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Economic and Social Commission for Asia and the Pacific

Building Resilience to Natural Disasters and Major Economic Crises

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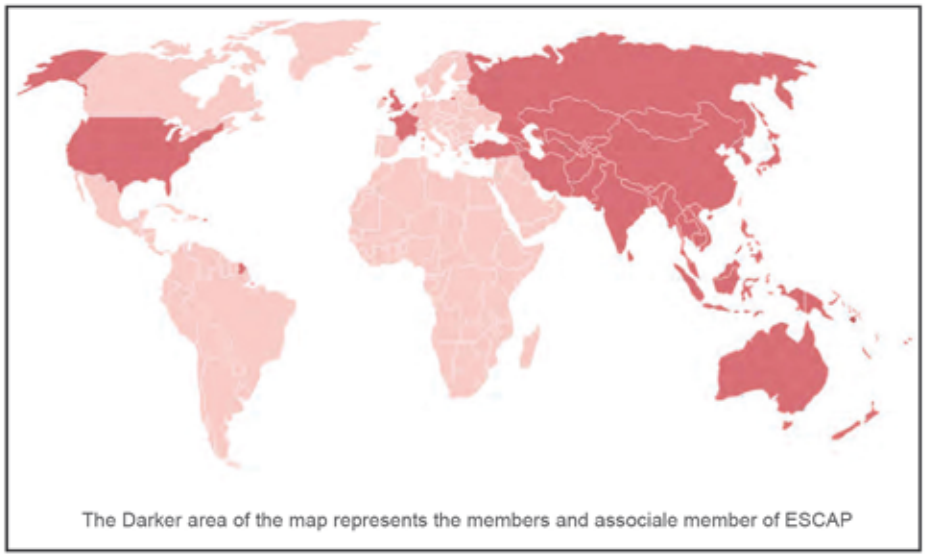

The Darker area of the map represents the members and associale member of ESCAP

Publication concept and design by Marie Ange Sylvain-Holmgren
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FOREWORD

Building resilience to multiple shocks is one of the most pressing contemporary development challenges faced by Asia and the Pacific. Economic crises and natural disasters are on the rise and know no boundaries; they straddle wide geographic areas, spread across all sectors of economic activity, and endanger our communities. For communities still living in fragile and conflict-affected States, each shock erodes their capacity to cope with the next disaster or crisis on the horizon. They are twice as likely to be undernourished and their children three times as likely to be out of school, while they receive less than half the amount that Governments in other countries spend on education, health and security. These communities are stuck in life-long vulnerability traps from which it is very difficult to break out.

Five years ago, global economies plunged into deep crises as they struggled under the weight of the most severe economic slowdown since the 1930s. In Asia and the Pacific, the financial crisis converged with the food and fuel crises, which compounded the damage inflicted on the livelihoods of millions of people across the region. Furthermore, in the past few years devastating earthquakes, floods, typhoons, droughts and other natural disasters have wreaked havoc throughout the region, causing enormous loss of lives, and widespread damage to livelihoods, property and local economies. In its wake, climate change has the potential to result in even more disasters among our most vulnerable communities.

Increased connectivity and interdependence through trade and financial flows, dense transport networks and speed of communications, while creating unprecedented opportunities, have also amplified the effects of these multiple shocks. Floods in Thailand, for example, triggered supply chain disruptions across the region, and severe droughts that covered large swathes of China and Central Asia led to higher food prices for millions of people. Meanwhile, turmoil in major financial markets continued to adversely affect people living in far-flung villages in our region who have never even visited a bank.

Although most economies in the region have been fortunate enough to recover relatively quickly from recent economic crises and stabilize towards long-term growth rates, this seemingly visible evidence of economic resilience masks the underlying vulnerabilities of poor and disadvantaged communities. For poor families who struggle daily under the reality of permanently higher food and fuel prices, who are unable to replace the loss of income from jobs that have disappeared and who have inadequate access to systems of social protection, the crises and disasters of years past are not distant memories. The lasting legacy of multiple shocks - food insecurity and rising maternal and child malnutrition, reduced public expenditures on health and education, compromised livelihood opportunities and underemployment - all affect the quality of human development long after GDP growth rates and per capita income have regained their footing. The gap between visible resilience and hidden forms of vulnerability among the "bottom billion" remains very large.

The lessons of the past five years have led to this new normal. The global financial crisis, food and fuel crises, and the consequences of natural disasters may seem to be unrelated, but they are the result of shocks applied to complex systems that interlink social, economic and environmental factors. They highlight the increasing interrelation of economies that have been brought together by globalization, which binds systems and economic activities in locations that were previously unconnected.

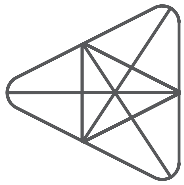
Experiences from the region and around the world have proven that disaster prevention and preparedness is far more effective and less costly than recovery and relief efforts. Despite this fact, policymakers are largely in uncharted territory when it comes to integrating crisis mitigation and disaster risk reduction measures into macroeconomic policy planning. As policymakers turn to building resilience as a key pillar of sustainable development for the Asia-Pacific century, they must factor in the impacts of natural disasters, balance short-term macroeconomic stability with long-term development and build capacity across all sectors and levels of government, if they are to successfully manage simultaneous shocks of unknown origin and

magnitude. These are not easy tasks. They call for systems thinking, applying new and more sophisticated decision-making tools and above all, overcoming inherent limitations in addressing risks and uncertainties.

It is my hope that this report will provide a significant contribution to the regional policy dialogue that addresses the pressing question of how people, organizations, institutions and policymakers can work together to weave resilience into the everyday fabric of our social and economic lives. A range of complex factors have impacts on levels of resilience and risks sown by economic crises and natural disasters, including health and education levels, political conflict and the legacy of violence in conflict-affected States. The focus on resilience is crucial in the current environment because multiple shocks are increasingly becoming the new normal for the region. The threats of tomorrow will come at anytime, from anywhere, without warning, and with increasing frequency. Countries that build systems of resilience to withstand, adapt to, and recover from major economic crises and natural disasters are investing in the security of our region's most valuable resource – its people.

Noeleen Heyzer
Under-Secretary-General of the United Nations and
Executive Secretary, United Nations Economic and
Social Commission for Asia and the Pacific

APRIL 2013



ACKNOWLEDGEMENTS

Under the overall direction of Noeleen Heyzer, Executive Secretary of ESCAP, this report was prepared by a team led by Shamika Sirimanne, Director of the Information and Communications Technology and Disaster Risk Reduction Division. The core team consisted of Masato Abe, Patrik Andersson, Witada Anukoonwattaka, Derek Atkinson, Tiziana Bonapace, Clovis Freire, Shaina Hasan, Kelly Hayden, Rémi Lang, Dominic Leong, Manuel Mejido, Linda Vega Orozco, Teemu Puutio, Nokeo Ratanavong, Madan B. Regmi, Mari Sawai, Ermina Sokou and Sanjay Kumar Srivastava.

The team appreciates the valuable support provided by the Senior Management Team of ESCAP, with special thanks to Shun-ichi Murata, Deputy Executive Secretary of ESCAP, Anisuzzaman Chowdhury, Director of the Macroeconomic Policy and Development Division, Dong-Woo Ha, Director of the Transport Division, Nanda Krairiksh, Director of the Social Development Division and Ravi Ratnayake, Director of the Trade and Investment Division who made substantive contributions to the report.

The following ESCAP staff members provided inputs, comments and suggestions: Shuvojit Banerjee, Alf Blikberg, Ksenia Glebova, Eric Hermouet, Alberto Isgut, Beverly Jones, Nagesh Kumar, Daniel Jeongdae Lee, Timothy Wai Leong Loh, Hongpeng Liu, Laura Lopez, Mia Mikic, Oliver Paddison, Hitomi Rankine, Isabel Pereira Rodrigues, Marco Roncarati, Maria Semenova, Harumi Shibata, Robert Spaull, Donovan Storey, Yusuke Tateno, Ram Tiwaree, Keran Wang, Natalja Wehmer and Jenny Yamamoto. The following individuals also provided inputs: Linghe Ye, Nitin Kumar Tripathi, Associate Dean of the Asian Institute of Technology (AIT), and Lal Samarakoon, Director, Geoinformatics Center, AIT.

The following experts prepared technical background papers for the Study: Benigno Balgos, Center for Disaster Preparedness, Philippines, and M.G. Quibria, Professor, Department of Economics, Morgan State University.

The following individuals provided research support: Han Du, Wei Jei, Iris Lim, Francisco Morino, Chitrini Mozumder, Jonghyo Nam, Suhyon Oh, Yuzuru Sato, Shweta Sinha, Zulfiya Suleimenova, Guibo Sun, Kento Yoshimura, Xun Zhang and Ruilin Zhu.

The report benefitted from the comments and suggestions of an external peer review meeting held in Bangkok on 26 and 27 February 2013. Participants in the meeting were a group of policymakers and scholars: Debapriya Bhattacharya, Distinguished Fellow, Centre for Policy Dialogue, Bangladesh; Wisit Chaisrisawatsuk, Assistant Professor, School of Development Economics, National Institute Development Administration, Thailand; Karin Fernando, Senior Professional, Centre for Poverty Analysis, Sri Lanka; Santosh Kumar, Professor and Head, Policy, Planning and Cross-Cutting Issues Division, National Institute of Disaster Management, India; Louis Lebel, Director, Unit for Social and Environmental Research, Chiang Mai University, Thailand; Antonio Limuaco Fernandez, Expert, Earthquakes and Megacities Initiatives, Philippines; Tetsuo Miyairi, General Manager, SOMA Construction Office, Tohoku Branch, East Nippon Expressway Company Limited, Japan; Thusitha Pilapitiya, Policy Advisor, Democratic Governance, Asia-Pacific Region, United Nations Development Programme, Thailand; and German Velasquez, Senior Regional Coordinator, United Nations Office for Disaster Risk Reduction, Thailand. The report also benefited from review and comments by Surya Raj Acharya, Senior Research

Fellow, Institute for Transport Policy Studies, Tokyo, and Shinya Hanaoka, Associate Professor, Tokyo Institute of Technology.

Asia-Pacific Research and Training Network on Trade (ARTNeT) advisors, John Gilbert, Sisira Jayasuriya, and Debaphrya Bhattacharya provided comments and suggestions on various chapters of the report.

Logistical support in processing and administration was provided by Suraphong Chuachamsai and Narada Kalra. Support from Patricia Budiyanto, Tarnkamon Chantarawat, Preyawan Chobpanich, Sukanitt Jaruveshsuti, Pradtana Limkrailassiri, Kanjana Sibunnanon on proofreading is much appreciated.

Substantive editing of the manuscript was undertaken by Peter Stalker. The graphic concept , design and layout was created by Marie-Ange Sylvain-Holmgren, assisted by Paula Simone do Amaral Praxedes, and printing services were provided by PK Printers.

Francyne Harrigan, Chief Strategic Communications and Advocacy Services, coordinated media communications.

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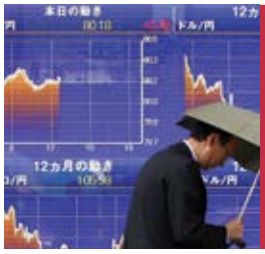

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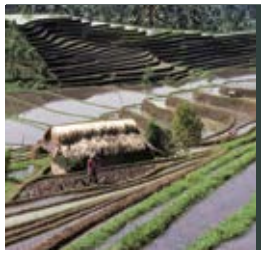

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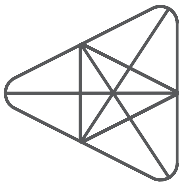

TABLES

ABBREVIATIONS

ACEDRR	Advanced Centre for Enabling Disaster Risk Reduction
ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
ADPC	Asian Disaster Preparedness Center
AMRO	ASEAN+3 Macroeconomic Research Office
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASEAN+3	ASEAN plus China, Japan and the Republic of Korea
BNPB	Badan Nasional Penanggulangan Bencana (National Agency for Disaster Management)
BRACE	Building Resilience and Awareness of Metro Manila Communities to Natural Disaster and Climate Change Impacts
BRICS	Brazil, Russian Federation, India, China and South Africa
C3	Makati Command, Control and Communications Centre
CCRIF	Caribbean Catastrophe Risk Insurance Facility
CMI	Chiang Mai Initiative
CMIM	Chiang Mai Initiative Multilateralization
CRA	Contingent Reserve Arrangement
CRED	Center for Research on the Epidemiology of Disasters
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DESA	Department of Economic and Social Affairs
DFID	Department for International Development
DRM	disaster risk management
DRR	disaster risk reduction
D-SIBs	domestic systemically important banks
EC	European Commission
ECAFE	Economic Commission for Asia and the Far East
ECLAC	Economic Commission for Latin America and the Caribbean
EM-DAT	Emergency Events Database
ERN-AL	Evaluación de Riesgos Naturales - América Latina
EROI	Energy return on investment
ESCAP	Economic and Social Commission for Asia and the Pacific

ETIC	Entrepreneurial Training for Innovative Communities
ERRA	Earthquake Reconstruction and Rehabilitation Authority
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign direct investment
FSB	Financial Stability Board
GDP	gross domestic product
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
GMS	Greater Mekong Subregion
G-SIBs	global systemically important banks
GVC	global value vhains
HDD	hard disk drives
HFA	Hyogo Framework for Action
ICIMOD	International Centre for Integrated Mountain Development
ICT	Information and Communications Technology
IDB	Islamic Development Bank
IEA	International Energy Agency
IEC	Information, education and communication
IFRC	International Federation of Red Cross and Red Crescent Societies
IMF	International Monetary Fund
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
ITU	International Telecommunication Union
KA	Kahua Association
LDCs	least developed countries
LECReD	Low Emission Climate Resilient Development
LLDCs	landlocked developing countries
MDG	Millennium Development Goals
MIMU	Myanmar Information Management Unit
NDRRMC	National Disaster Risk Reduction and Management Council
NEMA	National Emergency Management Agency
NGO	non-governmental organization
NRCNA	National Research Council of the National Academies
NREGA	Mahatma Gandhi National Rural Employment Guarantee Act
OCHA	Office for the Coordination of Humanitarian Affairs

OECD	Organization for Economic Co-operation and Development
OFDA	Office of United States Foreign Disaster Assistance
OMC	open method of coordination
PICs	Pacific island countries
PNPM	Program Nasional Pemberdayaan Masyarakat (National Program for Community Empowerment)
PPP	public-private partnership
RCEP	Regional Comprehensive Economic Partnership
RESAP	Regional Space Applications Programme for Sustainable Development
RIO+20	United Nations Conference on Sustainable Development
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
SAARC	South Asian Association for Regional Cooperation
SIDS	small island developing States
SMEs	small- and medium-sized enterprises
SOPAC	Applied Geoscience and Technology Division, Secretariat of the Pacific Community
TASIM	Trans-Eurasian Information Super Highway
TCIP	Turkish Catastrophe Insurance Pool
TEEB	The Economics of Ecosystems and Biodiversity
TNC	transnational corporation
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
UNCTAD	United Nations Conference on Trade and Development
UNISDR	United Nations Office for Disaster Risk Reduction
UNITAR	United Nations Institute for Training and Research
UNU	United Nations University
USAID	United States Agency for International Development
WB	World Bank
WEF	World Economic Forum
WHO	World Health Organization
WMO	World Meteorological Organization
WTO	World Trade Organization

EXPLANATORY NOTES

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The term "developing ESCAP region" in this publication excludes Australia, Japan, New Zealand and North and Central Asian economies from the above-mentioned grouping. Non-regional members of ESCAP are France, the Netherlands, the United Kingdom of Great Britain and Northern Ireland and the United States of America.

The term "East and North-East Asia" in this publication refers collectively to: China; Hong Kong, China; Democratic People's Republic of Korea; Japan; Macao, China; Mongolia; and Republic of Korea.

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The term "Central Asian countries" in this publication refers collectively to Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

The term "Pacific" in this publication refers collectively to American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The term "South and South-West Asia" in this publication refers collectively to Afghanistan, Bangladesh, Bhutan, India, the Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka and Turkey.

The term "South-East Asia" in this publication refers collectively to Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste and Viet Nam.

The term "countries with special needs" in this publication refers collectively to least developed countries, landlocked developing countries and small island developing States in the Asia-Pacific region as indicated below.

13 least developed countries:

Afghanistan,* Bangladesh, Bhutan,* Cambodia, Kiribati,** Lao People's Democratic Republic,* Myanmar, Nepal,* Samoa,** Solomon Islands,** Timor-Leste, ** Tuvalu** and Vanuatu**

(*also a landlocked developing country, **also a small island developing State);

12 landlocked developing countries:

Afghanistan,* Armenia, Azerbaijan, Bhutan,* Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic,* Mongolia, Nepal,* Tajikistan, Turkmenistan and Uzbekistan.

(*also a least developed country)

16 small island developing States:

Cook Islands, Fiji, Kiribati,* Maldives, Marshall Islands, Micronesia (Federated States of), Nauru, Niue, Palau, Papua New Guinea, Samoa,* Solomon Islands,* Timor-Leste,* Tonga, Tuvalu* and Vanuatu.*

(*also a least developed country)

Values are in United States dollars unless specified otherwise.

The term "billion" signifies a thousand million. The term "trillion" signifies a million million. Reference to "tons" indicates metric tons.

In the tables, two dots (..) indicate that data are not available or are not separately reported, a dash (–) indicates that the amount is nil or negligible, and a blank indicates that the item is not applicable.

In dates, a hyphen (-) is used to signify the full period involved, including the beginning and end years, and a stroke (/) indicates a crop year, fiscal year or plan year.

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EXECUTIVE SUMMARY

AN ERA OF OVERLAPPING SHOCKS

A COMPREHENSIVE RESPONSE TO NATURAL DISASTERS AND ECONOMIC CRISES IN ASIA AND THE PACIFIC

The Asia-Pacific region has been battered in recent years by a relentless series of shocks. Some have been related to natural disasters, such as earthquakes or droughts or floods. Others, such as the 2008 financial crisis, have been caused by convulsions in global markets. Still others, such as rocketing food and energy prices, have been the result of a complex combination of shocks.

