.

Since 2006 the Federal Government has been required by law to allocate no less than a total 0.4 percent of the annual federal budget to FONDEN together with a disaster prevention fund and an agricultural fund for natural disasters (net of the uncommitted funds remaining in the FONDEN Trust at the end of the previous fiscal year). Should this appropriation be insufficient, the law stipulates that additional resources must be transferred from other government programs and funds, such as the oil revenue surplus.

FONDEN is based on three complementary instruments: the Revolving Fund, the FONDEN Program and the FONDEN Trust Fund. The first provides monies for disaster relief efforts, the second supports reconstruction of infrastructure and the third manages Mexico's catastrophe risk financing strategy.

- *Revolving Fund:* This fund finances emergency supplies to be provided in the immediate aftermath of a natural disaster, for instance relating to shelter, food and primary health care. In the event that there is high probability of a disaster occurring, or imminent danger, local governments can declare a situation of emergency and obtain resources from FONDEN immediately. Doing so allows local governments to prepare for immediate relief needs.
- *FONDEN Program:* This program finances the reconstruction and restoration of public infrastructure (owned by municipalities, state governments, and the Federal Government), natural areas, and private dwellings of low-income households following a natural disaster. It supports the full cost of reconstruction of eligible federal infrastructure and manages the reconstruction efforts through the relevant federal agencies. It also provides up to 50 percent of the total cost of reconstruction of eligible state infrastructure, with related activities executed by the federal entities responsible for each of the affected sectors.

State governments finance the remaining 50 percent of these reconstruction costs.

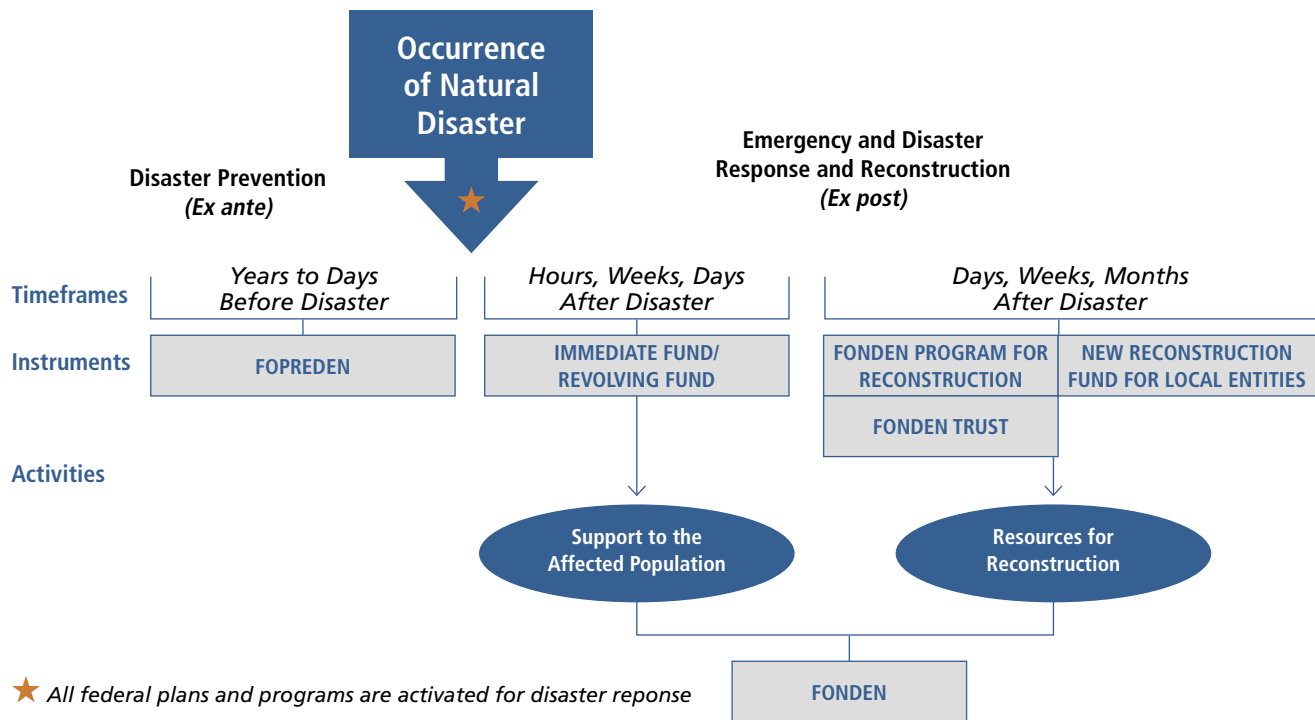
- *FONDEN Trust:* This Trust Fund manages FONDEN's financial resources for approved activities. It also acts as the contracting authority for risk transfer mechanisms, including insurance and catastrophe bonds.

These instruments are governed by clear rules of operation and continuous changes are made to enhance their efficiency and effectiveness. In 2009 a new financing mechanism known as 'Immediate Partial Support' (*Apoyos Parciales Inmediatos - APIN*) was introduced under FONDEN's Program for Reconstruction. This mechanism provides partial financial support immediately following a disaster to meet urgent needs while the full damage assessment and fund approval process is undertaken. Following devastating floods in 2010, a new Reconstruction Fund for Local Entities (*Fondo de Reconstrucción de Entidades Federativas*) was also created to provide additional support to local entities. This Fund offers zero-coupon lines of credit to local entities to help cover reconstruction costs. At the end of the 20-year credit period, eligible states pay the interest on the loan principal and the Fund repays the principal. FONDEN's role within Mexico's wider national system of civil protection is indicated in Figure A4.1.

FONDEN's Institutional Structure

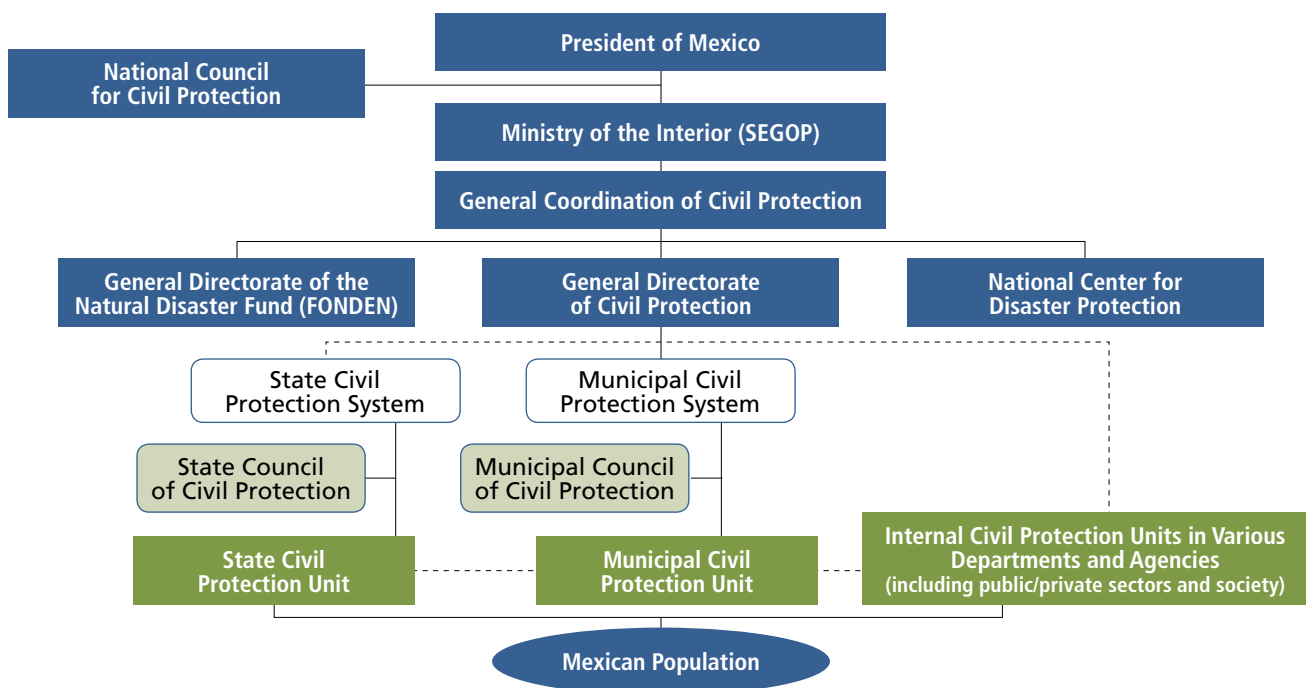
FONDEN is a trust located within the Civil Protection Unit of the Ministry of the Interior, as indicated in Figure A4.2. A federal FONDEN Trust Technical Committee approves the allocation of FONDEN resources for specific activities and monitors their implementation. The committee is chaired by the Ministry of Finance and is composed of members from the Ministry of the Interior, Ministry of Civil Service and the FONDEN Trust. Mexico's national development bank for public works and services, Banobras, acts as a fiduciary agent and trustee of the FONDEN Trust.

Figure A4.1. Role of FONDEN's Instruments in Mexico's National System of Civil Protection



Source: FONDEN (2011).

Figure A4.2. Flow Chart of the Civil Protection System in Mexico



Source: Authors, from Mexican Civil Protection (2010).

FONDEN Program

The FONDEN Program is intended to support federal and local government entities whose financial capacity has been overwhelmed by disaster relief and reconstruction needs. Local and federal authorities must follow a set procedure in order to access FONDEN resources. This procedure entails six main steps and should be completed within 23 days of the occurrence of a disaster:

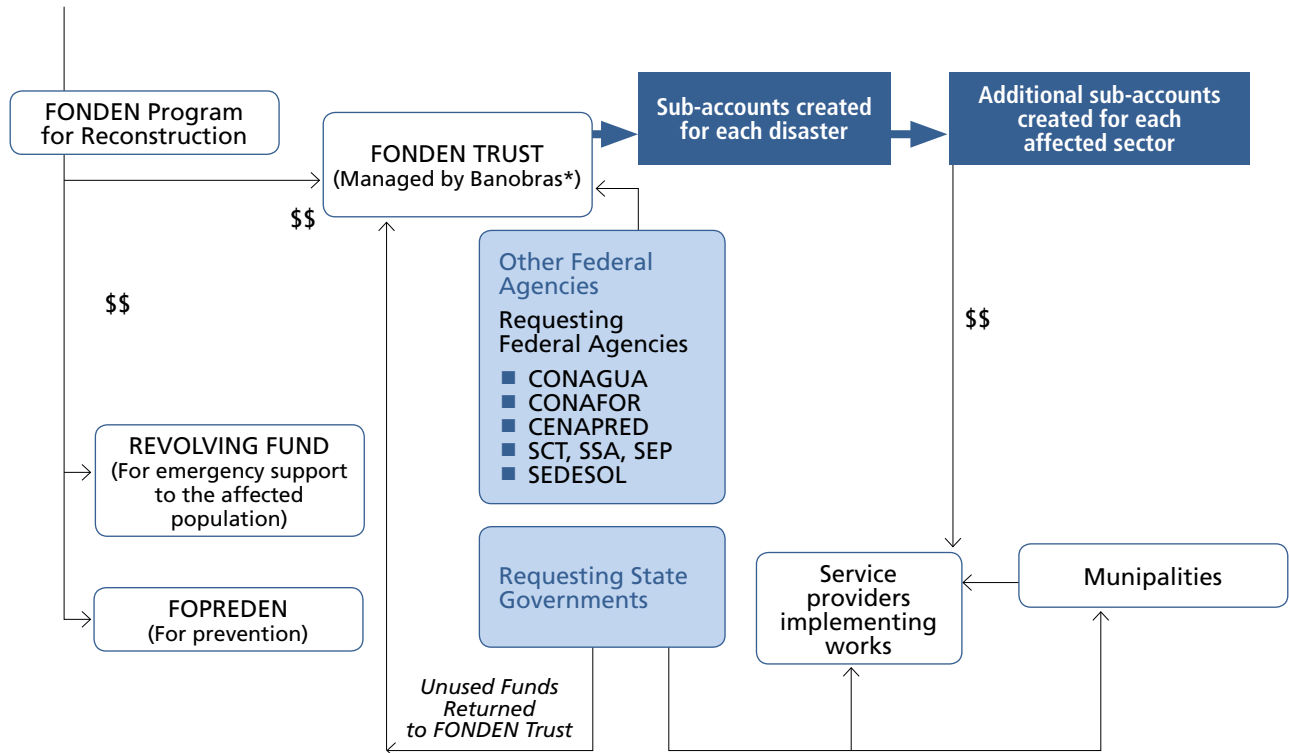
1. Within three days, a specialized federal agency (the National Water Commission in the event of hydrometeorological phenomena; the National Forestry Commission in the event of forest fires; and the National Center for Disaster Prevention in the event of geological phenomena) certifies the occurrence of a natural disaster and informs the relevant state government.
2. Within four days of the occurrence of the disaster, the government sets up a technical committee comprised of federal and state government representatives to identify and assess the damage. Once the Damage Assessment Committee is installed, sector sub-committees and agencies may request Immediate Partial Support (APIN) to finance urgent needs relating to the restoration of communications and lifeline infrastructure. Approved resources should be authorized by the Ministry of Finance within 24 hours of the receipt of requests.
3. Within 10 days following technical confirmation that a disaster has occurred, the damage assessment committee presents its findings to the Directorate General of FONDEN, including itemized reconstruction and 'build back better' needs and related costs.
4. Within 15 days from the occurrence of the disaster, the Ministry of the Interior issues a declaration of state of natural disaster. The Ministry of Finance can thereafter approve FONDEN resources.
5. Within a further two days, the Ministry of Interior should: (i) verify that there is no duplication of effort among the federal and state entities; (ii) verify that the requested resources only cover the damage caused by the disaster (and not pre-existing damage); (iii) verify that any items of uninsured damaged infrastructure have not previously received any reconstruction financing from FONDEN and, if they have, apply lower levels of financial support in accordance with FONDEN's predetermined procedure for such eventualities; and (iv) develop and submit to the Ministry of Finance a consolidated request for resources for all damaged sectors, including the Ministry of the Interior's opinion on whether the applications comply with FONDEN's requirements for resource authorization.
6. Within a further five days, a meeting of the FONDEN Technical Committee is convened to authorize the resources for post-disaster reconstruction and its authorization submitted to the Ministry of Finance. The FONDEN Trust Technical Committee reviews and transfers approved funds from the FONDEN Program for Reconstruction federal budget line to the FONDEN Trust. Banobras, FONDEN's fiduciary agent, makes payments from the FONDEN Trust directly to the accounts of the relevant public works contractors and/or suppliers and providers of goods and services for and on behalf of the executing agencies, based on directions received from the FONDEN Trust Technical Committee, as indicated in Figure A4.3.

FONDEN risk transfer instruments

In recognition of its considerable contingent fiscal liability for disaster losses, the Federal Government has empowered FONDEN to develop a catastrophe risk financing strategy to leverage its resources, relying on a layered combination of risk retention and risk transfer instruments. FONDEN's operational manual was modified to allow the FONDEN Trust to transfer risk to the reinsurance and capital markets in 2005, with the insurance premium being defined as a service in the government budget law. A va-

Figure A4.3. FONDEN's Resource Allocation Process for Post-Disaster Reconstruction

Mexico's Federal Budget (approved as line 23 of annual budget for fiscal year January 1 – December 31)



Source: Authors, from Mexican Civil Protection (2010).

riety of instruments have been developed and applied to transfer disaster risk, involving the strategic use of insurance and catastrophe bond options. In 2006, FONDEN issued the world's first government catastrophe bond, Cat MEX, providing cover against earthquakes in three specific zones of the country. The Mexican Government has been able to develop sophisticated private financial instruments in part because of its strong institutional capacity and its high level of access to global capital markets. The Federal Government also promotes the private insurance of specific federal and state government assets, thereby reducing financial dependence on FONDEN in the event of a disaster.

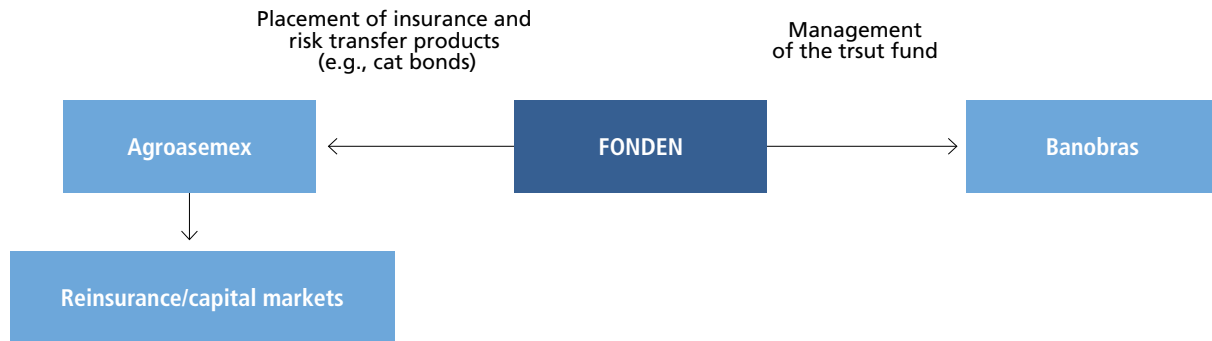
The financial structure of the FONDEN Trust is depicted in Figure A4.4. Banobras acts as the Trust's account manager, as already noted. The FONDEN

Trust places its excess risk with the public insurer Agroasamex, which in turn passes it on to the international reinsurance and capital markets.

The FONDEN Disaster Risk Financing Strategy for 2011

FONDEN's disaster risk financing strategy as of 2011 is illustrated in Figure A4.5. The bottom layer of risk, up to US\$1 billion, is retained by FONDEN through its annual budget appropriation and, if necessary, by an exceptional additional federal budget allocation. The US\$400 million layer in excess of this US\$1 billion is covered through an indemnity-based reinsurance policy on the whole FONDEN portfolio. Should total reconstruction costs exceed US\$1.4 billion, these excess losses are financed through a further exceptional budget allocation. FONDEN also has a

Figure A4.4. Financial Structure of FONDEN



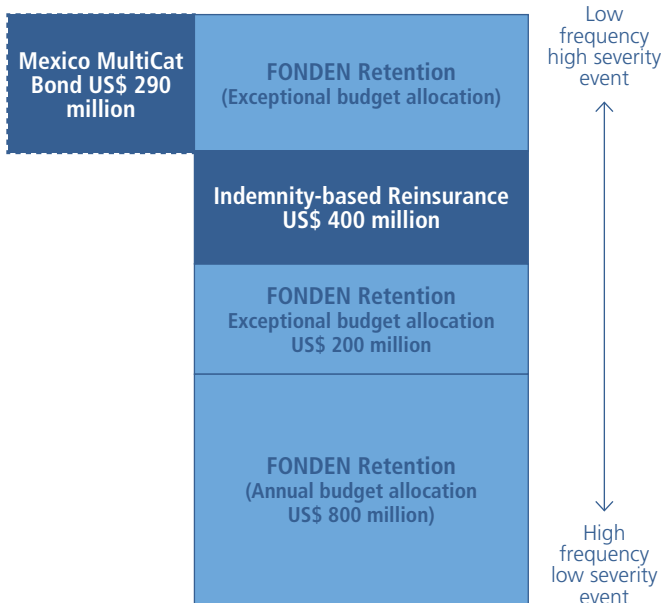
Source: FONDEN 2010.

catastrophe bond, MultiCat Mexico, in place to provide immediate liquidity should a major earthquake and/or hurricane occur in pre-defined areas of the country.

This is the first time that the Mexican Government has placed an indemnity-based excess-of-loss reinsurance treaty on the international reinsurance mar-

ket. Reinsurance payouts are based on the losses borne by the Federal Government as reported to FONDEN (that is 100 percent of the damage to federal assets and 50 percent of the damage to state/municipal assets and low-income housing). Only the replacement costs, which on average represent 75 percent of total reconstruction costs, are covered by the reinsurance treaty.

Figure A4.6. FONDEN Disaster Risk Financing Strategy of the Federal Government in 2011



Note: The Mexico MultiCat bond covers only earthquakes in three zones and hurricanes in three zones.

Source: Disaster Risk Financing and Insurance Program, GFDRR and FCMNB, 2011

The multi-peril cat bond, MultiCat Mexico, was issued in 2009 using the World Bank’s newly established MultiCat Program after the earlier 2006 CatMex matured. This new US\$290 million, four-tranche cat bond with a three-year maturity further diversifies the coverage provided by the 2006 CatMex by pooling multiple risks in multiple regions. It provides binary parametric insurance to FONDEN against earthquake risk in three regions around Mexico City and against hurricanes on the Atlantic and Pacific coasts. For the continued earthquake cover, trigger levels were reduced to include more events and the zones covered extended in order to protect a larger population. In the event of a disaster, an insurance claim will be triggered if an official declaration of a state of emergency is issued by the Ministry of the Interior and certain other criteria are also met. The principal will be repaid to investors if no claims are triggered over the life of the bond. The cost of the bond tranches are between 2.5 and 4.3 times the expected loss. See Annex 5.

Annex 5. Catastrophe Bonds in Mexico

FONDEN uses various instruments to support federal and local governments and entities in responding to natural disasters, including reserve funds and risk transfer solutions. In 2006, FONDEN issued a US\$160 million catastrophe bond (CatMex) to transfer Mexico's earthquake risk to the international capital markets. It was the first parametric cat bond issued by a sovereign entity.

After the CatMex matured in 2009, Mexico decided to further diversify its coverage by pooling multiple risks in multiple regions. In October 2009, it issued a multi-peril cat bond using the World Bank's newly established MultiCat Program, which helps sovereign and sub-sovereign entities pool multiple perils in multiple regions and reduce insurance costs.

Objective

The purpose of a MultiCat Program is to transfer disaster-related risks, covering multiple hazards, to the capital markets in order to reduce pressure on public budgets. Doing so ensures that adequate funds are in place for relief activities.