The traditional approach has been to consider such events individually. This is increasingly unrealistic. Governments across the region often find themselves dealing with overlapping shocks that demand a more comprehensive and systemic approach to building resilience. Resilience in this sense means the capacity of countries to withstand, adapt to, and recover from natural disasters and major economic crises – so that their people can continue to lead the kind of life they value.

For many policymakers this is new territory: they are more accustomed to focusing on problems in particular economic or social sectors rather than treating them as systemic wholes. Even more difficult, they have to take decisive action now about events that may or may not take place. By definition, this is a step into the unknown. On the whole, human beings are not very good at assessing the likelihood of what might happen in the future. Moreover, politicians know that they will be blamed for any such decisions that work out badly while receiving little credit for low-key actions that quietly avert disaster.

The risks they find easiest to identify are those from events that occur fairly regularly. Bangladesh, for example, is accustomed to coping with floods and cyclones and has invested in disaster risk reduction – in flood monitoring, for example, and forecasting and early warning systems. Other natural hazards, such as earthquakes and tsunamis, are far less predictable. Economic shocks may also come as a bolt out of the blue: the collapse of a United States investment bank that helped trigger the 2008 global financial crisis had been considered highly improbable.

To add to the uncertainty, a single event that, in isolation, might seem manageable within national borders can nevertheless provoke multiple and interrelated global shocks. The 2010 floods in Pakistan and the droughts in the Russian Federation were together translated by global financial and trade systems into higher food prices. And massive floods in Thailand in 2011 triggered a cascade of failures – bringing production to a halt in factories around the world.

These possibilities are of increasing concern in Asia and the Pacific because of the rising number of natural disasters. This is the world's most disaster-prone region: in the past decade, about 2.5 million people in Asia and the Pacific have been affected by disasters and almost 800,000 have been killed. At the same time, the economic damage caused by disasters has grown.

The countries that are most at risk to both natural disasters and economic crises are the small island developing States including Solomon Islands, Tonga and Vanuatu. Bangladesh, Cambodia, Fiji, Papua New Guinea and the Philippines, for example, also face high risks of natural disasters, while landlocked developing countries, such as Kyrgyzstan, the Lao People's Democratic Republic, and Tajikistan, are highly susceptible to economic crises. But not all are equally vulnerable. For example, a hazard only triggers a disaster when it encounters exposed and vulnerable communities. Thus, Bangladesh, Japan, Indonesia and the Philippines, even though highly exposed to disasters, have taken positive steps to mitigate the adverse effects.

For people living in fragile and conflict-affected States, the journey from fragility to resilience is often both long and arduous. With the additional threats to lives and livelihoods posed by climate change, natural disasters and economic crises, establishing human security is the most fundamental requirement of development. While this issue is not taken up in this report, what matters most for fragile States is good governance, strong institutions, accountable management of natural, human and financial resources and, above all, enlightened leadership.

THE MACROECONOMICS OF RESILIENCE

Despite the frequency of simultaneous shocks, economic literature offers little guidance on how to respond. Should countries faced with multiple crises maintain conventional macroeconomic stabilization objectives and targets – on inflation or fiscal deficits, or on liquidity norms or debt sustainability? And faced with the prospect of slower growth should they uphold their central bank's objective of low inflation?

From the macroeconomic perspective, a natural disaster generally reduces output and employment. Disasters can also affect trade balances, fiscal balances and public debt. But these outcomes are not automatic; much will depend on government policies, and private sector expectations and responses. Also critical is the nature of the shock. While a natural disaster can deliver a supply shock that increases inflation, an economic crisis can deliver a

demand shock that is likely to be deflationary. Natural disasters and economic crises that occur together can thus mitigate each other's impact on the price level. So getting policies right will mean considering both impacts.

Pre-disaster risk management

When preparing for disaster, Governments need to identify risks and social vulnerabilities and take steps to mitigate them – strengthening building codes, for example, or retrofitting existing buildings, while ensuring that they have systems of social protection that they can scale up to meet emergency needs. But it is also important to make financial preparations, by accumulating savings and foreign reserves, for example, or by transferring some risks through commercial insurance.

All these measures require up-front investments. Some governments may not consider this worthwhile. Moreover, there are risks of moral hazard: low-income countries, for example, may be tempted to underinvest in prevention if they believe they will always be rescued by foreign aid. Today's policymakers may therefore prefer to defer expenditure until a disaster happens, preferably on someone else's watch.

Even the most conscientious policymaker, however, will struggle to make a rigorous cost-benefit analysis if there are too many unknown factors. For assistance, they might turn to emerging sophisticated decision-making tools and methodologies based on scenario analysis, which can help them analyse unpredictable events for which there is very little information. Arriving at the best solution will always be difficult, but ultimately these are issues of public choice, so determining public priorities in disaster risk reduction will benefit from extensive stakeholder participation.

Post-disaster response: financing versus adjustment

Faced with the cost of a natural disaster, governments can draw on reserves or seek new finance – or embark on a programme of macroeconomic adjustment. Indeed, a well-accepted tenet in macromanagement of disasters is: "Finance if you can, adjust if you must".

Where can the finance come from? Some countries will be able to draw on reserves, or they may be able to pay the costs out of current budgets. They can also establish with lenders "contingent" credit lines that would enable them to borrow in the event of a disaster. The poorer developing countries should be able to rely on concessional aid or grants from international donors. In addition, they might assume that workers' remittances to families would increase in times of distress.

Governments and private individuals and corporations can also take out insurance. Governments can also become involved in insurance themselves, either providing it directly or working with the private sector. For some small island economies in the Pacific, disasters

could be on such a scale as to overwhelm the economy – yet, insurance would be prohibitively expensive. In this case, it might be possible to pool the risk with other countries that find themselves in similar positions.

In principle, the Government could also increase commercial borrowing. But this may be difficult. Even countries that have access to international capital markets will find foreign borrowing expensive, especially after a disaster. If so, they may have to adjust through fiscal policy – by redirecting funding from planned projects, by cutting discretionary expenditure or by raising taxes on high-income earners. The choices will depend on the current state of the economy: if it is overheated with a risk of inflation, the Government might impose a temporary tax on high-income citizens in the form of a reconstruction levy.

Monetary policy after a natural disaster presents a classic dilemma: how to use the same policy to reconcile two competing objectives – maintaining price stability while restoring pre-disaster levels of output and employment. Some policymakers would give priority to price stability and therefore tighten the money supply, but this could worsen unemployment and poverty. In fact, many economies are operating far below optimum levels of output, so fears of inflation may be unfounded.

Generally speaking, the midst of a crisis or disaster is not the best time to mechanically pursue prudential norms of macroeconomic stabilization. Instead, the overarching aim should be to arrest the spread of the shock to the real economy, to labour markets and, above all, to the poorest and most vulnerable. Moreover, even in "good times", there is no unique threshold of stability for each macroeconomic variable – growth, inflation, the fiscal deficit, the current account deficit, or the level of public debt. Rather, there is a continuum of thresholds for various combinations of these key variables. Developing countries should thus not have an overly mechanical interpretation of macroeconomic prudence. While maintaining short-run stability, they should instead be guided by the goals of long-run economic development and poverty reduction. This will require striking a balance between development and stability.

BUILDING RESILIENT COMMUNITIES

Those most exposed to economic crises and disasters are the poor. Without savings and living in precarious circumstances, they have few buffers against shocks. Already disadvantaged by social and economic imbalances, they can thus be further marginalized into vicious cycles of chronic hardship, sometimes for generations.

The poor tend to be more exposed to natural disasters because they tend to live on hazardous land - on earthquake fault lines, floodplains, or coastal areas that are highly exposed to cyclones and typhoons. The poor are also likely to be hardest hit by an economic crisis: most will be low-skilled, casual, seasonal or contract labourers with precarious or irregular work

and low earnings. And among the poor, the most vulnerable to disasters are "excluded" individuals – those who are outside many societal bonds and relationships. Among these are older persons, ethnic minorities and those with disabilities or living with HIV and AIDS. They have less access to networks and fewer relationships of support that they can turn to. They can also be disadvantaged when it comes to emergency relief.

Nevertheless, people facing disasters are rarely passive victims. Most will try to cope by drawing on all their economic, social and natural resources. Unfortunately, under pressure, they can also be forced into "erosive" strategies that lead to a vicious cycle of poverty. They might sell their livestock or agricultural or fishing equipment. Or they may take out high-interest loans. They can also reduce the quantity or quality of food, forego medical treatment, or overexploit natural resources. As a last resort, they may withdraw children from school. All these measures can perpetuate poverty and reduce the welfare of future generations.

The more resilient groups or households, on the other hand, can respond with "non-erosive" strategies that do not endanger their future livelihoods. They might be able to draw on their savings, sell non-essential possessions, or consume less expensive food. They could also seek additional work, either locally or by migrating to a nearby city. In addition, they might draw on family or social solidarity networks for food supplies or informal loans, or engage in reciprocal labour exchange.

Governments can support these forms of community resilience in a number of ways. They can, for example, strengthen systems of social protection – including old age and disability pensions, unemployment pay, maternity and child benefits, and universal access to essential health care. It is crucial to provide a basic social protection floor based on the understanding that all citizens have the right to benefits and that the State has a vital role in ensuring access, if not in the actual delivery of programmes. These systems cannot be set up overnight, and crises and disaster interventions should build on existing mechanisms. It is important, therefore, to ensure that the financing systems are sufficiently flexible so that they can be scaled up for episodic shocks. Ideally, the strategy should be one of "adaptive social protection" – integrating social protection with disaster risk reduction and climate change adaptation.

In the absence of formal social protection, most people rely on traditional or informal protection systems within households, groups and social networks. Generally, in many developing countries, social protection is likely to involve a combination of informal and formal channels – taking advantage of informal connections and systems but supporting these with formal mechanisms where appropriate.

Governments can also help communities with various forms of risk transfer. While richer individuals can take out their own insurance, poorer households cannot afford such coverage. An alternative is "microinsurance" which pools the risks and resources of whole groups. Some of the most effective microinsurance schemes are index based – for example,

assessing the exposure of a group of farmers within a specific area to extreme weather events and compensating them for the associated loss of income without their having to make individual claims.

Some of the most effective public support, especially for more frequent disasters, is likely to come from local governments. They can support community responses, engage vulnerable groups in decision-making and help them become more resilient. To do so, they need to involve those groups in every step of the development process – from vision setting, planning, and implementation to monitoring and evaluation. An important contribution to greater local resilience is effective decentralization which can improve the delivery of key public services. However, decentralization can only be effective if local governments have the necessary capacity, resources, accountability and transparency. In the absence of these conditions, decentralization can lead to rent seeking and capture by local elites.

Responding rapidly to a disaster requires timely and reliable data. The starting point should be extensive pre-disaster vulnerability assessments. Until recently, governments and development partners would have been daunted by this prospect, feeling that they lacked the necessary resources or skills. Nowadays, however, they can take advantage of new technologies. A number of governments, including Indonesia and the Philippines, have, for example, been using satellite-based data and geographic information systems to produce multi-hazard maps showing where the poor are at greatest risk.

During the crisis, both governments and community leaders will need to produce accurate up-to-date information and disseminate it quickly. Fortunately, they can now do this effectively in a variety of ways – print, radio, television, the Internet and mobile phones. Social media platforms are also proving invaluable.

THE LAND, WATER, ENERGY NEXUS – AVOIDING CATASTROPHIC FAILURE

Rapidly rising production and consumption of goods and services could push countries of Asia and the Pacific towards a catastrophic ecosystem collapse. Though natural systems have large absorption capacities, once tipping points are reached, they could suddenly crash, with devastating consequences for other economic and social systems. Building resilience will mean addressing this nexus of converging threats.

Land for agricultural production is becoming ever scarcer. Of the world's remaining arable land that could be used for cultivation, most is in Latin America and sub-Saharan Africa. There is also some in East and South-East Asia, but virtually none to spare in South and West Asia. Moreover, in South Asia, about 45 per cent of land with crop production potential is currently used for human settlements; and urban areas could encroach on the remainder. In addition, much of the land currently under cultivation in the region is becoming degraded: Asia has the largest amount of land affected by desertification, and when land is no longer productive, those cultivating it are often pushed into ecologically fragile areas, such as forests and wetlands.

Freshwater systems are also coming under increasing pressure as a result of over-exploitation and pollution. Most of this is due to cultivation. Unless water is used more efficiently, the world will need, by 2050, 40 per cent more than will be available. In Asia and the Pacific, only about 9 per cent of water withdrawal is for domestic consumption. Even so, about 380 million people in the region do not have access to clean water. About 12 per cent of water is used for industrial production and a number of enterprises are becoming concerned about supplies. Water is also needed for the production of energy – as well as for transport and processing of primary fuels: in 2010, about 15 per cent of the world's total water withdrawals were for energy purposes.

All these processes will be exacerbated by climate change, which is already reducing crop yields in some places and adding to water stress. However, the impact will vary according to location, with some areas suffering more droughts and others experiencing more floods.

Rising consumption is also leading to greater use of energy, whether for industrial processes, transport, or households for cooking and heating. Some energy sources, such as coal, are still relatively abundant, and other fossil fuel reserves, shale oil and gas, seem to be increasing. But these new reserves are more difficult to exploit – demanding significant amounts of energy for extraction. Using more fossil fuels will also increase CO_2 emissions, with serious implications for climate change.

Another concern is the future availability of minerals, some of which are becoming uneconomical to extract. These include the "rare earth" elements that are critical for many industries: electronic equipment, vehicle parts and batteries as well as renewable energy technologies.

Governments and societies that recognize the limits to the natural resource base can take some incremental steps to use resources more efficiently, but ultimately they will have to adapt and diversify their systems of production. The best results will come from involving stakeholders and communities who often have extensive knowledge of how to make the best use of scarce resources. It will also be important to place a true value on natural resources, for, if not properly priced and regulated, these are likely to be inefficiently used and rapidly exhausted.

A good starting point for making better use of energy is to remove fuel subsidies. But there are also many options for boosting water and energy efficiency. Good land use planning can reduce the initial and ongoing costs of resource consumption. The way a city is designed and built locks the population into consumption and production patterns for generations. Good urban planning therefore allows for sustainable city growth – considering the needs of its inhabitants yet also allowing more efficient use of resources. Likewise, sustainable land management, particularly for agriculture, will help reduce land degradation and strengthen food security, while also protecting against some natural disasters, such as floods and drought.

All of this will require strong policies that integrate national development priorities in a cross-sectoral manner, recognizing the true value of natural resources. They can only be effective if supported by strong and effective administration, monitoring and enforcement.

PROTECTING CRITICAL SECTORS

All sectors of the economy need to become more resilient to external shocks, but it is especially important to strengthen certain critical sectors for which any failure is likely to cascade across the whole society. Principal among these are the financial sector, and parts of the physical and social infrastructure.

Financial infrastructure

There are four main types of financial shock: banking crises; the bursting of speculative bubbles; currency or exchange rate crises; and sovereign debt defaults. In reality, financial crises often mutate from one type to another or show multiple symptoms. Banking crises typically result from a loss in confidence in one or two banks. In some cases, this can be contained, but, if not, the shock soon cascades to the real economy in the form of a widespread credit crunch. Speculative bubbles, however, are often consequences of herd behaviour and are particularly dangerous if they affect commodities, such as food or fuel, whose prices are of major significance to vulnerable people.

Governments and financial regulators have taken measures to make financial markets more stable and reduce the potential for future crises. They have, for example, increased surveillance by regulatory authorities, and reinstated controls on the riskiest behaviour, notably taming large-scale, speculative capital flows. In doing so, they need to strike a fine balance: on the one hand, they want to make the financial system less volatile and vulnerable; on the other hand, they do not want to excessively limit the capacity of capital markets to allocate funds to finance legitimate risk-taking that encourages innovation and productivity, and boosts economic growth.

As a result of the experience of the 1997 crisis, many countries in the region have aimed to become more resilient by building up large foreign-exchange reserves. However, they have effectively parked much of this in United States Treasury bonds with very low yields. They could use these funds more productively by investing them in the region. One option, recommended by ESCAP, would be to establish a fund to finance cross-border infrastructure projects and other regional public goods.

Another concern is that governments and investors find it difficult to assess risk exposure – hampered by a lack of transparency, poor accounting standards and weak understanding of financial instruments. This underlines the importance of better market surveillance – with accurate data on international financial interconnections, and assessments of the vulnerability of domestic economies. The Asia-Pacific region has already made progress in this

direction. In 2011, ASEAN established the ASEAN+3 Macroeconomic Research Office (AMRO). A truly Asia-Pacific system of resilience would mean expanding AMRO's membership and the scope of its surveillance. Overall, one of the most important principles should be global harmonization of banking and financial market regulations. Unless similar regulations apply everywhere, the more footloose institutions will be tempted to migrate to laxer jurisdictions.

Many Asia-Pacific developing countries, in particular the least developed countries, depend on exports of a small number of commodities while also relying on commodity imports, especially of food and fuel. All countries are thus concerned about the recent volatility of commodity prices. A number of measures have been proposed to dampen price volatility. One way to address this would be by taxing the trade in commodity derivatives to reduce the number and speed of speculative transactions.

Critical infrastructure

Even infrastructure that is well designed, constructed and maintained will not always withstand natural disasters. Governments will therefore need to identify "critical infrastructure" for which they need higher than usual margins of safety. Critical infrastructure includes not just "hard" infrastructure in terms of buildings or networks, but also the "soft" infrastructure that supports this – the institutions, users, regulations and legislation. Taken together, they should constitute a resilient system.

As regards social infrastructure, the greatest damage is typically to housing, schools and hospitals. Planning authorities generally try to ensure that high-rise "engineered" buildings follow stringent building codes – as a result, they often survive earthquakes. Those planning authorities now need to pay greater attention to houses and other non-engineered buildings using an interdisciplinary approach that includes both engineering and social sciences. They also need to ensure that builders and homeowners comply with these codes.