Outcome

The bond was oversubscribed, with broad distribution among investors. With this bond, Mexico transferred a pool of disaster risk to the market for the first time; secured multi-year protection for the covered risks at a fixed price; and reduced potential pressure on public budgets. Mexico effectively locked in funding for disaster relief prior to the occurrence of an event, rather than relying only on public budgets after an event.

The demonstration effect of this transaction for other emerging market countries is significant. It has paved the way for other highly exposed countries to manage fiscal volatility and stabilize government

budgets by transferring extreme natural disaster risks to capital markets, obviating the need to build up excessive budget reserves.

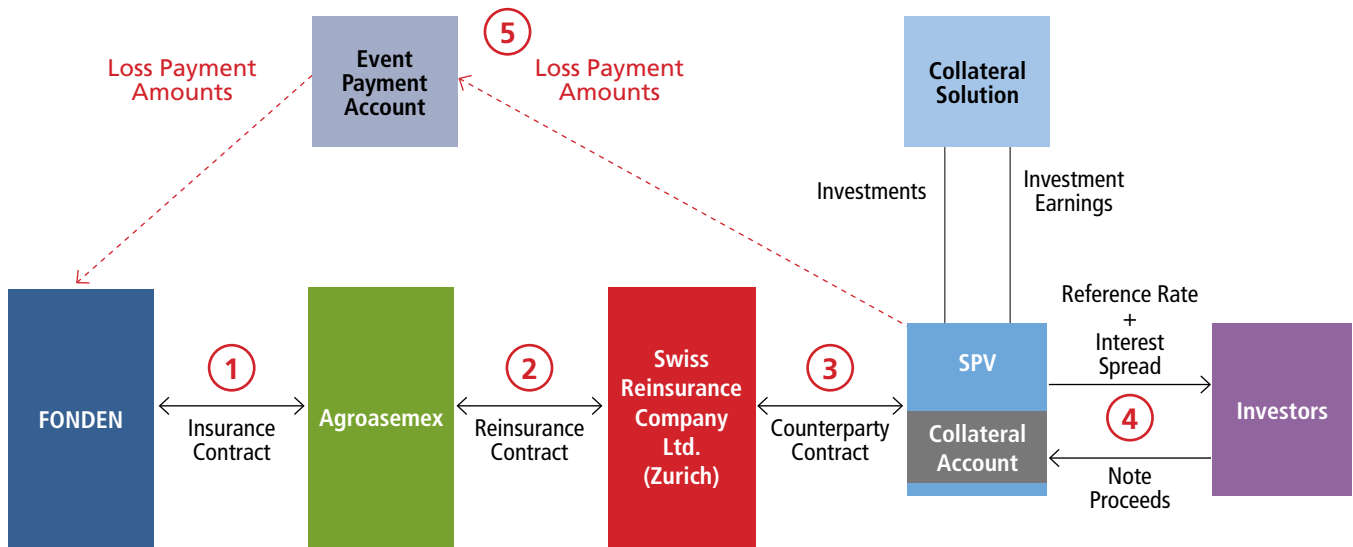
Operating structure

Mexico issued a four-tranche cat bond (totaling US\$290 million) with a three-year maturity under the MultiCat Program. The issuer is a Special Purpose Vehicle (SPV) that indirectly provides parametric insurance to FONDEN against earthquake risk in three regions around Mexico City and hurricanes on the Atlantic and Pacific coasts. The cat bond will repay the principal to investors unless an earthquake or hurricane triggers a transfer of the funds to the Mexican government.

The SPV structure is displayed in Figure A5.1 and the institutional arrangements are described below:

1. FONDEN enters into an insurance contract with local insurance company Agroasemex.
2. Agroasemex enters into a reinsurance contract with Swiss Re to transfer all of the catastrophe risk.
3. Swiss Re enters into a derivative counterparty contract with a Cayman Islands-based special purpose vehicle (MultiCat Mexico 2009 Ltd.) to transfer the catastrophe risk.
4. The SPV issues floating rate notes (cat bonds) to capital market investors to hedge its obligations to Swiss Re under the counterparty contract. The proceeds received from investors are invested in US Treasury money market funds and deposited in a collateral account.
5. A separate event payment account is established with a third party bank to allow FONDEN to receive parametric loss payments directly from the SPV, subject to the insurance contract.

Figure A5.1. Financial Structure of MultiCat Mexico



Lessons Learned

1. Countries need to have a strong legal and institutional framework in place for disaster risk financing to facilitate the implementation of risk transfer mechanisms, which should be part of a disaster risk management framework.
2. There is potential to replicate this type of transaction for other middle-income countries. The Mexico bond was significantly oversubscribed, proving that investors continue to exhibit strong appetite for non-peak risks.
3. The availability of data and statistics concerning the probability and severity of a catastrophic event is critical. New countries and regions attempting to tap the catastrophe bond market will need a supporting cat risk model. Donor countries with a specific interest in the development of disaster risk management capacity in developing countries can play an important part by financing risk modeling and transaction costs.
4. The World Bank's role as arranger significantly increased investor comfort. Future transactions will benefit from the standardized fees and design structure offered by the MultiCat Program.

Table A5.1. Summary of Terms: Mexico MultiCat 2009

Peril	Class A Earthquake	Class B Pacific Hurricane	Class C Pacific Hurricane	Class D Atlantic Hurricane
Notional (US\$ million)	140	50	50	50
S&P rating	B	B	B	BB-
Maturity	October 2012	October 2012	October 2012	October 2012
Interest Spread (over US Treasury Money Market Fund)	11.50%	10.25%	10.25%	10.25%
Expected loss	4.65%	4.07%	4.22%	2.39%
Multiple	2.47	2.52	2.43	4.29

Source: FONDEN.

Annex 6. Caribbean Catastrophe Risk Insurance Facility

On average, one to three Caribbean countries are affected by a hurricane or an earthquake each year, although during severe hurricane seasons this number can climb much higher. In 2004, the region suffered a disastrous hurricane season, with 15 named storms. Hurricane Ivan, the strongest storm of the season, wrought devastation on the Cayman Islands, Grenada, and Jamaica. In Grenada, 89 percent of the country's housing stock and more than 80 percent of its public and commercial building structures sustained damage. The damage was estimated at over US\$800 million, equivalent to approximately 200 percent of Grenada's GDP. The Heads of Government of the Caribbean Common Market and Community (CARICOM) were compelled by their experiences during this catastrophic season to ask for World Bank assistance in improving access to catastrophe risk insurance.

Objectives

The main objective of the Caribbean Catastrophe Risk Insurance Facility (CCRIF) is to provide its members with access to affordable and effective coverage against natural disasters. For a number of reasons, small island states have difficulty absorbing the financial impacts of disasters, including that: i) limited budgetary capacity prevents them from establishing sufficient financial reserves; ii) cross-regional subsidization of recovery efforts is generally impossible due to their limited size and economic diversification; iii) high debt levels limit their access to credit after disasters; and, iv) access to catastrophe insurance is limited due to the high transaction costs resulting from the relatively small level of business brought into these markets.

CCRIF enables countries to pool their individual risks into a single, better diversified, joint reserve mechanism. Through risk pooling, CCRIF provides coverage to countries at a significantly lower cost than individual governments would incur if they had to maintain

their own reserves or if they were to independently purchase insurance in the open market.

Structure and Description

CCRIF functions as a mutual insurance company controlled by participating governments. It was initially capitalized by the participating countries, with support from donor partners. A portion of the pooled risks is retained through reserves, which reduces the cost of insurance premiums. CCRIF transfers the risks it cannot retain by purchasing reinsurance and catastrophe swaps.

The coverage provided by the Facility is parametric in nature. Unlike traditional insurance settlements that require an assessment of individual losses on the ground, parametric insurance relies on a payout disbursement contingent on the intensity of an event (e.g., wind speed, ground acceleration). In the case of CCRIF, payouts are proportional to the estimated impact of an event on each country's budget. The estimated impact is derived from a probabilistic catastrophe risk model developed specifically for the Facility.

Insured countries pay an annual premium commensurate with their own specific risk exposure and receive compensation based on the level of coverage agreed upon in the insurance contract upon the occurrence of a triggering event.

Outcome

CCRIF is the first-ever multi-country risk pool. Sixteen Caribbean countries joined in 2007 and have renewed their policies each year since. Seven payouts have been made to date (see below for CCRIF members and payouts). CCRIF has been well received by the reinsurance market, which has provided capacity at a low rate to the Facility. A US\$20 million cat swap between IBRD and CCRIF was the first derivative transaction to enable emerging countries to access the capital market to insure against natural disasters.

Lessons Learned

1. CCRIF addresses one disaster risk financing need of small island states: access to immediate liquidity in the aftermath of a disaster. CCRIF does not cover all losses that a country may incur; instead it covers estimated liquidity needs for the first three to six months after a major catastrophe. When designing a disaster risk financing strategy, it is important to understand that each country requires a tailored combination of disaster risk financing tools. There is neither a “one size fits all” strategy nor a “silver bullet” disaster risk financing tool.
2. A critical mass of country participation in CCRIF is required for the Facility to benefit from risk pooling and diversification. In order for Caribbean countries to benefit from diversification through risk pooling (e.g., joint reserves and improved reinsurance rates), enough countries must participate in the Facility. Furthermore, CCRIF carries administrative costs that are shared by participants; a significant number of participants are required to maintain an affordable average administrative cost per country.
3. Dialogue on risk financing can enhance discussions with decision makers on more comprehensive disaster risk management. Risk modeling developed for risk financing products can provide useful information on the risk exposure of the analyzed economy. This information and related dialogue on financial protection can help sensitize decision makers to the need for more comprehensive strategies to deal with losses from adverse natural events, including actions to try to avoid the creation of new risks (e.g., territorial planning, building standards) and to reduce existing risks (e.g., protective measures, strengthening of infrastructure).

CCRIF Member Countries	
Anguilla	Grenada
Antigua & Barbuda	Haiti
Bahamas	Jamaica
Barbados	St. Kitts and Nevis
Belize	St. Lucia
Bermuda	St. Vincent and the Grenadines
Cayman Islands	Trinidad & Tobago
Dominica	Turks & Caicos Islands

Payout to Date (USD in millions)
8.5 to Barbados (2010)
3.2 to St. Lucia (2010)
1.1 to St. Vincent & the Grenadines
4.2 to Anguilla (2010)
7.8 to Haiti (2010)
6.3 to Turks & Caicos Islands (2010)
1 to Dominica (2007)
1 to St. Lucia (2007)

Annex 7. Turkish Catastrophe Insurance Pool

Bridging the contents of Europe and Asia, Turkey is highly exposed to severe earthquakes. Despite their common occurrence, Turkey's private insurance market was previously unable to provide adequate capacity for catastrophe property insurance against earthquake risk. Without adequate commercial protection of residential buildings, the Government of Turkey faced a significant contingent financial exposure in post-disaster reconstruction of private property.

In the aftermath of the Marmara earthquake in 2000, the government worked to limit its financial exposure to earthquake risk in the residential housing market through the establishment of the Turkish Catastrophe Insurance Pool (TCIP). This pool enables the Government of Turkey to ensure that owners who pay property taxes on domestic dwellings can purchase affordable and cost-effective earthquake coverage. In doing so, the government's contingent fiscal exposure to earthquakes is decreased by transferring risk to the international reinsurance markets, thereby reducing pressure to provide post disaster housing subsidies.

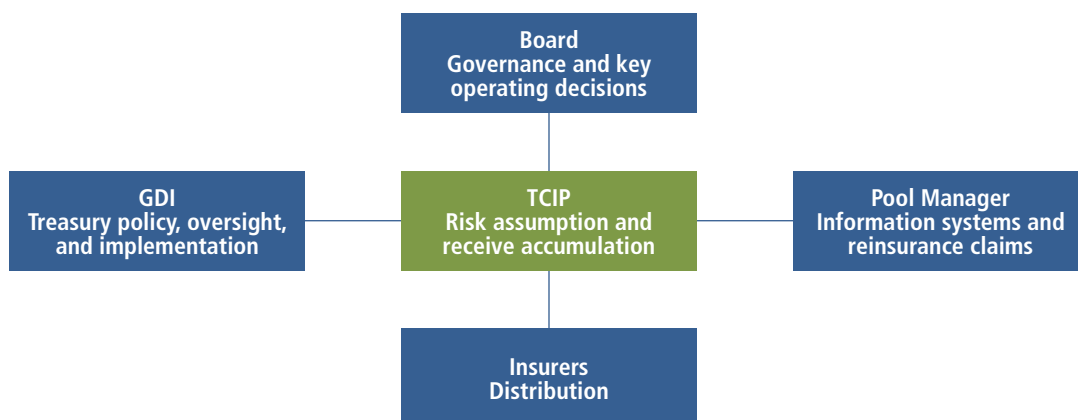
TCIP is a public sector insurance company which is managed on sound technical and commercial insurance principles. The Pool operates as a genuine public-private partnership with most, if not all, operational

functions outsourced to the private sector. 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. The full capital risk requirements for TCIP are funded by commercial reinsurance (currently in excess of US\$1 billion) and its own surplus capital (about US\$0.5 billion).

The TCIP policy is a stand-alone property earthquake policy with a maximum sum insured per policy of US\$65,000, an annual 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 than 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.

TCIP sold over 3 million policies at market-based premium rates (i.e., 23 percent penetration) in 2009, a considerable advance on the 600,000 covered households when the pool was established. To achieve this level of penetration, the government invested heavily in insurance awareness campaigns and made earthquake insurance compulsory for home-owners on registered land in urban centers. The legal framework for the program envisages compulsion enforcement mechanisms in urban settings, while coverage is voluntary for homeowners in rural areas.

Figure A7.1 Operational Structure of the TPIC

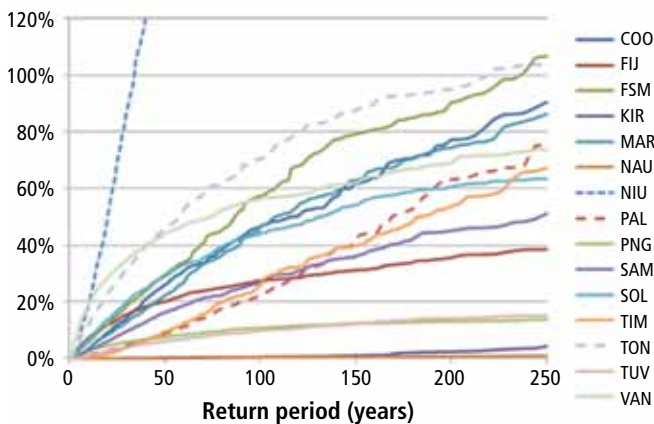


Annex 8. Pacific Catastrophe Risk Assessment and Financing Initiative

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) is a joint initiative between the Secretariat of the Pacific Community SPC/SOPAC, the World Bank, and the Asian Development Bank, with financial support from the Government of Japan and the Global Facility for Disaster Reduction and Recovery (GFDRR). The initiative aims to increase the resilience of Pacific Island Countries to natural disasters through the application of tools and strategies for disaster risk management.

The average annual direct loss caused by natural disasters in the South Pacific region is estimated at US\$284 million. State of the art catastrophe risk models have been developed as part of the PCRAFI to assess the economic and fiscal impact of natural disasters (including earthquakes, tsunamis, and tropical cyclones) in the fifteen Pacific Islands Countries (PICs).⁵¹ In particular, these models estimate the economic losses caused by natural disasters with different return periods (e.g., frequency of occurrence). See Figure A8.1.

Figure A8.1. Pacific Island Country Disaster Risk Profile



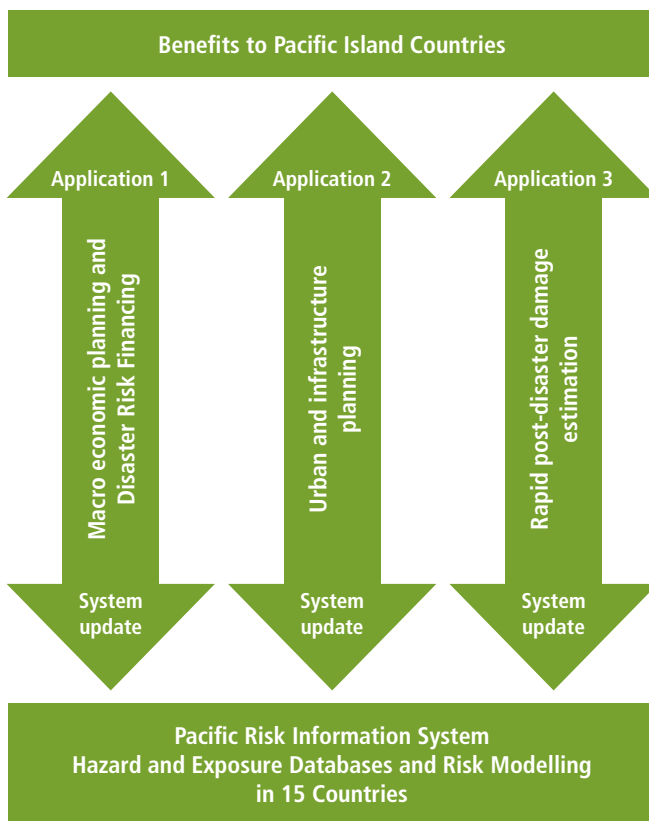
⁵¹ The Pacific Island Countries covered under PCRAFI are: Cook Islands, Federate States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea (PNG), Samoa, Solomon Islands, Timor Leste, Tonga, Tuvalu, and Vanuatu.

The PCRAFI has developed a Pacific Risk Information System (PRIS) (including a regional geospatial database and country-specific catastrophe risk models), which offers technical tools for the development of sustainable and affordable disaster risk financing and insurance solutions for the PICs.

The PCRAFI initiative has established the largest collection of geospatial information for the PICs; the Pacific Risk Information System. PRIS contains detailed, country-specific information on assets, population, hazards, and risks. The exposure database leverages remote sensing analyses, field visits, and country specific datasets to characterize buildings (residential, commercial, and industrial), major infrastructure (such as roads, bridges, airports, and electricity), major crops, and population. More than 500,000 buildings were digitized from very-high-resolution satellite images, representing 15 percent (or 36 percent without PNG) of the estimated total number of buildings in the PICs. About 80,000 buildings and major infrastructure were physically inspected. In addition, about 3 million buildings and other assets, mostly in rural areas, were inferred from satellite imagery. PRIS also includes the most comprehensive regional historical hazard catalogue (115,000 earthquake and 2,500 tropical cyclone events) and historical loss database for major disasters, as well as country-specific hazard models that simulate earthquakes (both ground shaking and tsunamis) and tropical cyclones (wind, storm surge, and excess rainfall). In peer-reviewing the models, Geoscience Australia described them as “*high standard, thorough and representative of best practice.*” PRIS contains risk maps showing the geographic distribution of potential losses for each PIC as well as other visualization products of the risk assessments. These can be accessed, with appropriate authorization, through an open-source web-based platform.

Building on PRIS, applications will be developed with the PICs under the PCRAFI. Some applications are illustrated on Figure A8.2 and described below.

Figure A8.2. PRIS



Application 1. Macro-economic planning and disaster risk financing. PRIS assists the PICs in the improvement of their macro-economic planning against natural disasters. It also helps the PICs to develop an integrated disaster risk financing strategy, relying on an optimal combination of reserves, contingent credit, insurance, and donor grants.

Application 2. Mainstreaming risk information into urban and infrastructure planning. PRIS ensures that disaster risk and climate change information and considerations form an integral part of the urban and infrastructure planning process.

Application 3. Rapid post-disaster damage estimation. In the immediate aftermath of a disaster, PRIS provides disaster managers and first responders with the tools and information to quickly gain an overview of areas and population affected and the likely severity of the event in terms of potential fatalities, injuries and building, infrastructure and crop damage.

The development objective of the Pacific Disaster Risk Financing and Insurance Program is to increase the financial resilience of the Pacific island countries (PICs) against natural disasters and to improve their capacity to meet post-disaster funding needs without compromising their fiscal balances and development objectives. It aims to assist the PICs in the improvement of their macroeconomic planning against natural disasters, and the design and implementation of a national disaster risk financing strategy, as part of their national disaster risk management and climate change adaptation agenda. The program supports the following activities: (i) capacity building on integrated disaster risk financing and insurance; (ii) development of private disaster risk insurance markets; and (iii) piloting of the Pacific disaster risk insurance program for governments.

Annex 9. Probabilistic Catastrophe Modeling

Probabilistic catastrophe risk modeling was originally developed by the insurance industry to assess the risk of a portfolio of assets and to price insurance contracts. The technique is increasingly used by governments to assess their exposure to adverse natural events and by regulators to implement risk-based supervision of insurers and reinsurers underwriting catastrophe risk.

Access to catastrophe risk models is limited in the ASEAN region. The principal model sources are:

- Independent third-party vendor modeling firm ‘off the shelf’ models
- Broking house models
- Insurer and reinsurer tools developed in-house

Independent third party vendor models:

The table below details ‘off-the-shelf’ model availability from the three largest independent third-party catastrophe model vendors. For the perils of earthquake and typhoon, all models explicitly capture the principal loss agents of wind damage for typhoon and ground motion for earthquake. Treatment of additional loss agents varies as follows⁵²:

- Tsunami following earthquake is not modeled by any vendor.
- Rainfall-induced-flooding from typhoon is modeled by both vendors providing typhoon modeling in the region.
- Coastal storm surge from typhoon is modeled by EQECAT but not included in the AIR Philippines typhoon model.