It is particularly important to secure school buildings. Over recent decades, the death toll of schoolchildren from natural disasters has increased significantly. Had their schools been built to be more resilient, the losses could have been substantially reduced. This means not just building safer structures but also preparing for emergencies and instilling a general culture of safety. Many schools can also serve as disaster shelters, but people living in vulnerable areas may need other forms of dedicated shelters integrated with early warning systems.

Storms, cyclones, floods and earthquakes frequently disrupt community power supplies and cause tremendous damage to transport infrastructure, telecommunications, wastewater and water supplies. Moreover, the various forms of infrastructure are becoming increasingly interdependent, so that a fault in one system can significantly affect many others – triggering a cascade of failures. It has been argued that "lifeline" systems, including power, water, wastewater, communication and transportation, need to be restored within four hours to support emergency response operations. Improving overall resilience thus involves recognizing and managing these interdependencies.

All these forms of infrastructure can be made more resilient. Power transmission lines can, in some cases, be moved underground, and coastal sections of roads and railways can be moved to higher ground or given protective walls or embankments. And in mountainous areas, roadside slopes can be made more stable through bioengineering. To keep transport links open for disaster relief operations, planners should incorporate some redundancy – building extra routes in case one is damaged. Similarly for ICT systems, submarine data cables can be complemented with terrestrial cables and communication satellites.

Making infrastructure more resilient requires significant investment. Although governments in most developing countries are aware of the benefits of disaster risk reduction, they may not feel able to justify such measures. If so, they can consider using some emerging methodologies to evaluate potential benefits and integrate disaster risk reduction and adaptation in planning processes. Adapting high design standards for critical infrastructure increases serviceability and lifespan of costly structures.

In some cases, Governments should be able to seek support from international financing institutions, such as the multilateral development banks. Many banks already incorporate disaster risk reduction into project assessment cycles and are often involved in financing rehabilitation and reconstruction after a disaster.

Some shocks themselves present financing opportunities. In normal circumstances, strict budgetary regulations preclude a high level of investment in new infrastructure. But these restrictions can be relaxed during a financial crisis, opening up opportunities for building more resilient facilities through economic stimulus packages. Another potential source of financing could be the private sector – via public-private partnerships (PPPs); engaging the private sector in infrastructure development should not only provide extra resources but also help improve project design.

Developing resilient infrastructure will demand coordination among many sectors and levels of administration. The focus should be not only on physical infrastructure but also on the associated policies, guidelines and by-laws. It is also imperative to engage communities and different stakeholders: the community can identify the necessary infrastructure while engineers can come up with solutions.

STRENGTHENING SUPPLY CHAINS

As well as protecting physical and social infrastructure, countries will also want to make their supply chains more resilient. Many goods are now provided through complex global chains of production and distribution. An increasing proportion of this trade is South-South. China in particular has now emerged as a “global assembly centre”.

A similar trend is evident in agriculture. Modern agricultural supply chains increasingly rely on imports and multi-tiered systems of supply management. Such chains encompass

inputs, production, post-harvest, storage, processing, marketing and distribution, as well as retailing and final consumption.

While these systems can be very efficient, they are also vulnerable to external shocks. If just one node is damaged the whole chain can be broken. Particularly exposed are enterprises that rely on inputs or intermediate goods from a single source – one which might be located on a tectonic fault line or in an area subject to frequent storms and hurricanes. Supply chains are also vulnerable to sudden changes in demand: faced with an economic downturn or recession in a major market, a highly complex supply chain might find it difficult and costly to react.

Most vulnerable are the small and medium-sized enterprises (SMEs). Generally, they work as subcontractors, supplying basic services or labour-intensive parts and components. Few SMEs are prepared for natural disasters. Typically, they lack insurance and do not carry out risk assessments or have business continuity plans. This makes it difficult to recover from disasters and heightens supply chain disruption.

Enterprises that want to build in greater resilience to natural disasters can take a number of measures. They can: (a) invest more in each location to enhance resilience to natural disasters; (b) spatially diversify the locations of both production and supply; (c) hold larger inventories or stocks; and (d) consider acquiring proper insurance. All these options incur extra costs. In addition to facing direct costs, enterprises building greater redundancy into their systems may also have to forego some economies of scale or opportunities for lower factor costs.

Devising the optimal strategy is not easy, particularly when allowing for rare events. Nevertheless, firms will need to assess risks and find ways to control them – and ensure that they have robust business continuity plans. Particularly important in this are the global value chain (GVC) anchors, the transnational corporations around which these chains work; they can help their smaller business partners become more resilient and, if necessary, help with reconstruction.

Governments can also support these efforts – improving the overall regulatory framework, providing better risk information and modelling systems and subsidizing private insurance. They can also foster the development of business continuity plans, for example by imposing legal requirements for such plans or by offering tax incentives or providing technical support. Governments can also temporarily relax labour movement restrictions to enable GVC anchors to send in people to assist in overseas subsidiaries.

MUTUAL SUPPORT THROUGH REGIONAL COOPERATION

Many of today's shocks are transboundary, so they will need transnational responses. By working together, Asia-Pacific governments can produce solutions that are greater than

the sum of individual country responses. The Asia-Pacific region has some regional cooperation mechanisms that deal with natural disasters and economic shocks. However, they are at various stages of development and, in most cases, do not have resilience built in.

What is needed now is a new regional framework for resilience-building – one that rebalances economic, social and environmental systems. The regional framework proposed in this report consists of three pillars, three enablers and an integrator.

Pillars

Coordinated economic management – In fiscal policy, for example, countries can work together to prioritize public investments in regional infrastructure, improving disaster preparedness, and adapting to climate change. Countries can also coordinate monetary and exchange rate policies and harmonize their banking and financial market regulations, while strengthening regional monetary and financial monitoring and surveillance. At the same time, Asia-Pacific economies can rationalize their preferential trading agreements to facilitate regional trade.

Coordinated investment in social protection and inclusive development – Inclusive development will involve greater investment in social infrastructure, particularly in education and health services. Similarly, all countries need to establish social protection floors – not as a handout but as an investment in building resilience. If countries cooperate on these issues, they can build synergies in the planning, coordination and tracking of such systems, which could ultimately lead to the establishment of a regional social protection fund. Such a fund, built on the principles of regional solidarity, could go a long way towards building resilience, especially for least developed countries, which have the largest portions of the population vulnerable to multiple shocks. Apart from the political groundswell that builds up from regional solidarity, there are numerous synergies from enhanced economic and social security, not least of which is the mitigation of push factors in economic migration and the huge expenditures of high-income countries on border protection. ESCAP could provide the platform for a further dialogue on this issue.

Cooperation on food security and sustainable resource management – Governments need to strengthen existing integrated river basin management frameworks by tapping into the new dynamism of South-South cooperation. Comprehensive frameworks can help countries sustainably manage shared water, energy and land resources – all of which are critical for food security.

Enablers

Investing in technological innovation – Governments need to manage the overall impacts of innovation – ensuring that the benefits spread to everyone, especially vulnerable

groups, while also taking measures to minimize potential risks, both for people and the environment. This will require collaboration between the public and private sectors both within and between countries.

Monitoring and early warning – Governments should continue to strengthen regional monetary and financial monitoring and surveillance. Similarly, in disaster-prone areas, they will need to generate and share people-centred risk knowledge, and strengthen regional multi-hazard monitoring and early warning systems. For this, they can work more effectively through regional cooperation – which would enable them to pool scientific knowledge and technical expertise and take advantage of economies of scale.

Pooling resources for better preparedness – For this purpose, ESCAP could serve as a bridge – bringing together regional cooperative mechanisms that have similar expertise and mandates. Cooperative mechanisms, such as RESAP and Sentinel Asia, for example, can provide satellite-based data and products. Supply chains could also be made more resilient through joint regional supply chain risk assessments.

The integrator

Synergizing regional efforts – All these pillars and enablers would need to be integrated into a comprehensive whole. For this purpose, ESCAP, as the main economic and social development centre of the United Nations system for the Asian and Pacific region, can provide the regional platform for mutual cooperation, sharing experience and building the region's resilience to withstand, adapt to, and recover from overlapping shocks.

The Asia-Pacific region has become the driving force in the global economy and has made significant progress in reducing poverty. Nevertheless, the region still faces considerable risks – most countries are regularly exposed to shocks that could jeopardize future economic and social progress. Countries across the region need, therefore, to work together to consolidate and extend their achievements by ensuring that their economic and social systems are sufficiently robust, flexible and resilient to deal with what lies ahead.

ESCAP PHOTO

1

RESILIENCE TO SHOCKS

RESILIENCE TO SHOCKS

The world has been subject to a series of shocks – from economic crises in rich countries, to natural disasters in developing countries, along with floods or droughts in key food producing regions. In a complex global economy, these crises have become increasingly interrelated. If the countries of Asia and the Pacific are to become more resilient to these regular, overlapping shocks, they will need to address them in a more comprehensive and systemic manner.

In early 2011, the people of Dhamuirhat, a rural community in Bangladesh, were taken by surprise by high food prices. The shop prices of key items such as rice, flour, soybean oil and chicken were 30 per cent higher than a couple of months earlier. As one agricultural worker said: "I am often afraid to ask the price." [1]

The people of Dhamuirhat did not know that these high prices had their origins in distant places. In the Russian Federation, for example, in June 2010, an abnormal heat wave had hit the wheat fields, causing fires and leading to the worst drought in nearly 40 years. Added to this were historically severe floods in Pakistan. These and other events were restricting global food supplies.

News of such shortages was transmitted instantly to the trading floor of the Chicago Mercantile Exchange where buyers and sellers match orders and haggle over futures and options contracts for agricultural commodities. Tight global supply coupled with financialization of commodity markets drove prices up. By February 2011, the global prices of wheat and other cereals had soared to record highs – which were soon reflected in local markets around the world. This was the beginning of a 'new normal' of high food prices.

This would have been difficult enough to cope with on its own. But people were already under pressure from another shock: the 2008 global financial crisis. The collapse of the American investment bank Lehman Brothers in September 2008 had eventually triggered a freeze in the global financial system. In Asia and the Pacific, this was felt primarily through a dramatic decline in trade. Within a couple of months, Asia-Pacific exports had collapsed – threatening the jobs of millions of workers.

"Why should something that happens ten thousand miles away affect me?" asked a female worker in the India state of Karnataka, as jobs started to disappear in early 2009. She had lost her employment in a small-scale business exporting handmade dolls.[2]

In an increasingly globalized economy, natural disasters can also be linked to employment in more oblique ways. In the Compostela Valley in the southern island of Mindanao in the Philippines, for example, small-scale gold miners had benefited from the high price of gold – an attractive alternative investment in times of uncertainty. Between 2008 and 2012, the price more than doubled. This, combined with the discovery of rich deposits, had lured thousands

of poor migrants from other islands to try their luck in the mountainous and landslide-prone sites in the Compostela Valley. That all came to an end at 4:45 am on 4 December 2012, when Typhoon Pablo made landfall in Mindanao.[3] The effect was catastrophic. But here too survivors would have found it hard to link that destruction with the global economic crisis.

All these crises are the result of shocks applied to complex interlinked systems. And globalization is binding these systems ever more closely together – and demanding that countries move aggressively towards comprehensive risk management. One of the most pressing development challenges is to build resilience to such combined crises (Box I-1).

BOX I-1

Resilience within the United Nations development agenda

The crucial need to build resilience was recognized in the Hyogo Framework for Action 2005-2015 (HFA): Building the Resilience of Nations and Communities to Disasters. This was adopted at the United Nations World Conference on Disaster Reduction in Kobe, Japan, in 2005 – only days after the 2004 Indian Ocean earthquake.[4] The HFA was subsequently endorsed by the General Assembly in its resolution 60/195 on the International Strategy for Disaster Reduction.

The ESCAP Commission in 2008 requested the Executive Secretary to continue to assist member countries in building their capacity to make appropriate policy responses that mitigate the impact of the economic crises, restore growth and avoid future global shocks – in resolution 65/1 on the implementation of the Bali Outcome Document in addressing the food, fuel and financial crises. Subsequently, a report of the Secretary-General emphasized that reducing disaster and other social and economic risks would be crucial for accelerating progress towards the Millennium Development Goals.[5]

The Fourth United Nations Conference on the Least Developed Countries, in adopting the Programme of Action for the Least Developed Countries for the Decade 2011-2020, identified 'multiple crises and other emerging challenges' as one of the eight interlinked priority areas for the sustainable development of the least developed countries.[6]

In 2012, the Secretary-General's High-Level Panel on Global Sustainability brought out the report 'Resilient People, Resilient Planet – A Future Worth Choosing'. It outlines a vision towards sustainable development through inclusive economic growth, environmental development and social equity. It also emphasizes a strategy for empowering people to make sustainable choices during a period of global volatility and uncertainty.

Some contemporary thoughts on resilience have been captured in the Rio+20 outcome document, 'The Future We Want', which emphasizes the need for building resilience in several economic, social and environmental spheres. In particular, the outcome document calls for "disaster risk reduction and the building of resilience to disasters to be addressed with a renewed sense of urgency in the context of sustainable development and poverty eradication, and as appropriate, to be integrated into policies, plans, programmes and budgets at all levels and considered within relevant future frameworks." And it further invites "governments at all levels, as well as relevant subregional, regional and international organizations , to commit to adequate, timely and predictable resources for disaster risk reduction in order to enhance the resilience of cities and communities to disasters, according to their own circumstances and capacities." [7]

Why have they not done so already? There are many reasons – some of which are common to many human activities. One is that human beings are not very good at assessing risks, relying more on immediate instinctive responses rather than rational analysis (Box I-2). And generally policymakers are more accustomed to breaking down complex issues into supposedly distinct parts than dealing with a systemic whole.

BOX I-2

Policymaker blind spots

Most policymakers agree that prevention is better than cure. Faced with multiple and increasingly frequent shocks, why do they not then invest more in risk prevention and preparedness? There are many factors at play. Some will be linked to immediate political problems and budget pressures. But research on behavioural economics, notably the work of Nobel Prize winner Daniel Kahneman, suggests that when it comes to evaluating risks there are basic limitations in the human mind.[8]

People are, for example, likely to be more concerned about an event that has recently happened. Thus, immediately after an earthquake, they will take more anti-earthquake precautions by building up emergency food supplies, but then become steadily less diligent as the memory fades – though clearly the risk is unchanged. On the other hand, people overestimate the probability of unlikely events and underestimate the probability of relatively common risks. One US study found, for example, that tornados were thought to kill more people than asthma – which actually causes 20 times more deaths.

Then there is myopic behaviour – simple short-sightedness. Thus people tend to postpone buying insurance or building up savings for old age. And when taking decisions they seldom give sufficient weight to the needs of future generations.[9]

Individual decisions are also easily swayed by the ways in which issues are framed. A patient who is asked whether they want to risk surgery is likely to be encouraged by the statement "the one-month survival rate is 90 per cent" but discouraged by the statement "there is 10 per cent mortality in the first month", though they both say the same thing.

And in general people tend to underestimate the extent of their ignorance and the uncertainty of the world in which they live. They thus assume they understand what happened in the past, and are overconfident in their ability to predict the future.

Policymakers in particular are likely to fall victim to the wisdom of hindsight. They know they will be blamed for decisions that work out badly, but get little credit for successful outcomes. As a result they tend to be reluctant to take risks, or are likely to underestimate them. They are thus likely to produce plans and forecasts that are unrealistically close to best-case scenarios, overestimating benefits and underestimating costs.

How can these constraints be overcome? First, policymakers need to be conscious of the potential illusions of the human mind and their consequent decision-making blind spots. Second, they need to know more about risks and how to measure them. For this purpose they can take advantage of more sophisticated decision-making methodologies. For example, for assessing the likely outcomes of risky projects they might use 'reference class forecasting' – using large databases that have information on both plans and outcomes of hundreds of similar projects all over the world.[10]

For low-probability, high-impact catastrophes which are difficult to assess using the traditional cost-benefit analysis they might instead use scenario analysis.[11] This will consider future events based on a range of alternative outcomes and favour solutions that are flexible, adaptive and hence can be used to safeguard from multiple shocks. Integrating risk-based methodologies into cost-benefit analysis can enable policymakers to quantify the consequences of climate change disasters and risks.

When taking decisions it is also crucial to involve those that may be most affected. As they experience these risks directly, they may be in a better position to understand them – and have fewer cognitive illusions.

DEFINING RESILIENCE

Resilience is usually associated with recovering from shocks. The form that this resilience takes will depend on the system that suffers the shock and the functions that need to recover. However, a common element of the different definitions is the idea that recovery in a changing environment requires the capacity to withstand, absorb and adapt to shocks (Box I-3).

BOX I-3

Definitions of resilience

"The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions." [12]

"A measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables." [13]

"The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self organization and the capacity to adapt to stress and change." [14]

"The ability to absorb disturbances, to be changed and then to re-organize and still have the same identity (retain the same basic structure and ways of functioning). It includes the ability to learn from the disturbance. " [15]

"The ability of people, households, communities, countries, and systems to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth." [16]

"The ability to deal with change and continue to develop." [17]

"Disaster resilience is the ability of countries, communities and households to manage change, by maintaining or transforming living standards in the face of shocks or stresses - such as earthquakes, drought or violent conflict – without compromising their long-term prospects." [18]

"The working definition of a resilient country (...) is (...) one that has the capability to 1) adapt to changing contexts, 2) withstand sudden shocks and 3) recover to a desired equilibrium, either the previous one or a new one, while preserving the continuity of its operations." [19]

This report concerns resilience of countries to multiple crises. Ultimately, what matters, however, is the effect of such shocks on people's lives – both in current and future generations. Therefore, the working definition of resilience in this report is:

The capacity of countries to withstand, adapt to, and recover from natural disasters and major economic crises – so that their people can continue to lead the kind of life they value.