Table A9.1. Independent third party model vendor coverage

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Vietnam
AIR Worldwide			Earthquake				Earthquake, Typhoon			
EQECAT			Earthquake		Earthquake, Typhoon		Earthquake, Typhoon	Earthquake,	Earthquake, Typhoon	
Risk Management Solutions			Earthquake				Earthquake			

Broking house models:

International brokers operating in the region have also developed models, primarily for technical support to their clients. Aon Benfield Impact Forecasting has an Asia typhoon model covering the Philippines, Thailand and Viet Nam. Willis has created regional stochastic risk tools and models mostly for those areas or perils for which there are no vendor models. Their models include typhoon models for the Philip-

pines, Viet Nam, Thailand, Cambodia and Lao PDR and earthquake models for the Philippines, Indonesia, Singapore, Malaysia, Viet Nam, Thailand, Cambodia and Lao PDR.

⁵² Inclusion of the effects of a loss agent may be through explicit separate modeling of the loss agent or through inclusion of the direct effects of an additional loss agent when calibrating hazard and vulnerability curves for the principal loss agent. For more information, see <http://www.air-worldwide.com>, www.eqecat.com and www.rms.com.

Insurer/reinsurer models:

International reinsurers often develop their own models in-house to supplement vendor model output for their catastrophe exposure management and pricing processes. It is likely that the large international reinsurers operating in the ASEAN region have

their own view of risk for some territories and perils. Some insurers operating in the region will also have models developed in-house – for example, specialist Indonesian earthquake insurer PT Maipark has developed a probabilistic earthquake model to support its operations.

Box A9.1. Probabilistic catastrophe modeling methodology

A typical catastrophe risk model is comprised of the following modules:

Hazard module: This module defines the frequency and severity of potential perils (e.g. earthquake, tropical cyclone) at specific locations within the region of interest. This is done by analyzing historical frequencies, and reviewing scientific studies performed on severity and frequencies in the region of interest. The potential of a system (such as a fault or a tropical cyclone basin) to produce events beyond the severity of events observed in the available historical record is considered. This module later generates thousands of stochastic events based on historical data and expert opinion.

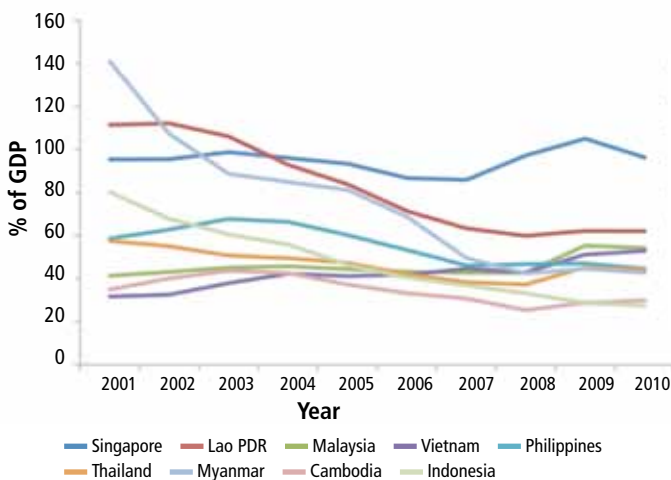
Exposure module: This is a geo-referenced database of assets at risk, assigning a list of attributes (e.g. exact location, construction type, number of stories) for each asset. This information is used to determine the area's vulnerability, captured through vulnerability functions typically specific to a construction or occupancy type and an area.

Loss Module: This module combines the hazard module and the exposure module to calculate different risk metrics, such as annual expected loss (AEL) and probable maximum losses (PMLs) for various return periods. The AEL is an expression of the long term average annual loss. The PML represents the expected loss severity based on likely occurrence, such as the 1-in-100 year loss or the 1-in-200 year loss. Risk metrics generated by probabilistic risk models are used to compliment historical analysis and are particularly useful for policy makers in assessing the probability of losses and the maximum loss that could be generated by major events in the future (e.g. a large earthquake or cyclone affecting a major city or port).

Annex 10. Borrowing capacity of ASEAN Member States

Government gross debt has considerably decreased in many ASEAN Member States over the last decade. Myanmar and Lao PDR significantly reduced their debts and went from having over 100 percent debt-to-GDP ratios in 2001 to presenting reasonable debts equivalent to 43 percent and 62 percent of their GDPs in 2010. Indonesia's government debt decreased substantially from a debt-to-GDP ratio of 80 percent in 2001 to a 27 percent ratio in 2010. The Philippines's government also reduced its debt considerably from 63 percent of its GDP in 2001 to 43 percent in 2010. Cambodia, Malaysia, Thailand, and Viet Nam present rather constant trends in their government's debt-to-GDP ratios, with relatively moderate debts as a percentage of GDPs of 30 percent, 54 percent, 44 percent, and 52 percent, respectively. Singapore's government stands as the most indebted in the ASEAN region, presenting a relatively constant trend of debt as a percentage of GDP between 85 percent and 105 percent. In 2010, Singapore's government presents a debt equivalent to 96 percent its GDP (See Figure A10.1).

Figure A10.1. General gross debt of governments as percentage of GDP



⁵³ Brunei Darussalam's government does not hold outstanding debt as of 2010. The country's debt-to-GDP ratio as per IMF statistics is zero.

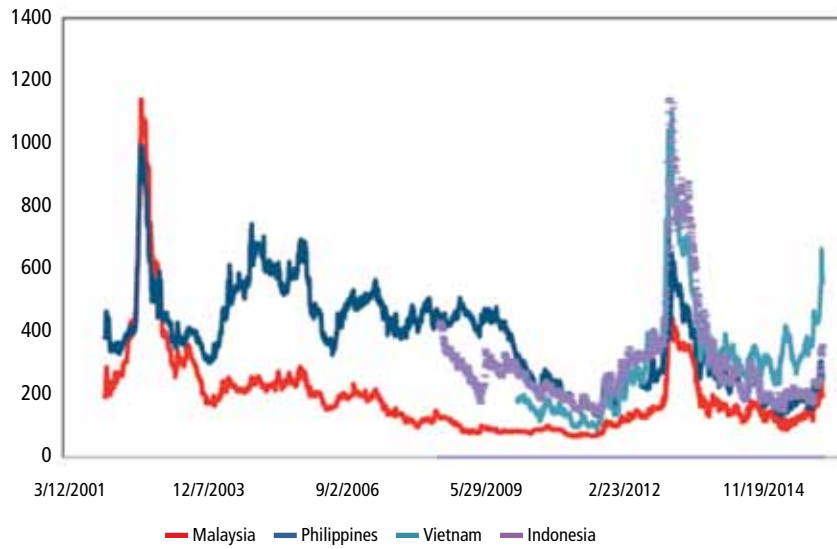
ASEAN Member States can be classified into three groups according to their debt-to-GDP ratios in 2010. Indonesia, Cambodia, and Brunei Darussalam⁵³ have debt-to-GDP ratios lower than 30 percent, and are the least indebted countries in the ASEAN region. Five countries show relatively moderate debt levels in 2010. Myanmar, Thailand, the Philippines have debt-to-GDP ratios between 40 percent and 50 percent, while the debt-to-GDP ratio for Viet Nam and Malaysia ranges between 50 percent and 55 percent. According to this indicator of debt position, most ASEAN Member States seem to have room for self-finance through debt, and to varying degrees to self-finance not only post disaster reconstruction activities, but also short-term recovery activities. On the other hand, the self-finance capacity of the most indebted countries in the region, Lao PDR and Singapore, whose debt-to-GDP ratios were 62 percent and 96 percent in 2010, might be more compromised (Figure A10.2). It is important to note that debt-to-GDP ratio is only one indicator of the financial soundness of governments, and a more in depth analysis is required for an accurate characterization of ASEAN Member States' debt burden sustainability and self-finance capacity⁵⁴.

The major natural disasters that recently occurred in the ASEAN region did not seem to significantly affect the cost of borrowing, nor the governments' ability to access capital markets for Indonesia, Malaysia, and the Philippines. Government bonds issued by Indonesia had a spread of around 200 basis points over US Treasury bonds as of April 2011 (Figure A10.3). Bonds issued by Malaysia had a lower spread of 194 basis points, while those issued by the Philippines had a slightly higher spread of 245 as of April 2011. Viet Nam's EMBIG seems to be slightly higher than the rest of the countries in the region, with an EMBIG of 555 basis points over US Treasury

⁵⁴ Although Lao PDR and Singapore are the most indebted countries in the region in terms of debt-to-GDP ratios, the debt sustainability of both countries can be entirely different when taking other measures into account, such as the NPV of government debt, and the liquidity of the debt, among others.

bonds. Note that peaks observed in 1998 and 2008 were caused by the Asian financial crisis in 1998 and the 2008 global financial crisis.

Figure A10.3. Emerging market Bond Global index for ASEAN Member States, spread over US Treasury bonds (basis points)



Source: WEO

Note: EMBIG is available for four of the 10 ASEAN Member States: Indonesia, Malaysia, Philippines, and Viet Nam.

Bibliography and References

Chapter 1. Introduction

ADB. 2009. *The Economics of climate change in SEA: A regional review*. Asian Development Bank.

ASEAN Disaster Risk Management Initiative, 2010. *Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment*. December.

Francisco, J.A, 2008. 'Adaptation to climate change: needs and opportunities in Southeast Asia.' *ASEAN Economic Bulletin*, 35 (1) 7-19.

GAR, 2011. GAR Preview Platform: [http:// preview.grid.unep.ch](http://preview.grid.unep.ch) and GAR Disaster Data Platform <http://www.preventionweb.net/english/hyogo/gar/2011/en/what/ddp.html>

Noralene Uy and Rajib Shaw, 2010. 'Climate Change Adaptation in ASEAN: Actions and Challenges' in *Climate Change Adaptation and Disaster Risk reduction: Issues and Challenges. Community, Environment and Disaster Risk Management*, Volume 4, 349-368.

SEA-START RC, 2007. *Future climate projection in mainland Southeast Asia: Climate change scenario for the 21st century*. Southeast Asia System for Analysis, Research and Training Regional Center. Available at <http://www.sea-climatechange.org>

UNISDR, 2011. *HFA Progress in Asia Pacific – Regional Synthesis report 2009-2011*. National Progress Reports.

UNISDR, 2008. *Climate change adaptation and disaster risk reduction in ASEAN - Challenges and opportunities for partnership with the UN*. Position paper prepared by the Asia-Pacific regional coordination mechanism: Thematic working group on environment and disaster management. International Strategy for Disaster Reduction.

Yusuf, A. A. and Francisco, H. A. (2009) *Climate change vulnerability mapping for Southeast Asia*. Singapore: EEPSEA.

Chapter 3. Fiscal Management of Natural Disasters

ADB, 2009. *Establishment of the Asia Pacific Disaster Response Fund*. Manila: Asian Development Bank, March.

ADB, 2010. *Asian Development Outlook 2010:*

Macroeconomic Management Beyond the Crisis. Manila: Asian Development Bank, April.

ADB, 2011. *Key Indicators for Asia and the Pacific 2011*. Manila: Asian Development Bank.

Arnold, Margaret, 2008. *The role of risk transfer and insurance in disaster risk reduction and climate change adaptation*. Stockholm: Commission on Climate Change and Development, March.

ASEAN Disaster Risk Management Initiative, 2010. *Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment*. December.

Auffret, Philippe, 2003. 'Catastrophe insurance market in the Caribbean region'. *World Bank Policy Research Working Paper* No. 2963. Washington, DC: The World Bank.

Becerra, Oscar, Eduardo Cavallo and Ilan Noy, 2010. 'In the Aftermath of Large Natural Disasters, what happens to foreign aid?' *Working Papers 201018*. Manoa: University of Hawaii at Manoa, Department of Economics.

Benson, Charlotte, 1997. *The Economic Impacts of Natural Disasters in the Philippines*. *ODI Working Paper* No. 99. London: Overseas Development Institute, June

Benson, Charlotte, 2008. *Socio-Economic Perspective on the Impact of Climate Extremes on the Rice Supply Chain and Implications for Macroeconomic Planning*. Paper prepared for World Bank/ProVention Activity on Philippines: Agriculture Climate Risk Assessment in support of Philippines Climate Change Adaptation Project (P101076). Washington, DC: The World Bank.

Benson, Charlotte, 2009a. 'Developing and targeting economic and financial information in support of effective disaster risk management'. Mimeo. Geneva: United Nations Development Programme, September.

Benson, Charlotte, 2009b. 'Natural Disaster Risk Management Project Component 3Additional Financing - Notes from Mission of 9 – 20 Nov 2009'. Mimeo.

Benson, Charlotte, 2011. *Financing disaster risk reduction: A strategic framework to stimulate greater public and private investment*. Background Paper commissioned by UNISDR for the Plenary Session on The Economics of Disaster –Effective Financial Instruments to Reduce Risk, Global Platform for Disaster Risk Reduction 2011, 8-13 May 2011, Geneva. Draft. Geneva: United Nations International Strategy for Disaster Reduction, April.

Blöndal, Jón R. and Sang-In Kim, 2006. 'Budgeting in Thailand. *OECD Journal on Budgeting*, 5(3): 7-36.

Brunei NDMC, 2011. *Brunei Darussalam National progress report on the implementation of the Hyogo Framework for Action (2009-2011)*. Bandar Seri Begawan: National Disaster Management Center, Government of Brunei Darussalam, April.

Borensztein, Eduardo Eduardo Cavallo, and Patricio Valenzuela. 2008. 'Debt Sustainability under Catastrophic Risk: The Case for Government Budget Insurance.' *IMF Working Paper WP/08/44*. Washington, DC: International Monetary Fund, February.

Cambodia NCDM, 2009. *National progress report on the implementation of the Hyogo Framework for Action*

Phnom Penh: National Committee for Disaster Management, Royal Government of Cambodia, May.

Cambodia Royal Government, 2010. *Post-Ketsana Disaster Needs Assessment*. A Report prepared by the Royal Government of Cambodia with support from the World Bank, GFDRR, UN System, ADB and ADPC Under the Leadership of the Cambodian National Committee for Disaster Management. Phnom Penh, March.

Cummins, J. David, Michael Suher, and George Zanjani, 2007. *Federal Financial Exposure to Catastrophic Risk*, Working paper, July 31.

Cummins, J David and Olivier Mahul, 2008. *Catastrophe Risk Financing in Developing Countries: Principles for Public Intervention – Overview*. Washington, DC: The World Bank. Available at http://gfdr.org/docs/Track-II_Catrisk_financing_Overview_booklet.pdf

Fengler, Wolfgang, Ahya Ihsan and Kai Kaiser, 2008. 'Managing Post-Disaster Reconstruction

Finance: International Experience in Public Financial Management'. *Policy Research Working Paper 4475*. Washington, DC: Public Sector Unit, Poverty Reduction and Economic Management and Poverty Reduction and Economic Management Network, East Asia and the Pacific Region, The World Bank, January.

Ghesquiere, Francis and Olivier Mahul, 2007. 'Sovereign Natural Disaster Insurance for Developing Countries: A Paradigm Shift in Catastrophe Risk Financing'. *Policy Research Working Paper 4345*. World Bank: Latin America and Caribbean Region, Hazard Risk Management Unit and Financial and Private Sector Development Vice Presidency, Social Safety Net

Department, September.

Goldstein, Markus and Samia Amin (eds), 2008. *Data Against Natural Disasters Establishing Effective Systems for Relief, Recovery, and Reconstruction*. Washington, DC: World Bank. Available at <http://siteresources.worldbank.org/INTPOVERTY>

Resources/335642-1130251872237/9780821374528.pdf

Gurenko, Eugene N, 2009. 'An Overview of Disaster Risk Financing Instruments in the World Bank Operations.' Presentation at GFDRR sponsored BBL, Washington DC, March 4, 2009. Washington, DC: The World Bank.

Hallegatte, S, Hourcade, J.-C. and P Dumas, P, 2007. 'Why economic dynamics matter in assessing climate change damages: Illustration on extreme events,' *Ecological Economics*, Vol. 62(2), 330-340.

Hofman, David and Patricia Brukoff, 2006. 'Insuring Public Finances Against Natural Disasters—

A Survey of Options and Recent Initiatives.' *IMF Working Paper WP/06/199*. Washington, DC: Policy Development and Review Department, International Monetary Fund, August.

IMF, 2005a. 'IMF Executive Board Concludes Second Post-Program Monitoring Discussion with Indonesia'. *Public Information Notice (PIN) No. 05/38* (March 22 2005). Washington, DC: International Monetary Fund, March.

IMF, 2005b. *Indonesia: 2005 Article IV Consultation and Third Post-Program Monitoring Discussions—Staff Report; Staff Supplement; and Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Indonesia*. IMF Country Report No. 05/326. Washington, DC: International Monetary Fund, September.

IMF, 2007. *Lao People's Democratic Republic: Selected Issues and Statistical Appendix*. IMF Country Report No. 07/359. Washington, DC: International Monetary Fund, November.

Indonesia BAPPENAS and the International Donor Community, 2005. *Indonesia: Preliminary Damage and Loss Assessment – The December 26, 2004 Natural Disaster*. Jakarta: Badan Perencanaan Pembangunan Nasional (State Ministry for National Development Planning) and the International Donor Community, January.

Indonesia Government, 2005. *Master Plan for the Rehabilitation and Reconstruction of the Regions and Communities of the Province of Nanggroe Aceh Darussalam and the Islands of Nias, Province of North Sumatra*. Jakarta: Government of the Republic of Indonesia, April.

Indonesia Government Kecamatan Development Program and the World Bank, 2007. *Aceh Flood: Damage and Loss Assessment*. Jakarta: Kecamatan Development Program, Government of Indonesia and the World Bank

Indonesia BNPB et al, 2009. *West Sumatra and Jambi Natural Disasters: Damage, Loss and Preliminary Needs Assessment*. A joint report by the BNPB, Bappenas, and the Provincial and District/City Governments of West Sumatra and Jambi and international partners, October 2009. Jakarta: Badan Nasional Penanggulangan Bencana (National Disaster Management Agency) and others, October.

Indonesia BNPB, 2011. *National progress report on the implementation of the Hyogo Framework for Action (2009-2011)*. Jakarta: Badan Nasional Penanggulangan Bencana, April.

Ketkar, Suhas L and Dilip Ratha, 2007. *Development Finance via Diaspora Bonds: Track Record and Potential*. Paper presented at the Migration and Development Conference at the World Bank, Washington D.C. May 23, 2007. Washington, DC: The World Bank.

Laos Government et al, 2009. *The Ketsana Typhoon in the Lao People's Democratic Republic (September 29, 2009): Damage, Loss and Needs Assessment*. A Report prepared by the Government of the Lao PDR

with support from the World Bank, ADB, ASEAN, FAO, AusAID, GFDRR and ADPC. Vientiane: Government of the Lao PDR, November.

Laos NDMO, 2011. *Lao People's Democratic Republic: National progress report on the implementation of the Hyogo Framework for Action (2009-2011)*. Vientiane: National Disaster Management Office, Ministry of Labour and Social Welfare, May.

Linnerooth-Bayer, Joanne and Reinhard Mechler, 2009. 'Insurance against Losses from Natural Disasters in Developing Countries'. *DESA Working Paper No. 85*. ST/ESA/2009/DWP/85. New York: Department of Economic and Social Affairs, October.

Malaysia National Security Council, 2011. *Malaysia:*

National progress report on the implementation of the Hyogo Framework for Action (2009-2011). Kuala Lumpur: National Security Council, Prime Minister's Department, May.

Myanmar Relief and Resettlement Department, 2010. *Myanmar National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – interim*. Naypyidaw: Relief and Resettlement Department, Government of the Union of Myanmar, November.

OECD, 2010. *Good Practice for Mitigation and Financing Catastrophic Risks: OECD Recommendation*. Paris: Organisation of Economic Cooperation and Development, December.

Philippines Government et al, 2009. *Typhoons Ondoy and Pepeng: Post-Disaster Needs Assessment – Main Report*. Manila: Government of the Republic of the Philippines, Asian Development Bank, United Nations, World Bank and Global Facility for Disaster Reduction and Recovery,

Philippines NDCC, 2009. *Philippines National progress report on the implementation of the Hyogo Framework for Action*. Manila: Office of Civil Defense, National Disaster Coordinating Council, Government of the Philippines, May.

Philippines Senate and House of Representatives, 2010. *Republic Act No. 10121: An Act Strengthening the Philippine Disaster Risk Reduction and Management System, Providing for the National Disaster Risk Reduction and Management Framework and Institutionalizing the National Disaster Risk Reduction and Management Plan, Appropriating Funds Therefor and for Other Purposes*. Manila: Congress of the Philippines, Government of the Republic of the Philippines.

Philippines OCD- NDRRMC, 2011. *National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – interim*. Manila: Office of Civil Defense, National Disaster Risk Reduction and Management Council, Government of the Philippines, March.

Powell, Andrew and Matteo Bobba, 2006. 'Multilateral Intermediation of Foreign Aid:

What is the Trade-Off for Donor Countries?'. Working Paper 594. Washington, DC: Research Department, Inter-American Development Bank, November.

Singapore MSD, 2009. *Singapore National progress report on the implementation of the Hyogo Framework for Action*. Singapore: Meteorological Services Division, National Environment Agency, Government of Singapore, February.

Thailand DDPM, 2011. *Thailand National progress report on the implementation of the Hyogo Framework for Action (2009-2011)*. Bangkok: Department of Disaster Prevention and Mitigation, Ministry of Interior, Government of Thailand.

TCG, 2008. *Post-Nargis Joint Assessment*. A report prepared by the Tripartite Core Group comprised of Representatives of the Government of the Union of Myanmar, the Association of Southeast Asian Nations and the United Nations with the support of the Humanitarian and Development Community. Yangon: Tripartite Core Group, July.

UN, 2006. *Tsunami Thailand One Year Later: National Response and Contribution of International Partners*. Bangkok: Office of the UN Resident Coordinator, United Nations Country Team in Thailand.

Viet Nam DMC, 2010. *Viet Nam: National progress report on the implementation of the Hyogo Framework for Action (2009-2011) – interim*. Hanoi: Disaster Management Center, Ministry of Agriculture and Rural Development, September.