Building resilience to a wide range of potential shocks is a complex task involving a large number of interconnected systems: economic, social and environmental. It demands that people, organizations and institutions develop the ability to reconfigure and redesign their systems to be able to cope with multiple shocks (Figure I-1). Although there are a number of measures of exposure and vulnerability to either economic crises or natural disasters, there are only a few tentative measures of resilience. One suggestion on how such a measure of the combined effects of these shocks is shown in Appendix 1.

PREDICTABLE AND UNPREDICTABLE SHOCKS

If countries are to be resilient to multiple shocks they need to deal with them as they arise. In some cases the risks are predictable and the forms of mitigation and response are fairly well developed. Bangladesh, for example, is regularly exposed to floods and cyclones and, as a result, has invested in disaster risk reduction – in flood monitoring, for example, and forecasting and early warning systems, all of which have proved effective in the aftermath of the two most recent cyclones Sidr in 2007 and Alia in 2009.[20]

Other recent shocks in the region have been more surprising and unexpected. Of the natural disasters, earthquakes are less common, especially when combined with tsunamis. Economic crises too are less predictable. For example, the collapse of Lehman Brothers, one of the biggest United States investment banks, which helped trigger the 2008 global financial crisis, would have been considered highly improbable.

FIGURE I-1

What is resilience?

Resilience is the ability to		
Quickly bounce back and restore a stable equilibrium after stresses, ensuring reduced risks and disturbances from shocks.	Mitigate disruption and reconfigure from shocks so as to maintain a functioning system.	Reorganize and transform in order to respond to crises, absorb their impact and maintain the system's core purpose.
Objects	**Systems**	**Complex systems**

Source: ESCAP based on Breen and Anderies, 2011.

Moreover, one event that in isolation might not seem catastrophic can nevertheless provoke multiple and interrelated shocks. This makes it hard to envisage all the possible scenarios and assess potential responses. For example, natural disasters such as the 2010 floods in Pakistan and droughts in the Russian Federation triggered complex crises, which were transmitted by the financial and trade systems. The damage can then be amplified by the interactions of fallible and sometimes confused agents.

In other cases, a complex crisis has emerged because the natural disaster is on such a scale that it causes a cascade of system failures. This happened following the earthquake in Japan in 2011, followed by a 10-metre high tsunami that hit north-eastern Japan and damaged the Fukushima power plant, triggering a third crisis, a nuclear accident. Even when countries have prepared for individual crises, they may find it difficult to cope with multiple overlapping events.

When the result is a large systemic crisis, one of the main challenges is to anticipate how all participants of the system are likely to act. This is true even in market systems: in principle with information conveyed by prices, markets should be self-correcting; in practice markets are often highly imperfect. As a result, as argued by Joseph Stiglitz following the 2008 global financial crisis: "(...)even if banks perfectly assessed their own risk, there would be no assurance that the system as a whole was stable."[21]

It is particularly difficult to address shocks that cross-cut multiple geographical, temporal and jurisdictional scales (Figure I-2). This presents three challenges:

1. Recognizing potential interactions – as between the price of gold and increased exposure of miners to disasters.


UN PHOTO

2. Dealing with different levels of interactions – as with natural disasters triggering sudden price moves in commodity markets.

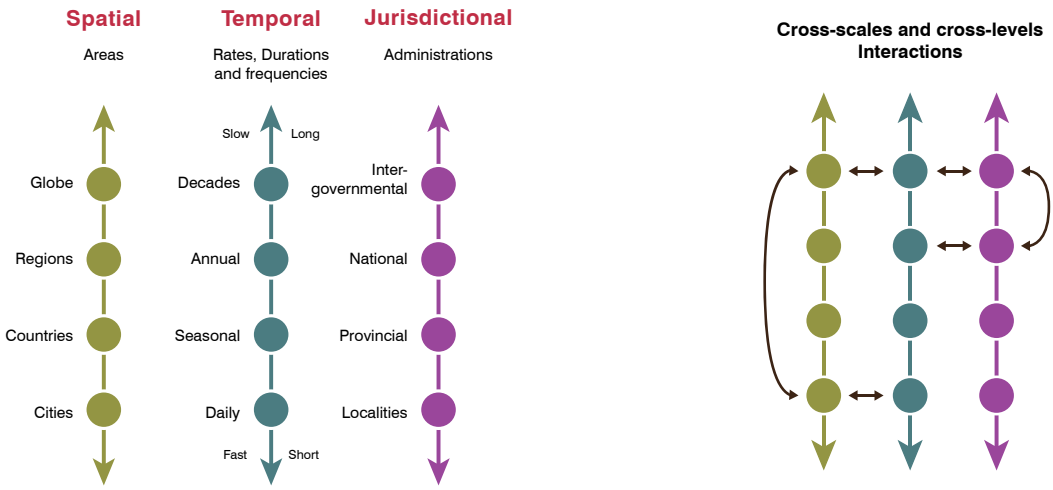
3. Addressing different perceptions and values – as with climate change when different countries have different interests and views. [22]

WHY RESILIENCE IS IMPORTANT

Resilience is crucial because Asia and the Pacific is regularly suffering simultaneous, multiple shocks, particularly economic crises and natural disasters.

FIGURE I-2

Different scales and levels



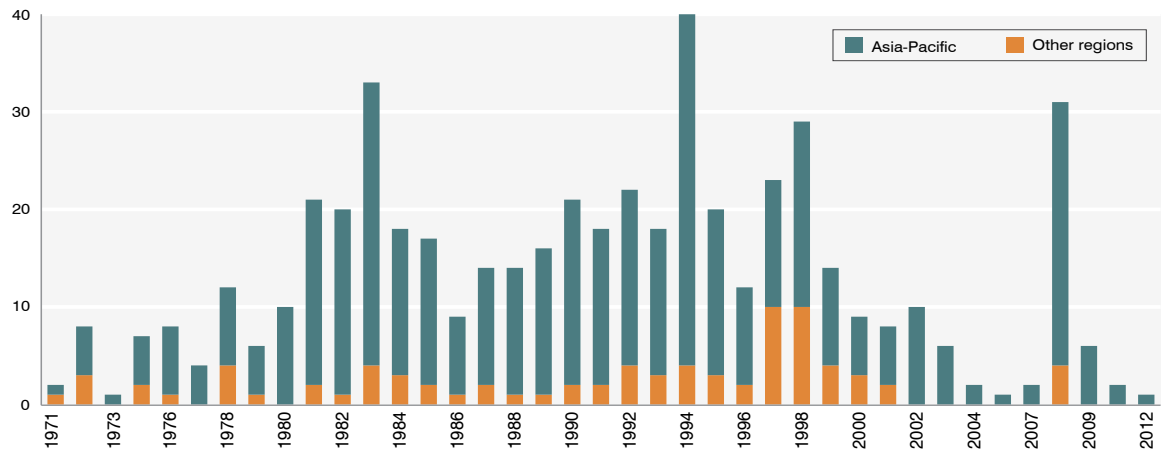
Source: ESCAP based on Cash and others, 2001.

Contagion from financial crisis

The Asia-Pacific region has been affected in recent years by a number of financial crises. However, most of these have originated outside Asia and the Pacific. Indeed over the past 40 years only one crisis in four started in the region; and none in the five years preceding the 2008 global financial crisis (Figure I-3).

FIGURE I-3

Number of financial crises starting in a given year, 1971-2012



Source: ESCAP based on data from Laeven and Valencia, 2012.
Note: Financial crises include systemic banking crises, currency crises, and sovereign debt crises.

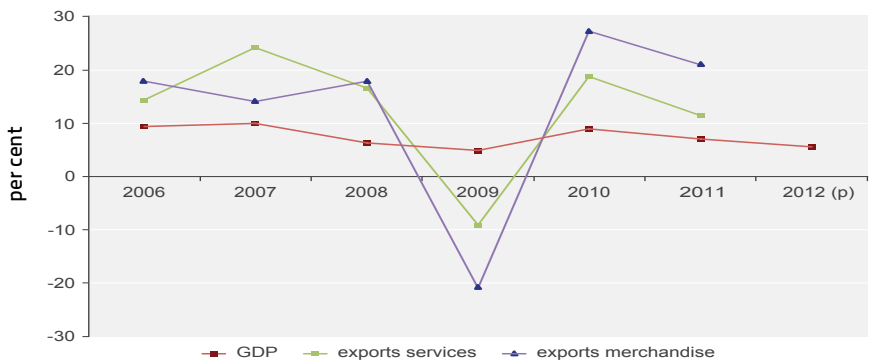
The most severe external event was the global economic crisis in 2008. The region's emerging economies felt the first round of this through falling exports – which in some cases reduced growth by more than one quarter. Nevertheless, by 2010 the developing countries of the region had managed a V-shaped recovery – though this tailed off as a result of spillovers from the euro zone debt crisis and the uncertain economic outlook in the United States. In 2012, growth in developing Asia was only 5.7 per cent, the lowest rate for a decade (Figure I-4). [23]

Financial integration increases risk of cross-border transmission of shocks

The contagion from the 2008 crisis illustrated the extent to which financial systems are integrated. Such integration increases the potential risks of cross-border transmission of shocks caused by sudden stops of capital flows. The impact of volatility will depend, however, on a range of factors, including GDP growth, the degree of trade openness and the stock market capitalization.

FIGURE I-4

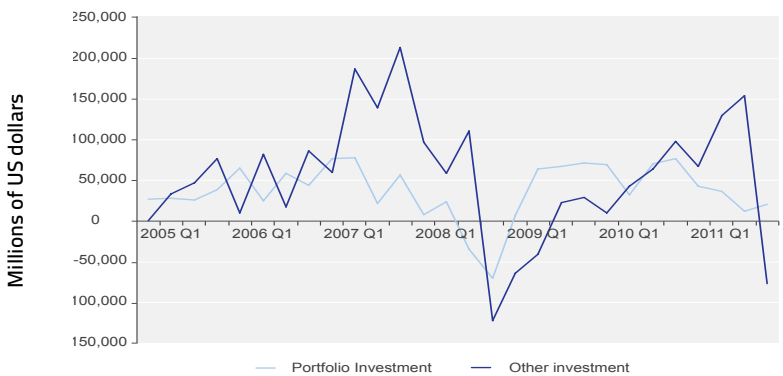
Growth of GDP and exports of developing Asia-Pacific economies, 2006-2012



Sources: ESCAP, 2012c and 2012d ESCAP annual core indicators online database. Available from: www.unescap.org/stat/data/index (accessed November 2012).

FIGURE I-5

Capital inflows to selected Asia-Pacific economies, 2005-2011



Source: ESCAP based on IMF International Financial Statistics. Available from http://www.imf.org/external/data.htm (accessed January 2013).
Note: Selected Asia-Pacific economies include: Australia; Bangladesh; Hong Kong, China; Georgia; India; Indonesia; Japan; Kazakhstan; Malaysia; Pakistan; Philippines; Russian Federation; Singapore; Thailand and Turkey.

Emerging Asian economies account for over 70 per cent of the total portfolio investment inflows in emerging markets.[24] Asian emerging markets attract a significant share of shorter term and more volatile investment. This is illustrated in Figure I-5 which shows a sharp drop in portfolio flows during the 2008 financial crisis.

Interconnected financial markets create the potential for systemic failures

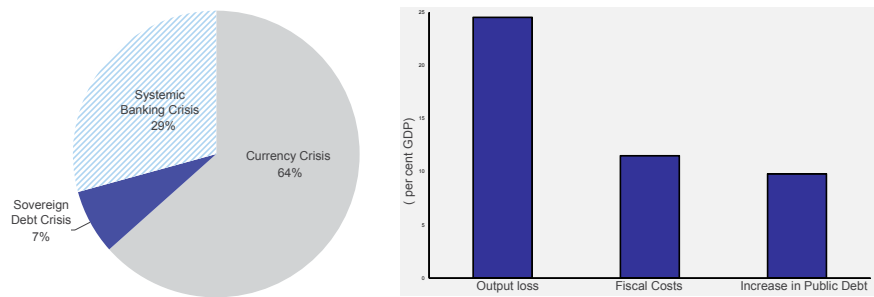
Financial systems based on a large number of competing banks should in principle be buffered against shocks: if one bank fails, others can take over the released demand and continue to supply the market with credit. But much will depend on the structure, or "topology" of the banking network.[25] If these banks are closely interconnected they may be susceptible to financial contagion.[26] The United States for example, has a few hub banks, while most banks deal only with a few other banks.[27] Such networks are more robust to random failures.[28] If a non-hub bank fails at random, this will have only a small effect on the system as a whole.

These networks are, however, still vulnerable to failures of hub banks, or to targeted attacks. And they may also suffer contagion from other networks.[29] For example, political and social networks can spread rumours that lead to herd behaviour in networks that otherwise might have been unaffected. Indeed the risks of economic and financial shocks increase when people believe they are likely to happen – self-fulfilling prophecies. For example, investors around the world now believe global shocks are all too plausible and may want to reduce their risk exposure at the same time. Since 2007, these 'risk-off' episodes have become more frequent.[30] Analysing a single network may thus miss a broader systemic risk.

Systemic banking crises can result in major losses and fiscal distress. In the developed countries these usually take the form of large losses in output and increases in public debt. Developing countries, on the other hand, which have weak institutional capacity and limited access to global markets, tend to experience higher fiscal costs associated with financial sector restructuring. Over the past four decades, Asia-Pacific economies have experienced 24 episodes of systemic banking crises. On average, these have resulted in losses amounting to a quarter of the country's GDP, and 10 per cent increases in both fiscal costs and public debt (Figure I- 6).

FIGURE I-6

Share and average relative costs from systemic banking crises in Asia and the Pacific, 1970-2011



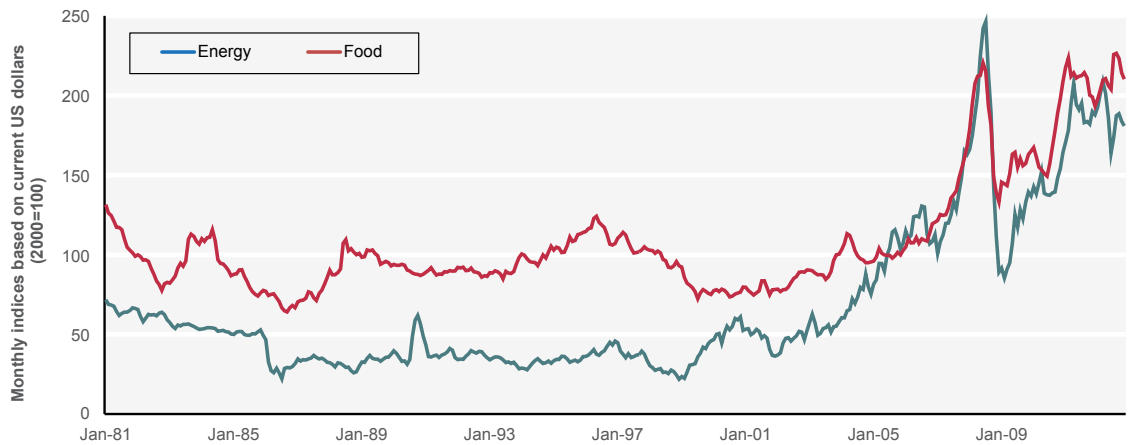
Source: ESCAP based on Laeven and Valencia, 2012.

High and volatile commodity prices

Tight global supply coupled with financial speculation has led to high and volatile commodity prices (Figure I-7). In addition, some food commodity prices have recently been coupled with energy prices (Figure I-8). This is understandable since high fuel prices drive up the costs of production and transportation, as well as the prices of agricultural inputs such as fertilizers. But it may also be that speculative investments have shifted some commodity prices away from the fundamentals.[31] This is suggested by the extent of co-movements among those commodities for which there are futures markets; those without futures markets seem unrelated.

FIGURE I-7

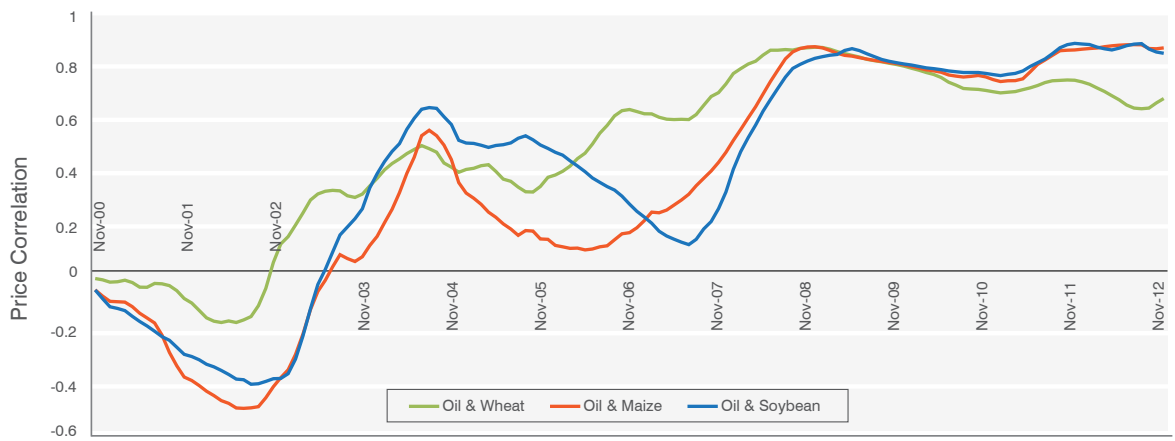
High and volatile prices of commodities, 1981-2012



Source: Based on data from World Bank Commodity Markets available from http//go.worldbank.org/4ROCCIEQ50 (accessed January 2013)

FIGURE I-8

Prices of commodities have become more correlated, 2000-2012



Source: Based on data from World Bank Commodity Markets, available from http//go.worldbank.org/4ROCCIEQ50 (accessed January 2013)

High prices of food and fuel threaten food security, increase inflation and slow the rate of poverty reduction. In countries that are net importers, high prices of food and fuel can also put pressure on the exchange rate, leading to higher prices for other imports. Some local food producers may gain, but high food prices generally hurt the poor who are net buyers of food thus have less to spend on other priorities including health and education (Box I-4). In 2010, across Asia and the Pacific the combination of high prices of food and oil is thought to have prevented some 15.6 million people escaping from poverty and pushed another 3.7 million below the poverty line.[32]

Sudden price moves can also cause a deterioration in the terms of trade, with high output losses.[33] For example, in the aftermath of the 2008 global financial crisis, commodity exporters in North and Central Asia suffered from sharp drops in oil and mineral prices resulting in a decline in output.[34] In 2008, the plunge of oil prices helped trigger banking crises in Kazakhstan and the Russian Federation and a currency crisis in Turkmenistan. The least developed countries are particularly vulnerable to declining terms of trade and external demand shocks. Between 2007 and 2009, in countries such as Bhutan and Lao People's Democratic Republic, GDP growth was reduced by more than 10 percentage points.[35]

Increased interconnection of trade, while promoting economic growth, makes the region vulnerable to external shocks

Another hallmark of the current wave of globalization is the increasing movement of goods and services across borders. In the past 10 years, world trade has almost tripled,[37] and the majority of this growth was driven by the emergence of developing countries. This higher

Box I-4

Disasters triggering high commodity prices

In Pakistan in 2010, the monsoon rains caused massive floods which killed nearly two thousand people, affected more than 20 million and made at least 7.8 million people food insecure. There was also serious economic damage. Agriculture accounts for 21 per cent of Pakistan's GDP, 45 per cent of employment and 60 per cent of exports. This disaster resulted in a loss of 7.5 million tons of sugarcane, 2.5 million tons of rice, 0.7 million tons of cotton and 0.3 million tons of maize.[36]

The floods also damaged infrastructure, destroyed storage facilities, roads and constrained food access for many communities – in a country where almost 20 per cent of the total population were already undernourished. The wheat price increased about 10 per cent in the three months following the disaster. According to the World Food Programme, between July and August 2010, the wheat price increased 82 per cent in one local market in the Khyber Pakhtunkhwa mountainous area. The floods impacted livelihoods and income-generating opportunities for the poor including farmers and unskilled labourers.

The floods reduced food production and generated rises in international prices. Between July and December 2010 the rice price increased from 465.8 to 563.8 rupees, and between 2009 and 2010 reduced rice exports from 13 to 9 per cent.

Sources: Pakistan, NDMA 2010; FAO, 2011b; WFP, 2010a.

value of trade was also more interconnected. Between 1993 and 2010, the number of countries that were responsible for the top 75 per cent in value of all the world's bilateral trade increased from 53 to 74 (Figure I-9). Over the same period, the average number of bilateral trade relations within that group increased from six to eight. Previously the main hubs, which had trade links with many other countries, were the United States, Japan, Germany, the United Kingdom and France. But by 2010 these had been joined by other countries in Europe and emerging countries such as China, India, Malaysia, the Republic of Korea and Singapore.

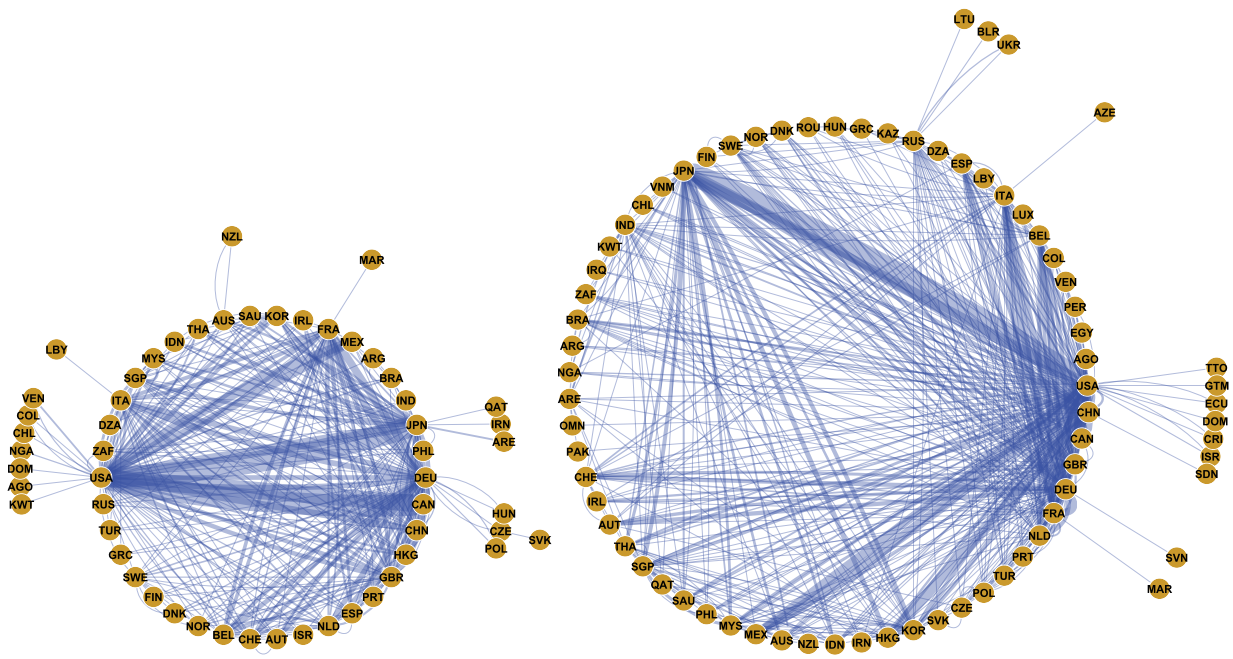
Exporters that have more trading partners should be less exposed to any crisis in export demand. But they will have less protection if the economic cycles of their trading partners are correlated.[38] This is currently the case as a result of low economic growth and export demand in the main trading hubs in the West. Increasing the number of trade partners has thus not necessarily reduced exposure to demand shocks.

Disasters disrupt supply chains

Not only are countries trading with more partners, they are integrating their production networks. Nowadays, a high proportion of trade in Asia and the Pacific is in intermediate goods used in global supply chains for the production of final capital and consumption goods. Between 2002 and 2010, the total trade in

Figure I-9

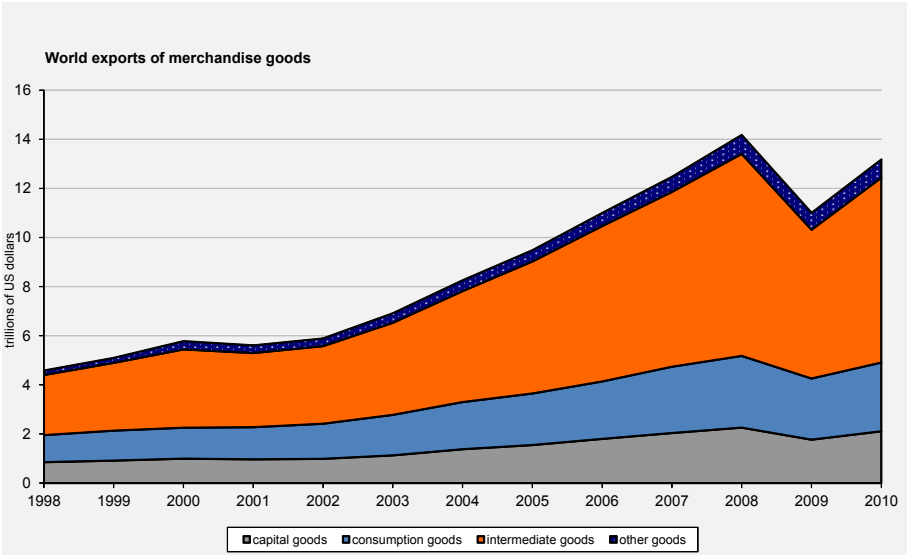
Higher bilateral trade-value partners participating in 75 per cent of global trade



Source: ESCAP based on COMTRADE. Available from http://comtrade.un.org/db/default.aspx (accessed November 2012).
Note: Each small circle represents a country that is part of the group responsible for the top 75 per cent in value of all the world's bilateral trade. The links between nodes represent bilateral trade, and the thicker the link the higher the value traded.

FIGURE I-10

Increasing share of trade in intermediate goods, 1998-2010



Source: ESCAP based on Basu and others 2013 and COMTRADE. Available from http://comtrade.un.org/db/default.aspx (accessed November 2012).

intermediate goods in current terms increased from about $3.2 trillion to more than $7.5 trillion. This increasing integration of trade in parts and components has helped boost output, but can also make the system more vulnerable to disasters: when one node collapses, the entire supply chain succumbs (Figure I-10).

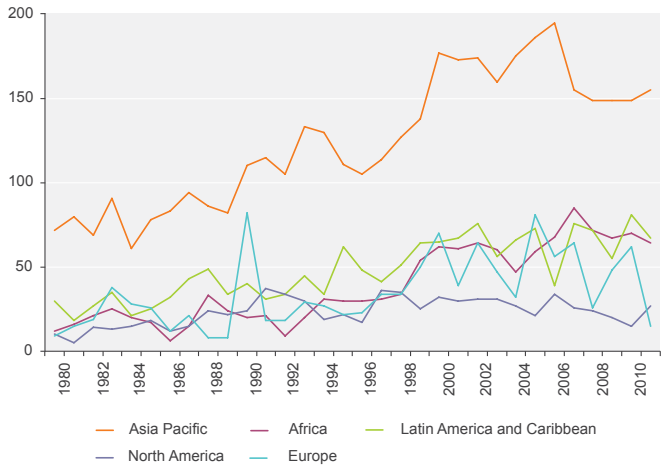
Natural disasters have indeed been disrupting production and supply chains. In March 2011, following the earthquake, Japanese automobile production fell by 47.7 per cent and electrical component production by 8.3 per cent. The effects were soon felt elsewhere. Between April and May 2011, the production of automobiles and electrical goods slowed significantly in Thailand, the Philippines, Malaysia and Indonesia. There were similar effects following the 2011 floods in Thailand which disrupted production not only in Thailand but also in other countries, notably Japan where electrical component production fell 3.7 per cent in the fourth quarter of 2011. Thailand's flooding also reduced the region's agricultural production.[39]

Asia and the Pacific is the world most disaster-prone region

Over the past three decades, the incidence of natural disasters has increased globally but the sharpest increase has been in Asia and the Pacific (Figure I-11).[40] In the past decade, a person living in Asia and the Pacific was almost twice as likely to be affected by a natural disaster as a person living in Africa; almost six times more likely than someone in Latin America and the Caribbean, and almost 30 times more likely than a person living in North America or Europe. In total, during that period, around 2.5 million people in Asia and the Pacific were affected by disasters and almost 800,000 were killed (Figure I-12).

FIGURE I-11

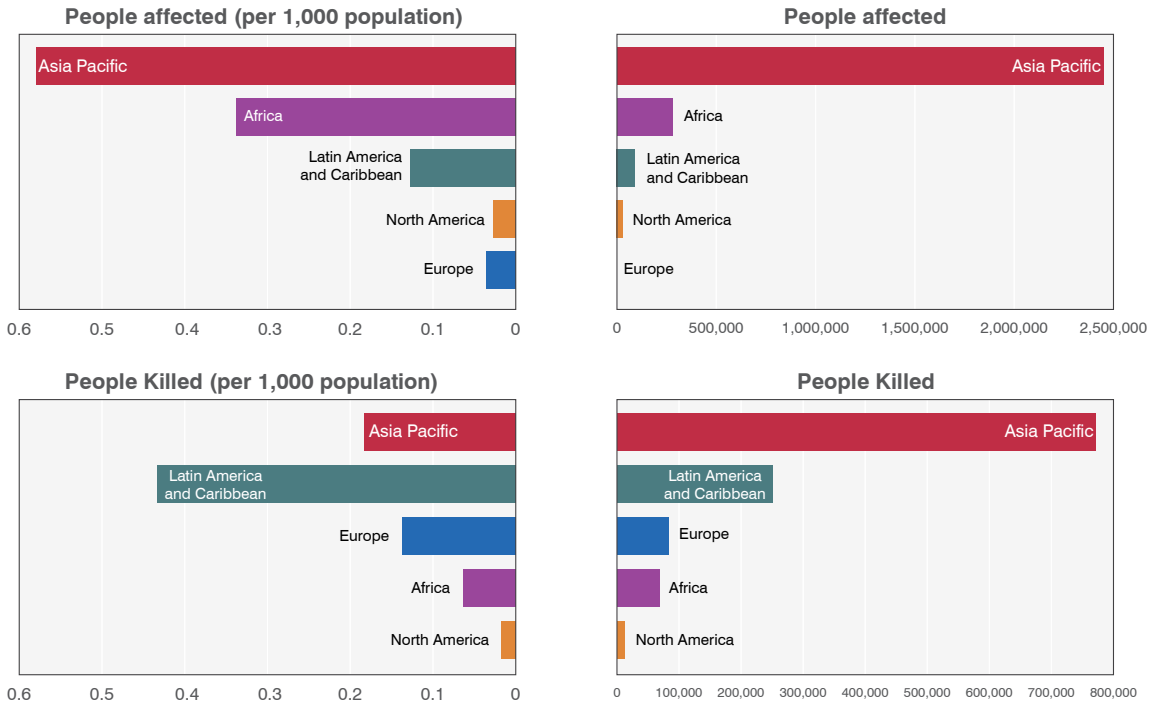
The number of reported natural disasters has increased, particularly in Asia and the Pacific, 1980-2011



Source: ESCAP based on data from EM-DAT: The OFDA/CRED International Disaster Database. Available from http://www.emdat.be/ (accessed November 2012).

FIGURE I-12

Risks of being killed or being affected by natural disasters, 2000-2012



Source: ESCAP based on data from EM-DAT: The OFDA/CRED International Disaster Database. Available from http://www.emdat.be/ (accessed November 2012).

Losses and damage have been rising

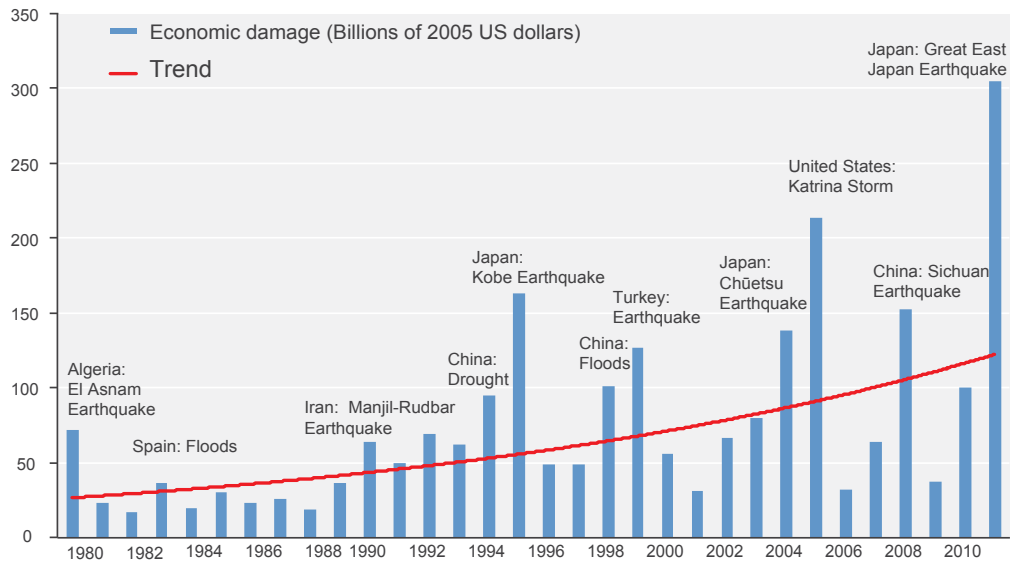
At the same time disasters have been causing greater economic damage. And over the past 20 years the pattern of losses has been dominated by the increasing frequency of large events (Figure I-13). In absolute terms, disasters may cause greater economic damage in richer countries that have more developed infrastructure.

But in relative terms the low-income countries are much harder hit. [41] In Asia and the Pacific, in the past five years, the average annual impact of disasters as a percentage of GDP was almost twice as high in low-income countries as in lower middle-income countries, and more than 10 times higher than in upper middle-income and high-income countries (Figure I-14).

The impact can be particularly severe in small island countries, in many cases causing damage and losses that represent multiples of the country's total annual output (Figure I-15).

FIGURE I-13

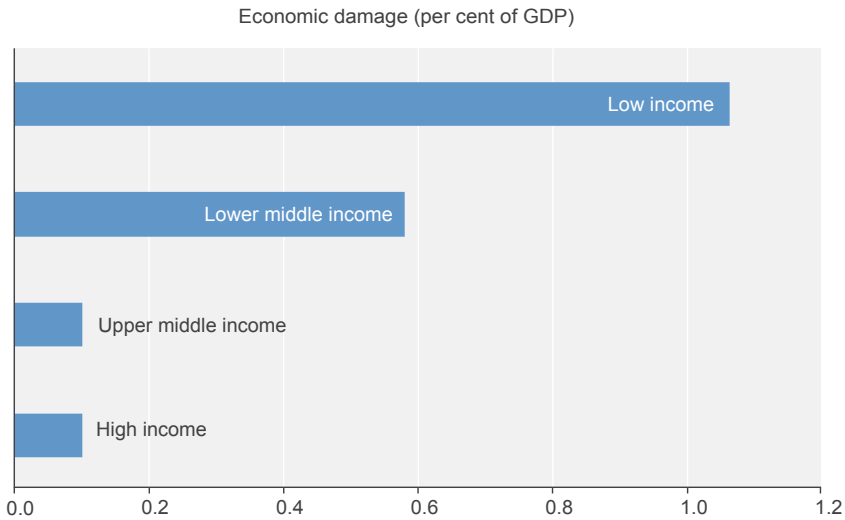
Global economic losses and damage are on the rise, 1980-2010



Source: ESCAP based on data from EM-DAT: The OFDA/CRED International Disaster Database. Available from http://www.emdat.be/ (accessed November 2012).
Notes: Labels in the figure show major disasters that contributed to high damage and loss in selected years.