WFP and IFAD, 2010. *The Potential for Scale and Sustainability in Weather Index Insurance for Agriculture and Rural Livelihoods*. Rome: World Food Programme and International Fund of Agricultural Development, March.

World Bank and NDCC, 2005. *Natural Disaster Risk Management in the Philippines: Enhancing Poverty Alleviation through Disaster Reduction*. Report 33822. Manila: World Bank and National Disaster Coordinating Council.

World Bank, 2010a. *Weathering the Storm: Options for Disaster Risk Financing in Viet Nam*. Washington, DC: The World Bank, May.

World Bank, 2010b. *Mitigating the Adverse Impacts of Natural Disasters on the Philippines: A Study of Disaster Risk Financing Options*. Washington, DC: Global Facility for Disaster Reduction and Recovery, World Bank, October.

World Bank, 2010c. *Thailand Economic Review: November 2010*. World Bank Office—Bangkok

World Bank-GFDRR, 2010. *Mitigating the Adverse Impacts of Natural Disasters on the Philippines:*

A Study of Disaster Risk Financing Options. Washington, DC: Global Facility for Disaster Reduction and Recovery, World Bank, October.

World Bank and UN, 2010. *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention*. Washington, DC and New York: The World Bank and the United Nations.

World Bank, 2011a. *Indonesia: Advancing a National Disaster Risk Financing Strategy: Options for Consideration*. Jakarta and Washington, DC: Disaster Risk Financing and Insurance Program (GFDRR and GCMNB), Indonesia Country Management Unit, East Asia Finance and Private Sector Unit, East Asia Social Development Department and Global Facility for Disaster Reduction and Recovery.

World Bank, 2011b. *Thailand Economic Monitor April 2011*. Bangkok: World Bank Office, April.

World Bank, 2011c. *World Development Report 2011: Conflict, Security and Development*. Washington, DC: World Bank.

Yang, Dean, 2006. 'Coping with Disaster: The Impact of Hurricanes on International Financial Flows, 1970-2002. NBER Working Paper 12794. Cambridge, MA: National Bureau of Economic Research, December 2006.

Chapter 4. Private Catastrophe Risk Insurance Markets

Private property catastrophe insurance

AM Best (June 2011). *Special Report Viet Nam's Insurance Market Awakening to Further Change*.

AM Best, 2010. Best's special report: *Southeast Asia Life & Non-Life Market review*, February.

AXCO (retrieved 2011). Insurance Market Reports retrieved from <http://www.axco.co.uk>.

Bangkok Insurance (2011). *Annual Report 2010*.

Bank Negara Malaysia. Various data retrieved from <http://www.bnm.gov.my/>.

Brata, Aloysius Gunadi (July 2010). *Regional Development for a Disastrous Country. MPRA Paper No. 23606*. Faculty of Economics, Atma Jaya Yogyakarta University. Indonesia.

- Bugl, Werner. *Indonesia: The Recent Tsunami - A Review of the Impact And Lessons Learnt*. Asia Insurance Review. SIRC Special Issue. September 2005.
- Business Report Thailand (January 2011). 'Hedging Distribution Strategies'. Issue #4. Retrieved from <http://www.businessreportthailand.com/bancassurance-insurance-strategies-12385>.
- Cambodia Royal Government, 2010. *Post-Ketsana Disaster Needs Assessment*. A Report prepared by the Royal Government of Cambodia with support from the World Bank, GFDRR, UN System, ADB and ADPC Under the Leadership of the Cambodian National Committee for Disaster Management. Phnom Penh, March.
- Chan, David, 2008. *Underinsurance and non-insurance: a factor of Attitude, Accessibility and Affordability: An analysis of the factors contributing to underinsurance and the low penetration of insurance in Malaysia, Singapore and Viet Nam*. ANZILF Peter Corrigan Award 2008 Research Paper.
- Deh, Pak (April 2011). Malaysia: Takaful Insurance. Retrieved from <http://askpakdeh.blogspot.com/2011/04/malaysia-takaful-insurance.html>
- Deloitte, 2010. *More than one approach: alternative insurance distribution models in Asia Pacific*.
- Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 *on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II)*. Official Journal of the European Union, December 2009.
- Ernst and Young, 2011. *World Takaful Report*.
- Eugene Gurenko, 2011, 'Strengthening FSA's Reinsurance Regulatory Capabilities'. Washington DC: World Bank.
- Excerpts from Ministry of Economy and Finance Royal Government of Cambodia, 2004. *Insurance Developments In Cambodia*.
- Fitch Ratings (December 2010). *Fitch Revises Malaysian Re's Outlook to Positive; Maintains Mrt's Outlook at Stable*.
- Fitch Ratings-Singapore/Hong Kong.
- Fitch Ratings, (July 2011). *Indonesia Full Rating Report: PT Asurani Maipark Indonesia*.
- Fox-Pitt Kelton. (April 2005). *Thai Non-Life Insurance*.
- Gavin, James (2010). *Building Capacity For Sharia Supervision*. Malaysia International Islamic Financial Centre.
- General Insurance Association of Cambodia. 2006. *Profile 2006*.
- General Insurance Association of Cambodia. Various data retrieved from <http://www.giac.com.kh/>.
- Government of the Republic of the Philippines, the Asian Development Bank, European Commission, United Nations, the World Bank Group and others (November 2009). *Philippines Typhoons Ondoy And Pepeng: Post-Disaster Needs Assessment*.
- Government of the Union of Myanmar, ASEAN, UN (December 2008). *Post Nargis Recovery and Preparedness Plan*.
- Guy Carpenter, 2010. *Asia Pacific Catastrophe Report October 2010*.
- Guy Carpenter, 2011. *Succeeding under Solvency II*. September.
- Herbert Smith, 2010, *Southeast Asia insurance market e-bulletin, November*
- IFC, 2010. *Weather Index Insurance for Maize Production in Eastern Indonesia, a Feasibility Study*.
- Institut Bank-Bank Malaysia (April 2010). *Financial Sector Talent Enrichment Programme, Insurance & Takaful Handbook*.
- Insurance industry stakeholders through GIA, TLAA (2007). Commentary. *Risk Based Capital Framework for Insurance Business in Thailand*.
- International Association of Insurance Supervisors, 2010. *Insurance Core Principle (ICP) material adopted: ICP 17 Capital Adequacy, October*.
- Islamic Financial Services Board and International Association of Insurance Supervisors, 2006.
- Issues in Regulation and Supervision of Takaful (Islamic Insurance), August.
- Kingdom of Cambodia, Royal Government, 2001. Sub-Decree on Insurance. Phnom Penh, October.
- KPMG, 2011. *Evolving Insurance Regulation: Asia Pacific Supplement*. March.
- Laubuan Offshore Financial Services Authority (January 2006). *Guidelines on General Reinsurance Arrangements*.

Malaysian Re (April 2011). *'Evolution Of Reinsurance & Retakaful Industry'*. Malaysia.

Marsh (January 2011). *Regional Overview (Asia)*. Retrieved from <http://www.insurancemarketreport.com/Reports/tabid/8078/ID/986/Regional-Overview.aspx>.

Maung Nynt, Khin (June 2009). 'Export of Services and Economic Growth: Needs and Opportunities for Myanmar'. Mae Fah Luang University.

Milliman (June 2011). Asia e-alert: *Risk Based Capital Guidelines for Takaful Operators in Malaysia*.

Ministry of Finance, Viet Nam. Viet Nam Financial Review (May 2008). Covering bases: The Maturation of Insurance.

Mohamed, Hafiz, 2006. 'Takaful in Asean: Gaining Momentum With Malaysia Leading the Way'. Middle East Insurance Review, September.

Monetary Authority of Singapore (MAS) (2004-2011). MAS Notices 114, IA/PP-N03.1, IA/PP-N01.1.

Monetary Authority of Singapore (MAS). Various data retrieved from <http://www.mas.gov.sg/>.

National Assembly of the Kingdom of Cambodia, 2000. Insurance Law of the Kingdom Of Cambodia, Adopted by the

National Assembly of the Kingdom of Cambodia on 20th June, 2000 at the 4th Session, 2nd Legislation.

National Insurance Company Berhad, Brunei Darussalam. *2009 Annual Report*.

Office of the Insurance Commission (OIC) Thailand. Various data retrieved from <http://www.oic.or.th/en/home/index.php>.

Ortoritas Jasa Keuangan (Indonesian insurance regulator). Various data retrieved from <http://www.depkeu.go.id/Ind/>.

Philippine Insurance and Reinsurance Association (2010-2011). Official newsletters, chairman's report. Retrieved from <http://www.pirainc.org/>.

Philippines Insurance Commission. Various data retrieved from <http://www.insurance.gov.ph/>.

Phnom Penh Securities Plc, 2011. *Research Paper Cambodia Insurance Sector*. May.

Prudential Financial Policy Department, Bank Negara Malaysia. 2008. *Risk-Based Capital Framework for Insurers [Revised - Version 2.0]*, November.

PT. Asuransi Maipark. Various data retrieved from <http://www.maipark.com/>.

Republic of the Philippines, Department of Finance (2005 - 2009), Insurance Commission. Circular Letters No. 5-2005, 22-2009, 24-2006, 29-2006, 39-2006, 8-2007. Manila.

Republic of the Philippines, Department of Finance (2006). Department Order 27-06. Manila.

Republic of the Philippines, Department of Finance (2006-2010), Insurance Commission. Insurance Memorandum Circulars 7-2006, 1-2010. Manila.

Republic of the Philippines, Department of Finance (2010), Insurance Commission. *Annual Report 2009*. Manila.

Risk Management Solutions Ltd, 2006. *Managing Tsunami Risk in the Aftermath of the 2004 Indian Ocean Earthquake & Tsunami*.

Rossi, Vanessa. 2010. *The Challenges and Opportunities for Financial Services in Indonesia*. City of London Corporation and Chatham House. July.

Russin & Vecchi (May 2010). *Insurance Law & Regulation Viet Nam*. Ho Chi Min City.

Standard and Poor's (October 2003). *Ratings Direct - Thai Reinsurance Public Co. Ltd*.

Swiss Re (December 2010). *Sigma No 2/2010 World Insurance in 2009 Statistical Appendix*.

Swiss Re (February 2011). *Sigma No 1/2011 Natural Disasters and Man Made Catastrophes in 2010*.

Thai Reinsurance Public Company Limited (2011). *Annual Report 2010*.

The Board of Directors of MNRB Holdings Berhad (MNRB) (December 2009). Announcement. Reference No: MN-091231-38343. Subject : Voluntary Cessions (VC) to Malaysian Reinsurance Berhad.

World Bank, 2010a. *Weathering the Storm: Options for Disaster Risk Financing in Viet Nam*. Washington, DC: The World Bank, May.

Agricultural insurance

AIT-UNEP RRC.AP. 2011. *Assessment of capacity gaps and needs in South East Asia Countries in addressing impacts, vulnerability and adaptation to climate change*. Regional climate change adaptation knowledge platform

for Asia. Asian Institute of Technology-United Nations Environment Programme Regional Resource Centre for Asia and the Pacific (AIT-UNEP RRC.AP). July 2011.