FIGURE I-14

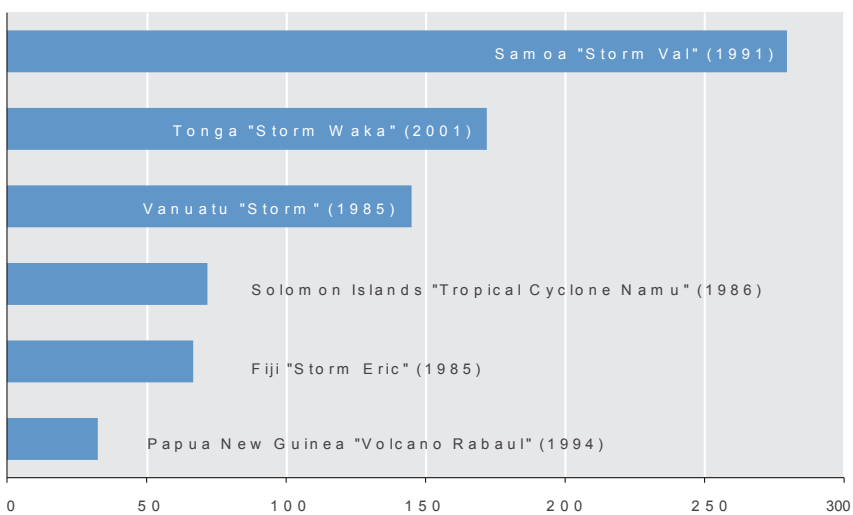
Impact is higher in poorer countries: Asia-Pacific average annual impact by income classification, 2006-2010



Source: ESCAP based on data from EM-DAT: The OFDA/CRED International Disaster Database. Available from http://www.emdat.be/ (accessed February 2013).

FIGURE I-15

Small island countries, economic damage as a percentage of GDP



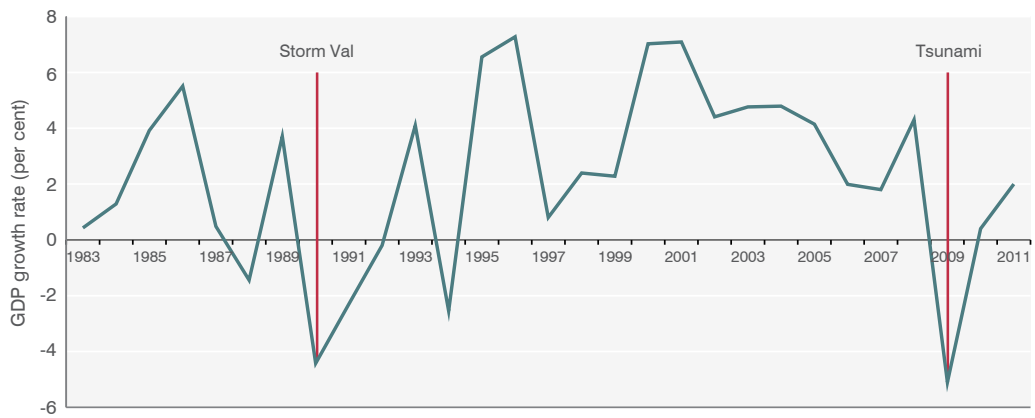
Source: ESCAP based on the World Bank's World Development Indicators available from http://data.worldbamk.org/data-catalog/world-development-indicators (accessed January 2013) and EM-DAT: the OFDA/CRED International Disaster Database. Available from http://www.emdat.be/ (accessed January 2013).

Shocks make growth volatile

Developing economies, and the small ones in particular, are also vulnerable to natural and other disasters because of structural weaknesses. Often they do not have very diverse exports and can be highly dependent on primary commodities. They can also be quite remote and have high concentrations of poverty. As a result they have less capacity to absorb shocks and their economic growth is likely to be more volatile. This is evident in Samoa, for example which in 1990 was hit by major storm Val and in 2009 by a tsunami, both of which caused significant losses in output (Figure I-16).

FIGURE I-16

Samoa, real GDP growth percentage, 1983 – 2011



Source: ESCAP based on World Bank's World Development Indicators. Available from http://data.worldbank.org/data-catalog/world-development-indicators (accessed January 2013).

Large shocks can cause permanent economic loss

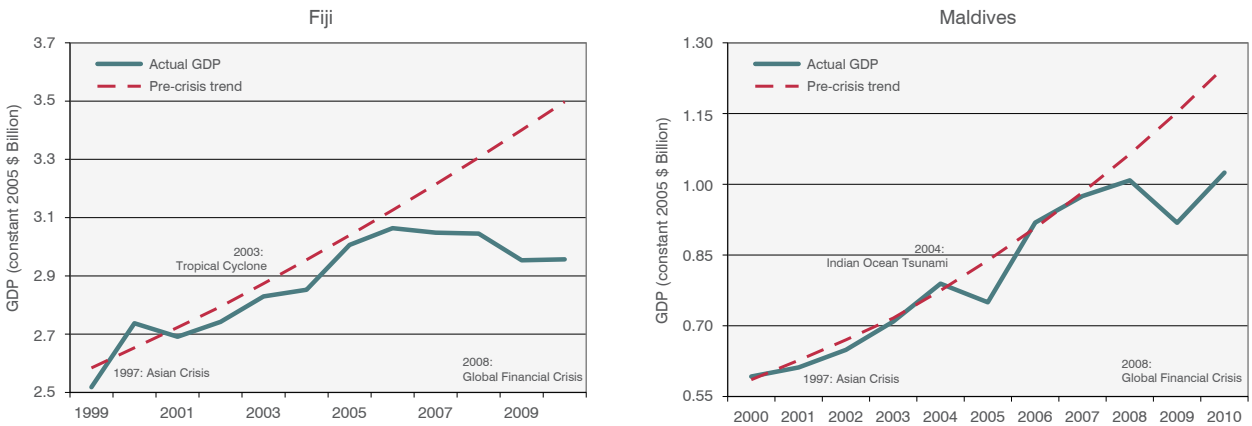
Severe shocks can also knock countries off their growth trajectories and lead to a permanent loss in output. For example, a banking crisis in developing and emerging economies may reduce total output by 4.5 per cent after eight years.[42] As a result of the 2008 crisis, GDP growth in many least developed countries is still below the pre-crisis trend.[43] In low-income countries, droughts, floods, storms and extreme temperature events can lead to declines in real per capita GDP of around 2 per cent. [44]

A major disaster causes suffering and loss of life, but in a poor country it also damages the limited stock of capital goods and can lead to a long-term decline in productive capacity. As economic activity declines, fiscal revenues also shrink. The sudden and large demand for cash and foreign currency adds to the macroeconomic challenges. Likewise, financial and economic crises generate output losses that result in economic slowdowns, create unemployment and threaten poverty reduction. All this distress can easily derail the economy and send it to a lower path of growth.

If a country suffers a series of shocks this can also have a cumulative effect, as illustrated by the 2003 cyclone Ami in Fiji and the 2004

FIGURE I-17

Persistent losses caused by shocks



Source: ESCAP based on Annual core indicators online database. Available from www.unescap.org/stat/data/statdb/DataExplorer.aspx (accessed January 2013)
Note: For more details see Laeven and Valencia, 2012.

Indian Ocean tsunami in Maldives, both of which were coupled with the 2008 global financial crisis (Figure I-17).

In addition to the permanent losses in output, large shocks also affect the achievement of the Millennium Development Goals. In Pakistan, for example, the 2005 earthquake, the 2007 cyclone and the 2010 floods all affected net primary school enrolment. These events damaged education facilities – reducing the quantity and quality of education. [45]

WHO IS MOST VULNERABLE TO MULTIPLE SHOCKS?

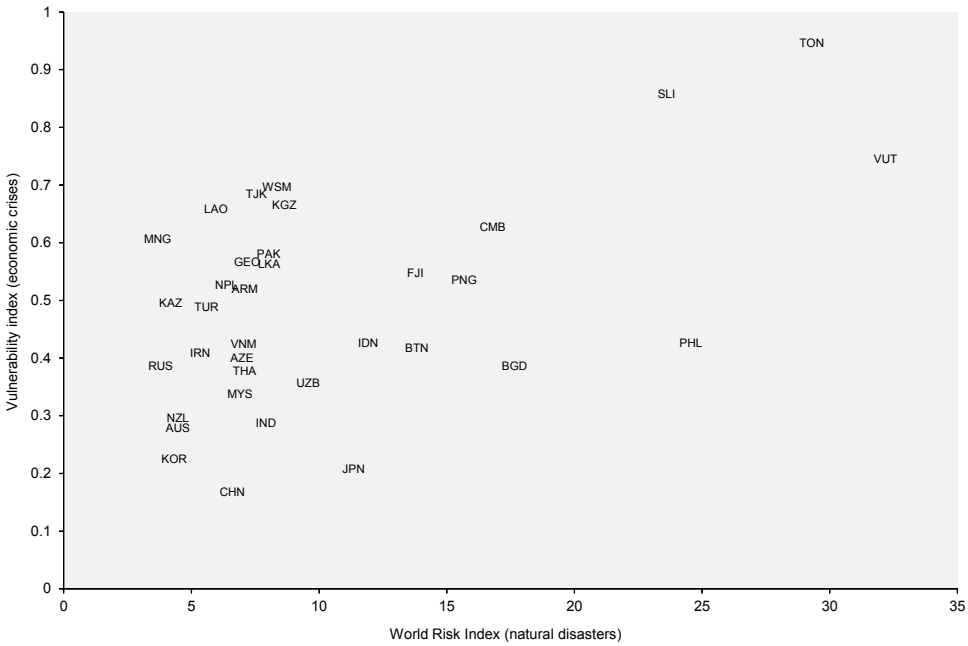
The countries most vulnerable to economic crises and natural disasters can be highlighted using two indices. The first is the ESCAP vulnerability index which assesses each country's exposure and capacity to cope with economic crises, and has been computed for 37 countries.[46] The second is the world risk index which assesses the risk to natural disasters using four indicators: exposure, susceptibility, coping and adaptive capacity.[47] Figure I-18 plots these two indices against each other. The countries most vulnerable to both types of shock lie in the top-right quadrant. These are the small island developing States including the Solomon Islands, Tonga and Vanuatu – which have populations concentrated in low-lying coastal areas and do not have very diverse economies.

As a proportion of GDP, the countries that lose most as a result of natural disasters are the developing countries, which globally lose 2 to 15 per cent of GDP annually.[48] Among these, the most vulnerable are the least developed countries, landlocked developing countries and small island developing States.

A similar trend emerges in the Asia-Pacific region where the most vulnerable are the least developed countries and small islands developing States. Bangladesh, Cambodia,

FIGURE I-18

Mapping vulnerability to economic crises and natural disasters



Source: ESCAP, 2010; UNU, 2011.

Papua New Guinea, the Philippines, Solomon Islands, Tonga and Vanuatu are the most at risk to natural disasters due to their high exposure and susceptibility to damage. The landlocked developing countries such as Tajikistan, Kyrgyzstan, Mongolia and Lao People's Democratic Republic are the most susceptible to economic shocks; these countries, being relatively more dependent on primary products, suffer most from commodity market volatility.

However, not all are equally vulnerable. A hazard only becomes a disaster when it encounters exposed and vulnerable communities. Vulnerability is also determined therefore by social, economic and environmental factors as well as the capacity to respond. Countries such as Bangladesh, Japan, Indonesia and the Philippines, even though at relatively higher risk have taken positive steps to mitigate the adverse effects.

The map of vulnerability in Asia-Pacific follows, to a great extent, the contours of the region's poverty map which shows the most vulnerable people to be those living in the most populous least developed countries.

From fragility to resilience

For people living in fragile and conflict-affected States, the journey from fragility to resilience is often both long and arduous. One quarter of the people in the world still live in areas plagued by high levels of criminal and political violence. They are twice as likely to be undernourished and their children three times as likely to be out of school.[49] With the additional threats to lives and livelihoods of climate change, natural

disasters, and economic crises, establishing human security is the most fundamental requirement of development. While this issue is not taken up in this report, for fragile states, good governance, strong institutions, accountable management of natural, human and financial resources, and above all, enlightened leadership matter the most.

SYSTEMIC RESPONSES

In future, it is clear that many countries will need to build their resilience to adapt and thrive in an unpredictable and shock-prone environment. To achieve this they will need to make policy in a different way. Rather than dealing with problems in the economy, environment and society separately, they will have to be addressed as parts of an overall system.

In pursuing these policies, policymakers of the region face key challenges when dealing with multiple crises. Subsequent chapters of this consider how they might address them:

- ***Chapter 2 – The macroeconomics of resilience***

Confronted with an already weakened macroeconomic environment as a result of an economic slowdown, policymakers face the dilemma of how to handle the added challenge of natural disasters using the limited number of macroeconomic instruments they have. This is particularly difficult in the least developed countries and in small and less diversified economies.

- ***Chapter 3 – Building resilient communities***

Economic crises and disasters hurt poor and vulnerable people the most. It is important therefore to support the most vulnerable communities, so that they can learn from past adversities and bounce back stronger and better-prepared for future shocks. This, however, requires a better understanding of the measures needed at national, provincial and local government levels to build community resilience.

- ***Chapter 4 – The land, water, energy nexus: avoiding catastrophic failure***

Building resilience involves using environmental resources as efficiently as possible. In particular this will mean diversifying economic activities so as to reduce dependence on individual environmental resources and limit the impacts on these systems in the event of an ecosystem failure. This will not be easy. Policymakers have to facilitate ecosystem conservation, regeneration and restoration while promoting sustained, inclusive and equitable economic growth.

- ***Chapter 5 – Protecting critical sectors***

Some sectors are inherently vulnerable and can either cause a crisis or act as transmitters of a localized crisis to a larger system. For example, the financial sector is sensitive to shocks and prone to systemic crisis. It is also important to safeguard critical social infrastructure, such as schools, hospitals and community buildings, major supply roads, bridges, power, water systems and crucial communication lines, so that they do not fail during natural disasters. This will mean designing legal, regulatory, and governance structures that minimize their exposure and vulnerability.

- ***Chapter 6 – Strengthening supply chains***

Integration into global value chains has enabled many Asia-Pacific economies to establish strong manufacturing bases and benefit from increased exports. However, this also increases

their vulnerability, directly and indirectly, to natural disasters. Policymakers also therefore need to devise mechanisms for boosting resilience throughout the chains.

■ ***Chapter 7 – Mutual support through regional cooperation***

Countries are increasingly faced with economic crises and natural disasters that have cross-border impacts. They can benefit, therefore, from mutually reinforcing strategies to build resilience, and share lessons, practical knowledge and experience across countries and subregions. The Asia-Pacific region has some regional cooperation mechanisms that deal with natural disasters and economic shocks. However, they are at different stages of development and, in most cases, they do not incorporate resilience. How to build on these mechanisms and fill up the gaps in regional cooperation is a key question for the governments of the region.

PHOTO CPA MEDIA

APPENDIX

MEASURING RESILIENCE

While there are a number of measures of exposure, vulnerability and risk to economic crises and disasters, thus far there have been fewer efforts to measure resilience to these combined shocks. This appendix makes an initial attempt to do so for each country based on characteristics of both the economy and the society. The focus is on the intrinsic resilience of countries to adapt to shocks, which is defined here as the resilience that emerges from intrinsic characteristics of the economy and the society that creates the environment for people to withstand, absorb and adapt to shocks. It considers therefore whether the economy can adapt to changed circumstances and self-organize to continue functioning at times of crises. And it considers whether people are sufficiently empowered to be better able to absorb and adapt to shocks. Another set of characteristics that might be used are those related to the environment, but it is not possible to investigate this at present due to a scarcity of relevant data.

Resilient economies – This measure is based on the assumption that a country will be more resilient if it has a complex and diversified economy which will offer greater opportunities for recombining its productive capabilities to keep the economy functioning and generate productive jobs after a shock. To assess the complexity of its production structure this report uses a measure based on the characteristics of its exports (see technical annex).

Resilient societies – People will be more resilient in more equitable societies that empower them to be better able to absorb and adapt to shocks. One way of measuring these is through levels of achievement in five Millennium Development Goals related to gender and children. The focus on women and children reflects their persistent vulnerability to shocks and the assumption that people will be in a stronger position to develop the capabilities needed to respond to disasters, if they live in societies that empower women and protect their children (see technical annex).

The result of this analysis is illustrated in Figure A-1. The vertical axis registers the economic component; the horizontal axis registers its social component. The figure is divided into four quadrants based on the global averages of each component. Countries in the upper-right quadrant are above the global average in both measures, so are more intrinsically resilient. In Asia and the Pacific these include Japan, Australia, and New Zealand, as well as emerging economies such as China, Malaysia, the Republic of Korea, and Thailand (Table A-1). They have diversified economies and are responsible for a large share of the region's total output. These countries also have relatively high achievement in the social indicators related to the inclusiveness of development. However, it should be noted that this is a national average and there is likely to be variation between regions in each economy: some regions may be better prepared to adapt to change and even benefit from it, while others may suffer dramatic loss and never recover.

FIGURE A-1

Intrinsic resilience, 2010

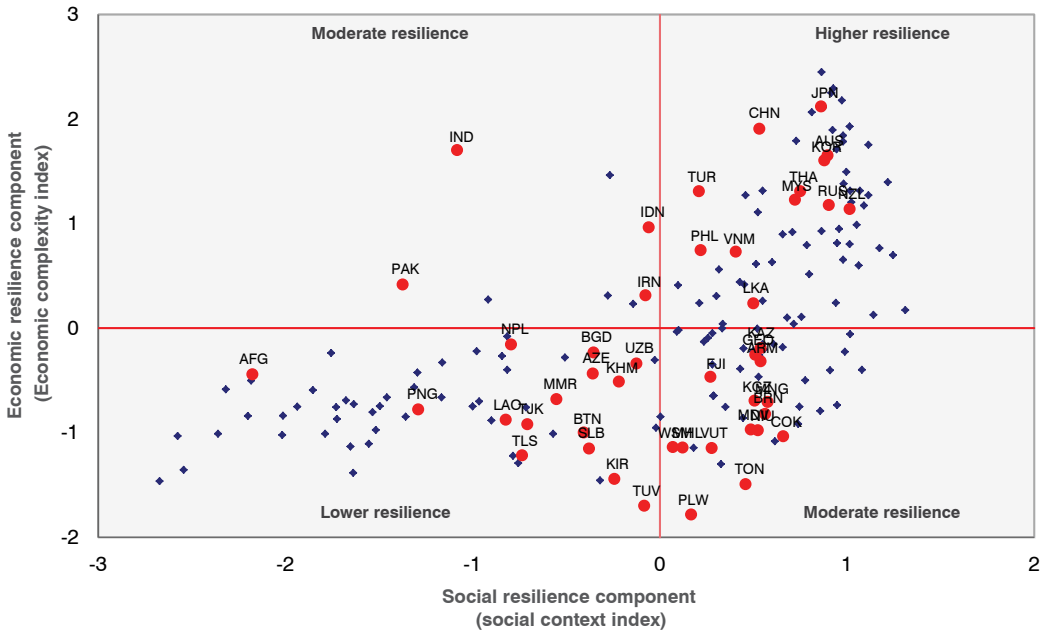


TABLE A-1

Intrinsic resilience of Asia-Pacific countries, 2010

Higher	
ENEA	China, Japan, Republic of Korea
NCA	Russian Federation
PAC	Australia, New Zealand
SEA	Malaysia, Philippines, Thailand, Viet Nam
SSWA	Sri Lanka, Turkey
Moderate	
Higher social component	
ENEA	Mongolia
NCA	Armenia, Georgia, Kazakhstan, Kyrgyzstan
PAC	Cook Islands, Fiji, Marshall Islands, Niue, Palau, Samoa, Tonga, Vanuatu
SEA	Brunei Darussalam
SSWA	Maldives
Higher economic component	
SEA	Indonesia
SSWA	India, Iran (Islamic Republic of), Pakistan
Lower	
NCA	Azerbaijan, Tajikistan, Uzbekistan
PAC	Kiribati, Papua New Guinea, Solomon Islands, Tuvalu
SEA	Cambodia, Lao People's Democratic Republic, Myanmar, Timor-Leste
SSWA	Afghanistan, Bangladesh, Bhutan, Nepal

Countries in the lower-left quadrant of the chart have a lower combined resilience. These include some of the region's least developed countries: Afghanistan, Bangladesh, Cambodia, Lao People's Democratic Republic, Nepal and Timor-Leste. Afghanistan, for example, despite progress in many social and economic indicators in recent years still has a low capacity to adapt to sudden and major shocks. Timor-Leste has also been involved in a difficult process of nation building and still has a relatively lower intrinsic resilience. In general, the economies that are least resilient are the smaller ones which are less diversified and have fewer productive capacities.

Countries in the upper-left quadrant have moderate resilience – with above-average economic resilience but below-average social resilience. These include Pakistan, and also India which, although it has made rapid economic progress, is still relatively unequal when considering the welfare of women and children. On these measures, Indonesia and the Islamic Republic of Iran are borderline.

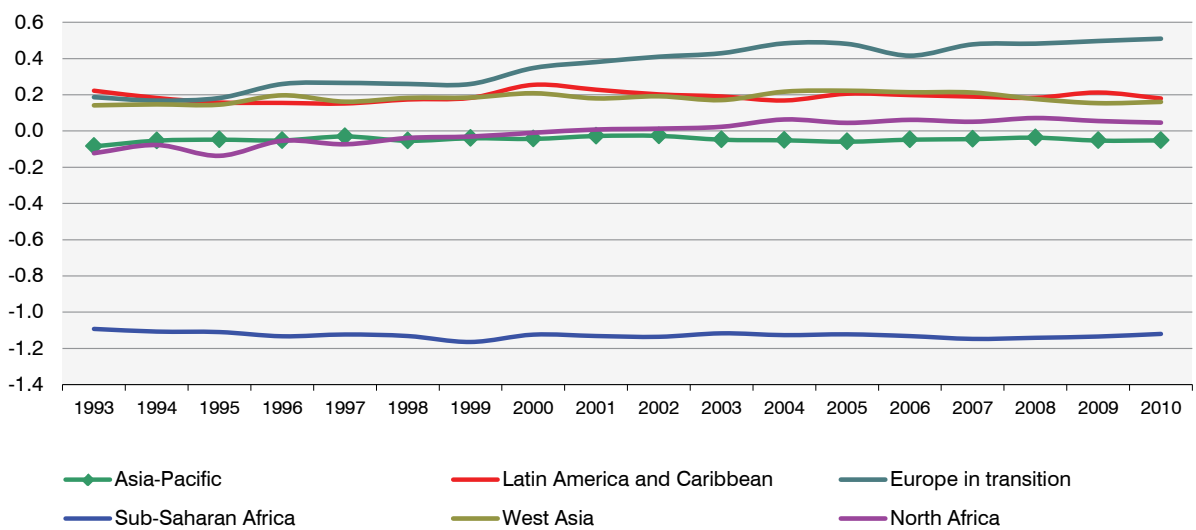
Countries in the lower-right quadrant also have moderate resilience, but in this case with above-average social resilience and below-average economic resilience. Most are small island countries; typically they have strong community links which bolster their intrinsic social resilience, but often have narrowly based economies making it too difficult for them to reorganize and adapt in case of a major shock – whether caused by an economic or natural disaster.

A composite index of resilience

The economic and social components can be combined with equal weights to produce a composite index. The results for Asia and the Pacific as a whole are shown in Figure A-2. This shows the region's intrinsic resilience to be

FIGURE A-2

Overall resilience index, selected global regions, 1993-2010



Source: Based on data from COMTRADE available from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/mdg/Default.aspx (accessed November 2012).
Notes: In the graph, zero marks the global average. The standard deviation of the global distribution of the index of overall intrinsic resilience is equal to 1.

similar to the global average but lower than in Latin America and the Caribbean, West Asia or the transition countries in Europe. Moreover, the region has made scarcely any progress, and the gap with some other regions has widened.

The regional average hides differences in performance across and within Asia-Pacific subregions. This is illustrated in Figure A-3 which shows the resilience to be greatest in the East and North-East subregions. Resilience is lower in other subregions but has been rising, in North and Central Asia, for example, and particularly in South and South-West Asia. The Pacific, on the other hand, has become less resilient over the years, even when considering the relatively higher resilience of its developed countries, Australia and New Zealand.

Overall, the higher resilience is generally found in countries with higher per capita income. Resilience is also greater in countries that are more urbanized. Cities concentrate the largest share of the economic complexity of countries and, in the aftermath of shocks, new connections are more likely to be established in the network of business and resources located in cities than in rural areas.

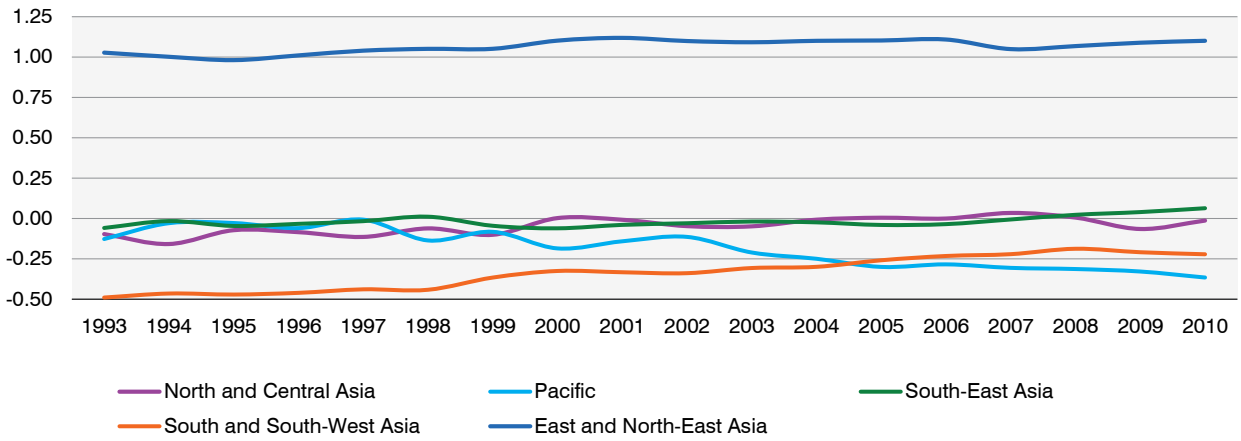
Higher resilience also goes hand in hand with better standards of governance – this would include better public services and a high quality civil service that is independent of political pressures. Also important is the quality of policy formulation and implementation, and the government's commitment to such policies including those that promote private-sector development – which contributes to a dynamic economy that is more likely to self-organize and heal itself in the aftermath of a crisis.

KNOWN RISKS AND VULNERABILITIES

The analysis of the relationship between resilience and the vulnerabilities associated to known risks provide important information about the challenges that countries face in dealing with more predictable crises.

FIGURE A-3

Index of intrinsic resilience, Asia-Pacific subregions ,1993-2010



Source: Based on data from COMTRADE available from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/mdg/Default.aspx (accessed November 2012).
Notes: In the graph, zero marks the global average. The standard deviation of the global distribution of the index of overall intrinsic resilience is equal to 1.

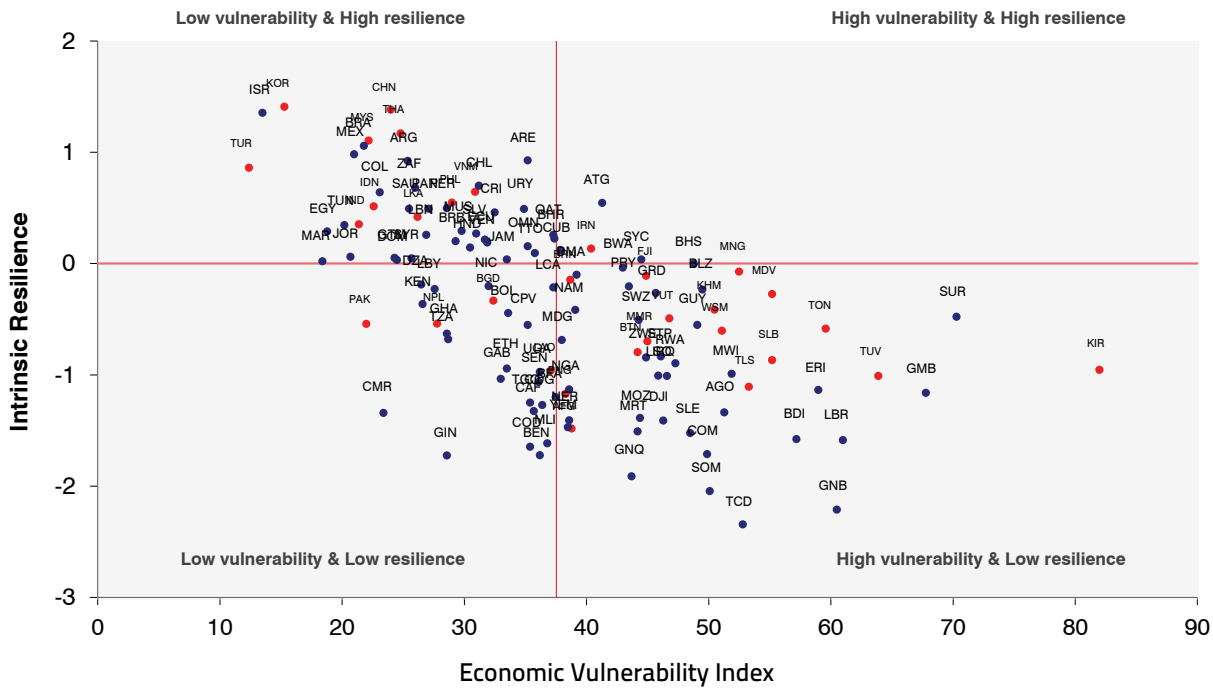
This is illustrated in Figure A-4, which compares the resilience index with the economic vulnerability index (EVI). The EVI is a United Nations index which measures the risk of a country's economic development being affected by exogenous and unexpected shocks. The EVI is calculated by combining equally weighted indices of exposure, which include size, location, economic structure and environmental factors, and the effects of previous shocks, including trade shocks and natural disasters.[50]

Figure A-4 shows that the intrinsic resilience index has an inverse association with the EVI: the higher the vulnerability, the lower the resilience. The red lines on the chart mark the global averages of the index of resilience and EVI. The countries in the top-left quadrant have high resilience and lower values of economic vulnerability. People in these countries are less likely to be affected by crises, and more likely to adapt and recover from them. On the other hand, countries in the bottom-right quadrant have lower resilience and are more vulnerable to external shocks. This quadrant includes the least developed countries of the region, and the small island countries. Most at risk on this basis are Kiribati, Tonga and Tuvalu.

Similarly, countries can be classified according to their intrinsic resilience and the risks of natural disaster. The risk of disasters is estimated using the world risk index (WRI) developed by the United Nations University and the Alliance Development Works. The WRI has four components related to known disasters: exposure,

FIGURE A-4

Association between intrinsic resilience and the economic vulnerability index



Source: Based on data from COMTRADE avalable from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/unsd/mdg/Default.aspx (accessed November 2012).

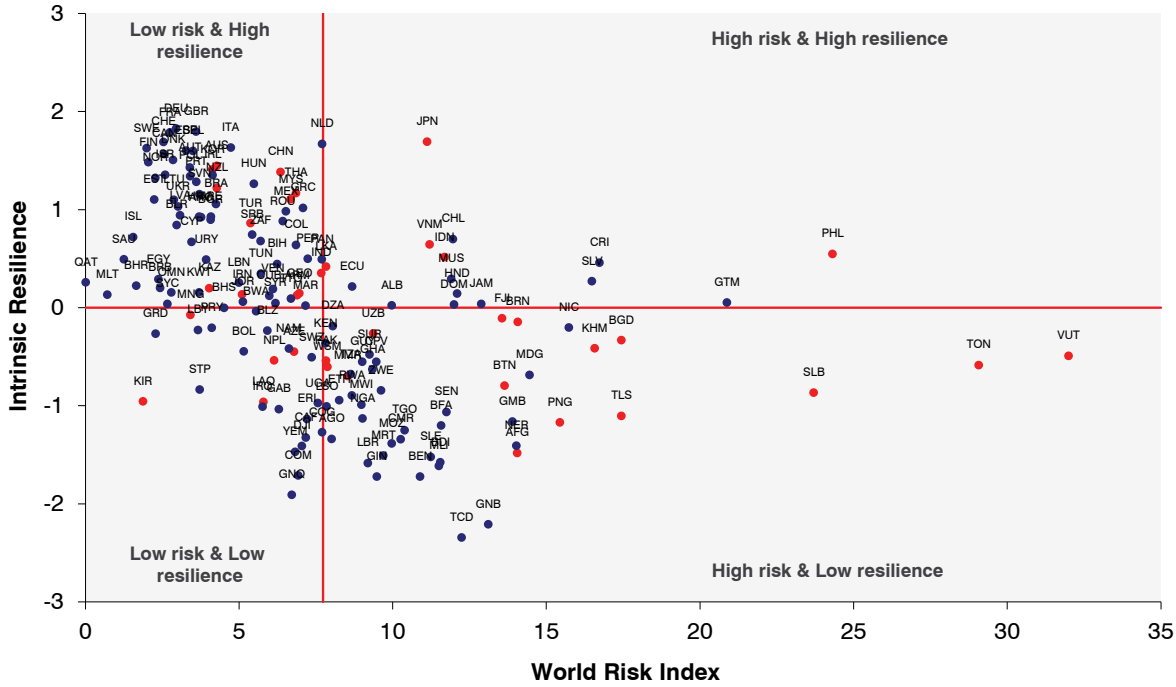
susceptibility, coping capacities and adaptive capacities. The exposure component refers to the physical exposure to earthquakes, storms, floods and droughts. The susceptibility component includes indicators of public infrastructure, economic capacity, distribution of income, poverty, dependency ratios of youth and of elderly, and nutrition. The coping capacity element assesses the capacity of government and authorities, medical services and material coverage or insurances, while the adaptive capacity element covers education and research, gender equity, environmental status and investment.

As indicated in Figure A–5, the intrinsic resilience index shows a less pronounced linkage with the WRI. The two red lines mark the global averages of the index of resilience and the WRI. Globally, among the countries with high levels of resilience, Japan is the country that faces the higher risk of natural disasters. The resilience of those that face lower risk varies from low levels as in the case of Kiribati, Mongolia, Nepal, and Lao People's Democratic Republic, to high resilience such as for Australia and the Republic of Korea. On the other hand, except for the Philippines, countries that face higher risk are associated with lower resilience.

The countries that are particularly at risk are Solomon Islands, Tonga and Vanuatu. These small island countries face many structural and geographical challenges in increasing resilience. Their small populations may create the conditions for more equitable societies but

FIGURE A-5

High risk countries are also less resilient



Source: Based on data from COMTRADE available from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/unsd/mdg/Default.aspx (accessed November 2012).