AonBenfield 2011. *Thailand Rice Insurance. Thailand Case Study in conjunction with the World Bank 15 August 2011.*

EFOS 2011. Agricultural Based Yield Index Insurance (ARBY). Pas-Pas-KLARO. Enhancement of Food Security (EFOS)-Micro Insurance. GIZ in collaboration with PCIC Tacloban, Leyte.

FAO. 2011 (forthcoming). *Agricultural Insurance in Asia and the Pacific Region*. Regional Office for Asia and the Pacific (RAPA), Food and Agriculture Organization of the United Nations (FAO)

Hazell, P.B.R. 1992. "The appropriate role of agricultural insurance in developing countries". *Journal of International Development* Vol. 4, No.6: 567–581.

Hazell, P.B.R., C. Pomareda, and A. Valdes. 1986. *Crop insurance for agricultural development: Issues and experience*. Published for the International Food Research Institute, The John Hopkins University Press, Baltimore and London.

Mahul, O., and C.J. Stutley. 2010. *Government support for agricultural insurance: Challenges and options for developing countries*. The World Bank, Washington, D.C.

Solloway, R. 2010. *Market overview*. Presentation for Aon Benfield Agricultural Insurance Conference, Beijing, 2010.

Allianz AG, GTZ, and UNDP Public Private Partnership, 2006. *MicroInsurance Demand and Market Prospects*. Lao People's Democratic Republic, August 2006

FAO. 1986. Crop insurance in Asia: Report on regional expert consultation on crop insurance programmes and policies in Asia, held in Tianjin, People's Republic of China, 1–5 April 1986. Regional Office for Asia and the Pacific (RAPA), Food and Agriculture Organization of the United Nations (FAO) and Asian and Pacific Regional Agricultural Credit Association (APRACA), Bangkok.

FAO. 1991. *Crop insurance compendium 1991*. Marketing and Credit Service Agricultural Services Division, FAO, Rome.

GTZ. 2009. Development of an index-based micro flood insurance product in Indonesia: a public-private partnership Munich Re & GTZ - Lessons learnt. Bonn, Germany.

IFC, 2010. *Weather Index Insurance for Maize Production in Eastern Indonesia: A Feasibility Study*. International Finance Corporation, World Bank Group, supported by Australia Indonesia Partnership, Kemitraan Australia Indonesia

Itturioz, R. 2009. *Agricultural Insurance*. Primer Series on Insurance 12. The World Bank, Washington D.C.

Itturioz, R. 2010. *Understanding agricultural reinsurance. Insurance for the poor*. The World Bank, Washington D.C.

Lai Poong Shen. 2010. *Agricultural insurance: Positioned for growth – Malaysian perspective*. Presented at International Agricultural Insurance Conference 18–20 April 2010, Beijing.

Manila Observatory (2005), *Mapping Philippine Vulnerability to Environmental Disasters*.

Martirez, H, W. 2009. *Micro insurance, climate change and agriculture as sustainable measures for risk management*. Presented to the Community of Practice for Agriculture, Rural Development and Food Security, Asian Development Bank, 22 October 2009.

Pasaribu, S. M. 2010. *Developing rice farm insurance in Indonesia*. Presented at the International Conference on Agricultural Risk and Food Security 2010. Agriculture and Agricultural Science Procedia 1: 33–41.

PCIC. 2006. *Agricultural insurance: The Philippines experience*. Paper presented by the Philippines Crop Insurance Corporation (PCIC) to the Asia-Pacific Organization Conference, New Delhi, 15 October 2006.

Phnom Penh Post 2011. *Micro-insurance rules nearly finished*. 26 May 2011

PICC. 2010. *Introduction to China Agricultural Insurance Development*. People's Insurance Company of China, Property & Casualty.

Quang Hung, N. 2010. *Agricultural insurance in Viet Nam: Current situation and the pilot project*, presented at AonBenfield 2010 conference Beijing.

Rao, K.N. 2010. *Agricultural Insurance – Indian Experience*. AIC presentation to the International Agriculture Insurance Conference, 18-20 April 2010, Beijing

Sompo Japan Insurance Inc (2011) *Increase in applications for Weather Index Insurance for Thai Farmers*, 24 August 2011.

World Bank, 2005. *Natural Disaster Hotspots: A Global Risk Analysis*. Disaster Risk Management Series no. 5, 34423. The World Bank, Washington D.C.

World Bank, 2007. *China: Innovations in agricultural insurance. Promoting access to agricultural insurance for small farmers*. Sustainable Development, East Asia and Pacific region, Finance and Private Sector Development, The World Bank, June 2007.

World Bank, 2009. *Agricultural insurance feasibility study for Nepal*. Report No. 46521-NP, Finance and Private Sector Development Unit, South Asia Region, The World Bank, Washington, DC.

World Bank. 2010. *Agricultural insurance in Bangladesh: Promoting access to small and marginal farmers*. Draft Final Report. The World Bank, Washington, DC.

World Bank. 2010b. *Weathering the storm: Options for disaster risk financing in Viet Nam*, GFDRR, The World Bank, Washington, DC.

World Bank 2010c. *Agricultural Insurance in Latin America: Developing the Market*. The World Bank, Washington D.C. December 2010.

Yimlamai, A. 2010. *Agricultural weather index insurance in Thailand*. BAAC, July 2010

Disaster microinsurance

Alip, J., Navarro, E., & Catibog, M. (2009). *Status of Microinsurance in Southeast Asia: The cases of Cambodia, the Philippines, and Viet Nam*. Bangkok, Thailand: Asia Pacific Rural and Agricultural Credit Association.

Allianz Group. (2010). Learning to insure the poor: Microinsurance report.

Angove, J., & Tande, N. (2011). *A business case for microinsurance: An analysis of the profitability of microinsurance for five insurance companies*. Geneva, Switzerland: International Labor Office.

Bandel, C. (2011, April 6). Holcim uses cut-price insurance to lure homebuilders in emerging markets. *Bloomberg News*. Retrieved from <http://www.bloomberg.com/news/2011-04-06/holcim-uses-cut-price-insurance-to-tap-emerging-markets-clients.html>

Banking with the Poor and SEEP Network. (2008). *Microfinance Industry Report: Viet Nam*.

Chiong, V. (2010). Microinsurance in the Philippines and its Regulation. Speech presented at 6th International Microinsurance Conference 2010, Hotel Intercontinental, Manila, Philippines.

Churchill, C. (Ed.). (2006). *Protecting the poor: A microinsurance compendium*. Geneva, Switzerland: International Labor Office & Munich Re Foundation.

General Insurance Association of Malaysia. 2010. PIAM Annual Report 2010. Retrieved from <http://www.piam.org.my/annual/2010/005.htm>

GlobalAgRisk Inc. (2011). Pre-feasibility: Earthquake risk and index-based insurance for Indonesia.

Hintz, M. (2010). The 100 million dollar baby, successful scale-up of Allianz micro- endowments. Speech presented at 6th International Microinsurance Conference 2010, Hotel Intercontinental, Manila, Philippines.

International Association of Insurance Supervisors (IAIS) & CGAP Working Group on Microinsurance. (2007). Issues in regulation and supervision of microinsurance.

International Association of Insurance Supervisors (IAIS) & CGAP Working Group on Microinsurance. (2010). Issues paper on the regulation and supervision of mutuals, cooperatives and other community-based organizations in increasing access to Insurance Markets.

Kittikanya, Charoen (2009, Nov 19). Muang Thai tries microinsurance. *Bangkok Post Business*. Retrieved from <http://www.bangkokpost.com/business/economics/27684/muang-thai-tries-micro-insurance>

Kunmakara, M. (2011, May 20). Microinsurance rules nearly finished. *Phnom Penh Post*. Retrieved from <http://www.phnompenhpost.com/index.php/2011052049250/Business/micro-insurance-rules-nearly-finished.html>

Kunzemann, Thilo (2010, May 27). Cyclone Nisha Batters India. Retrieved from <http://knowledge.allianz.com/?424/allianz-bajaj-care-cyclone-nisha-microinsurance>

Lloyds and The MicroInsurance Centre. (2010). Lloyd's 360° Risk Insight: Insurance in developing countries: Exploring opportunities in microinsurance.

McCord, M. J., Ramm, G., & McGuinness, E. (2006). Microinsurance Demand & Market Prospects – Lao People's Democratic Republic. Allianz AG, The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH & United Nations Development Programme (UNDP).

Munich Re Singapore Microinsurance Team (2011). Nat-Cat Protection Philippines. Speech.

Portula, Dante (2011). Philippines Model of Microinsurance Inclusion: Process and Success Factors of Public-Private Collaboration. Speech presented at 5th Asian Conference on Microinsurance, Le Meridien Jakarta, Indonesia.

Qureshi, Z. and Reinhard, D. (Eds.). (2010). Proceedings from the 6th International Microinsurance Conference 2010. Munich Re Foundation.

Roth, J., McCord M. J., & Liber, D. (2007). *The Landscape of microinsurance in the world's 100 poorest countries*. Appleton, WI: The Microinsurance Centre, LLC.

Simanjuntak, K. (2011). Earthquake Microinsurance for Indonesia. Speech. General Insurance Association of Indonesia.

Sompo Japan Insurance Inc. (2011, July 19). Applications for Weather Index Insurance for Thai Farmers- Expansion of Sales Area to Five Provinces Increase Number of Insurances Sold to 6,173. Retrieved from http://www.sompo-japan.co.jp/english/about/csr/topics/e_20110719.html

Swiss Reinsurance Co., Ltd. Economic Research and Consulting. (2010). Microinsurance for 4 billion people. Sigma study no. 6.

Ussavasodhi, Santibhap (2010, Feb 28). Special Report: Micro-insurance – macro ambition. *National News Bureau of Thailand Public Relations Department*. Retrieved from <http://thainews.prd.go.th/en/news.php?id=255302280025>

World Bank. (2011). *Poverty Indicators* [Data file]. Retrieved from <http://data.worldbank.org/topic/poverty>



Global Facility for Disaster Reduction and Recovery

1818 H Street, NW
Washington, DC 20433, USA

Telephone: 202-458-0268
E-mail: GFDRR@worldbank.org
Facsimile: 202-522-3227



Special thanks and appreciation are extended to the partners who support GFDRR's work to protect livelihood and improve lives: ACP Secretariat, Arab Academy for Science, Technology and Maritime Transport, Australia, Austria, Bangladesh, Belgium, Brazil, Canada, China, Colombia, Denmark, Egypt, European Commission, Finland, France, Germany, Haiti, India, Indonesia, International Federation of Red Cross and Red Crescent Societies, Ireland, Islamic Development Bank, Italy, Japan, Korea, Republic of, Luxembourg, Malawi, Malaysia, Mexico, the Netherlands, New Zealand, Nigeria, Norway, Portugal, Saudi Arabia, Senegal, Solomon Islands, South Africa, Spain, Sweden, Switzerland, Togo, United Kingdom, United Nations Development Programme, United States, UN International Strategy for Disaster Reduction, Vietnam, the World Bank, and Yemen.