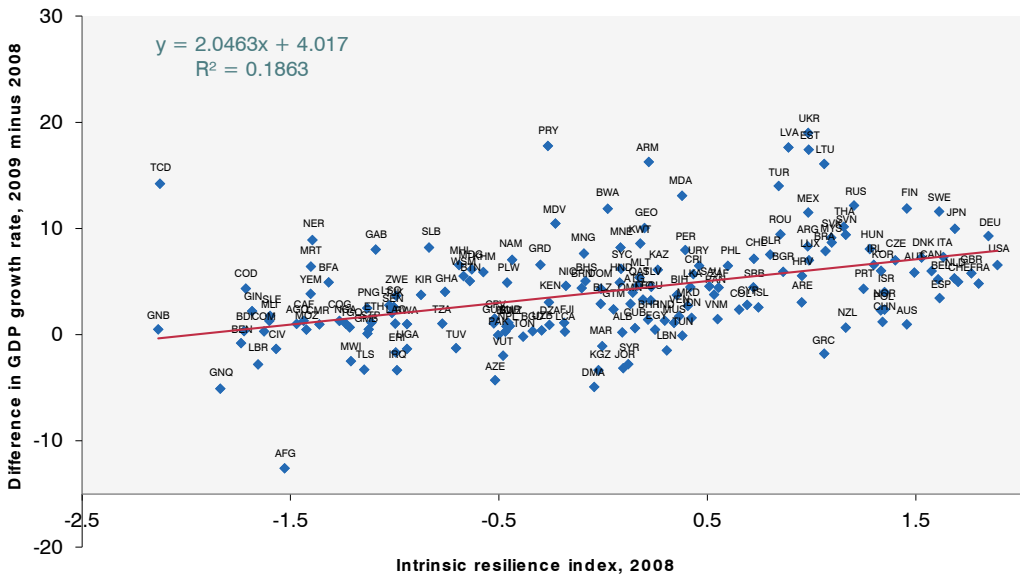
limit the development of diverse economies that can adapt to shocks. The best way for these economies to safeguard their development is to take disaster risk reduction measures that reduce their exposure and sensitivity to natural disasters – to prevent hazards becoming disasters.

RESILIENCE TO ECONOMIC CRISES

Countries in 2008 with higher scores on the intrinsic resilience index recovered best in 2009 after the global economic crisis (Figure A–6). The association is statistically significant and the index alone explains 18 per cent of the variation of the differences between the 2008 and 2009 GDP growth rates of 171 economies. Similarly, Asia-Pacific countries in 1997 with higher scores for the intrinsic resilience index presented better economic performance in the midst of the 1997 Asian financial crisis (Figure A–7). Again, the association is statistically significant and the index alone explains 15 per cent of the variation of the differences between the 1997 and 1998 GDP growth rates of 42 economies of the region.

FIGURE A-6

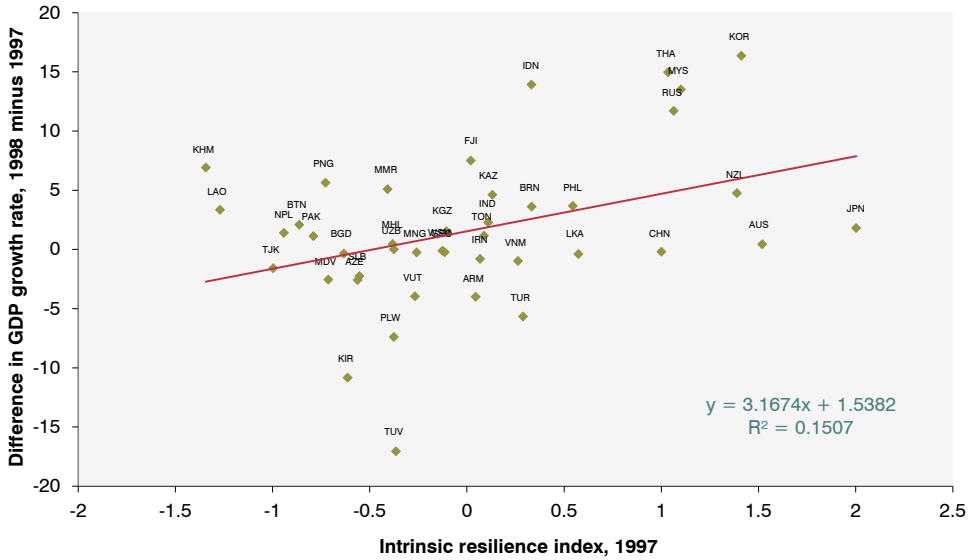
Global economic crisis, 2008-2009



Source: Based on data from COMTRADE available from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/unsd/mdg/Default.aspx (accessed November 2012) and the World Bank's World Development Indicators available from http://data.worldbank.org/data-catalog/world-development-indicators (accessed November 2012).

FIGURE A-7

Asian financial crisis



Source: Based on data from COMTRADE available from http://comtrade.un.org/db/default.aspx (accessed November 2012) and MDG Indicators Database available from http://mdgs.un.org/unsd/mdg/Default.aspx (accessed November 2012) and the World Bank's World Development Indicators available from http://data.worldbank.org/data-catalog/world-development-indicators (accessed November 2012).

TECHNICAL ANNEX

ECONOMIC COMPLEXITY INDEX

The analysis presented in this Study applies the method of reflections proposed by Hidalgo and Hausmann[51] to quantify the set of productive capabilities available in a country's economy based on the structure of a bipartite network connecting countries to the products that they export. The method of reflections assumes that products require specific combinations of capabilities to be produced; countries have some capabilities but not others; and countries will produce goods as long as they have all the required capabilities.[52] This analysis infers the set of capabilities available in the countries by analysing the association and implied relationships that connect countries to products. The method uses trade data to infer the products that the country is able to produce.

Data is data from *United Nations COMTRADE* using SITC rev2 (5-digit level). The value traded is not used in the analysis, only the unit value is considered to further classify products by price range.

The method represents the network connecting countries to products using the adjacent matrix *Mcp*, where M_{cp} is 1 if the country produces the product and 0 otherwise. The method is defined as the recursive set of observables:

$$K_{c,N} = \frac{1}{K_{c,0}} \sum_{p} M_{cp} K_{p,N-1}$$

and

$$K_{p,N} = \frac{1}{K_{p,0}} \sum_{c} M_{cp} K_{c,N-1}$$

For $N \geq 0$, with $K_{c,0}$ representing the number of products exported by country c and $K_{p,0}$ representing the number of countries that export product p. The method of reflections thus produces, for each country c, a vector represent ing the complexity of productive structure of the country in terms of the diversification and ubiquity of its product-mix, which can be identified with an ordered list of N real numbers $(K_{c,0}, K_{c,1}, K_{c,2}, \ldots , K_{c,N})$, where N is the number of iterations of the method of reflections. As the number N of iterations of the method increases, the higher order variables tend to converge to the same number. There is, therefore, a limit to the number of iterations that result in relevant values to produce the ranking. The value of such limit number (N_L) depends on the structure of the network (i.e. the number of countries, products, and how they are connected). Since the method converges quickly, however, this report approximates the limit by $K_{c,12}$. The measure is normalized by subtracting its mean and dividing by the standard deviation.

SOCIAL CONTEXT INDEX

This report creates a quantitative measure of intrinsic social resilience for each country by applying the method of reflections to information on the attainment of five Millennium Development Goal (MDGs) indicators related to gender and children (Table A–2).

Similarly with the estimation of economic complexity, the method represents the network connecting countries to products using the adjacent matrix M_{cp}, where M_{cp} is 1 if the country produces the product and 0 otherwise. The assumption is that more challenging levels of attainment are less likely to be achieved by a larger number of countries, and that more socially equitable countries are more likely to reach a large number of goals. Data on each indicator is disaggregated by taking each percentage point in the level of attainment as a different MDG product. Missing values on the MDG dataset of a country between two reporting years were imputed using simple interpolation method and missing data in years before the earliest or after the latest data available were imputed by replacing them with the nearest available data/year for the country. For indicators such as infant and under-5 mortality, the scale is reversed to reflect the fact that the lower number represents the highest level of attainment. The measure is normalized by subtracting its mean and dividing by the standard deviation.

TABLE A-2

List of MDG indicators considered to calculate the social resilience component

MDG	Indicator
Promote gender equality and empower women	Gender Parity Index in secondary level enrolment
	Share of women in wage employment in the non-agricultural sector
Reduce child mortality	Children under five mortality rate per 1,000 live births
	Infant mortality rate (0-1 year) per 1,000 live births
	Children 1 year old immunized against measles, percentage

ENDNOTES

1 Hossain and Green, 2011.

2 Narasimhan, 2009.

3 Philippines, NDRRMC, 2012.

4 United Nations, 2005a.

5 United Nations, 2010.

6 United Nations, 2011.

7 United Nations, 2012b.

8 Kahneman and others, 2011.

9 World Bank, 2012b.

10 Flyvbjerg, 2006.

11 Weitzman, 2009.

12 UNISDR Terminology on Disaster Risk Reduction.

13 Holling, 1973.

14 IPCC, 2007.

15 Resilience Alliance, further information from http://www.resalliance.org/index.php/glossary.

16 USAID, further information is available from http://www.usaid.gov/resilience

17 Stockholm Resilience Centre, further information is available from http://www.stockholmresilience.org/21/research/what-is-resilience.html.

18 UK DFID, 2011.

19 WEF, 2013.

20 For further information, refer to www.usaid.gov/resilience.

21 Stiglitz, 2009.

22 Cash and others, 2006.

23 ESCAP, 2012c and 2012d.

24 ADB, 2011b.

25 Fornanri and Stracca, 2012.

26 Grilli and others, 2012.

27 Soremaki and others, 2006.

28 Albert and others, 2000; Crucitti and others, 2004.

29 May and others, 2008.

30 De Bock and Carvalho Filho, 2013.

31 ESCAP, 2012c.

32 ESCAP, 2011b.

33 Becker and Mauro, 2006.

34 ESCAP, 2012c.

35 Bhattacharya and Dasgupta, 2012.

36 ADB and World Bank, 2010.

37 UNCTAD, 2013.

38 Jansen and others, 2009.

39 ESCAP, 2012c.

40 In this study natural disasters are droughts, floods, storms, extreme temperatures, and wildfires, as well as mass movements such as landslides, volcanoes, earthquakes and tsunamis.

41 Noy, 2009.

42 Furceri and Zdzienicka, 2012.

43 Bhattacharya and Dasgupta, 2012.

44 Raddatz, 2007; Hochrainer, 2009.

45 ESCAP and UNISDR, 2012.

46 ESCAP and others, 2010.

47 UNU, 2011.

48 UNISDR, 2011.

49 World Bank, 2011c.

50 Cariolle, Joel and Patrick Guilaumont, 2011.

51 Hidalgo and Hausmann, 2009.

52 Hausmann and Hidalgo, 2010.

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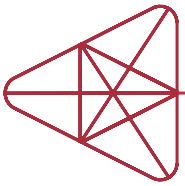
2

THE MACROECONOMICS OF RESILIENCE



THE MACROECONOMICS OF RESILIENCE

Countries in Asia and the Pacific regularly face multiple shocks – from both economic crises and natural disasters. As well as causing human suffering, these shocks also affect national economies. Policymakers now have to respond with careful choices that address inflationary pressures, fiscal deficits and the prospect of rising debt.

Countries in the Asia-Pacific region are vulnerable to many kinds of shock – resulting from financial crises, for example, or declines in the terms of trade, as well as political or social upheaval, health pandemics, or natural disasters. And many of these shocks may be experienced at the same time: indeed in Asia and the Pacific simultaneous multiple shocks have become the 'new normal' – particularly the combination of natural disasters and economic crises.

Despite the frequency of simultaneous crises, the economic literature offers little guidance on how to respond. To what extent should countries faced with multiple shocks, uphold conventional macroeconomic stabilization objectives and targets – on inflation or fiscal deficits, or on liquidity norms or debt sustainability? And faced with the prospects of slower growth should they uphold the central bank's objective of low inflation?

There are also unanswered questions on how to prepare for disasters. Conventional wisdom will argue for investing in risk reduction – in order to reduce subsequent expenditure on relief and rehabilitation. Nevertheless, the economic literature offers little guidance on how to integrate disaster risk reduction into macroeconomic policymaking.

It is also important to consider the inter-connections between policy choices made before and after disasters. The options for restoring the economy to its long-run, pre-disaster growth will depend to a certain extent on previous policy choices on prevention and preparedness.

This chapter attempts to shed light on some of these unresolved issues, and puts forward some pragmatic general principles for a macroeconomic framework that promotes resilience to both economic shocks and natural disasters – helping countries mitigate their inherent vulnerability to shocks while enhancing their ability to recover.

IMPACT OF NATURAL DISASTERS ON THE ECONOMY

Natural disasters not only lead to loss of life and human suffering, they also destroy private and public capital – productive assets, property and infrastructure. This soon affects the overall economy – slowing down manufacturing and agricultural production and increasing the prices of essential goods.

At the same time disasters erode human capabilities. Households faced with rising prices can suffer from hunger and malnutrition and may

have a diminished capacity to work – problems which are compounded if governments under even greater fiscal pressure reduce expenditure on the social sectors. This general environment of scarcity can also have broader effects on the society and lead to increases in crime and violence.

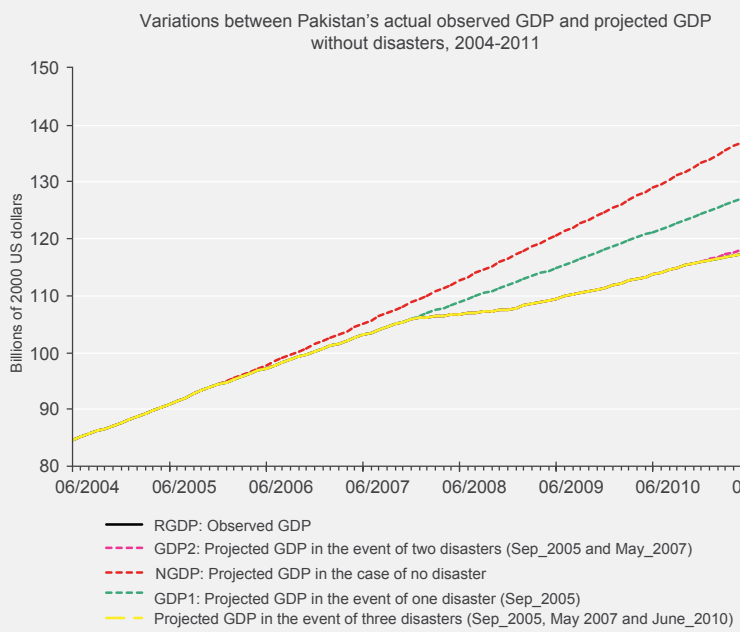
Natural disasters lead to an immediate, short-term contraction in economic output. One survey of 35 events for which median damage was 3 per cent of GDP found that in 28 cases GDP growth fell in that year, with a median reduction of 1.7 percentage points.[1] Another study looked at 21 major disasters and found that same-year GDP growth fell by an average of 3.1 percentage points.[2] Other studies have estimated that disasters produce an average 0.7 percentage-point drop in GDP growth in the first year.[3]

There are also long-term implications. This is a particular risk for low-income countries where a series of disasters is likely to reduce fiscal space and increase debt, while eroding people's coping capacities. Box II-1 shows how natural disasters might have reduced growth in Pakistan. For the long-term effects there is less empirical cross-country evidence, but one study has found that countries that had a natural disaster followed by political upheaval then suffered long-term declines in growth.[4]

BOX II-1

Impact of natural disasters on economic growth in Pakistan

In recent years the country has been hit by a series of natural disasters. In October 2005, there was a 7.6 magnitude earthquake. And in 2010 and 2011, there was severe flooding. The disasters had a massive cumulative effect on the economy. The figure below shows what growth might otherwise have been, indicating an overall dampening effect on the economy.



It should be emphasized, however, that these projections are only illustrative and do not take into account factors other than natural disasters that might have affected growth rates.

Source: ESCAP and UNISDR, 2012.

The long-run impact of a disaster on any country will depend on the economic, social and institutional conditions – and the subsequent response. Sometimes the outcome can be positive. The May 2008 earthquake in Sichuan, China, for example, resulted in a wholesale capital stock replacement which helped boost productivity and growth (Box II-2).

MACROECONOMIC TRANSMISSION CHANNELS OF NATURAL DISASTERS

From the macroeconomic perspective, a natural disaster delivers a shock to the aggregate supply curve, resulting in a decline in real output and employment. This supply shock is transmitted to the real sector through a number of channels.

- ***External sector*** – Natural disasters usually lead to a sharp deterioration in the trade balance. Import bills rise for food, raw materials and reconstruction materials, while exports tend to decline due to the destruction of productive capacity and market infrastructure or the reallocation of labour to disaster relief and rehabilitation. One study for Latin America and the Caribbean, for example, considered 42 large natural disasters and found that these were, on average, associated with a deterioration in the balance of payments by an amount equal to one-third of the estimated damage.[5] Another

BOX II-2

Creative destruction in Sichuan, China

The earthquake that struck Sichuan Province in May 2008 left behind scenes of almost apocalyptic devastation: mountaintops sheared off into valleys, cities reduced to rubble and dust, cracked dams, collapsed bridges and at least 80,000 dead.

But the earthquake also did something else: it helped the Chinese economy. A little over a month after the quake, the State Information Centre, a Chinese Government research body, announced that the massive rebuilding effort, and the billions of dollars it would pump into the Chinese economy, would far outweigh the economic losses from the quake. The benefits, the centre said, would be enough to raise national economic growth by 0.3 per cent, a small but not insignificant part of a growth rate for 2008.

Rebuilding efforts provide a short-term boost by attracting resources to the region, economists say. By destroying old factories and roads, airports and bridges, the disasters allowed new and more efficient infrastructure to be built, forcing the transition to a sleeker, more productive economy in the long term. In this instance, a disaster performed the economic service of clearing out outdated infrastructure to make way for more efficient replacements. It might be seen as Mother Nature's contribution to what the Austrian-born Harvard economist Joseph Schumpeter famously called capitalism's "creative destruction."

As the recent evidence suggests, the Sichuan economy has actually become more productive than before, as was predicted by many economists. With rebuilding nearly complete, there has been an on-going economic boom in Sichuan. In the last four years, its income has doubled, with per capita GDP exceeding $4,000; in economic terms, it now ranks number one among provinces in Western China. It has also attracted a large volume of foreign investments, and now hosts 200 of the Fortune 500 firms.

Sources: New York Times, 2008. China Daily, 2012.

study found that 21 major natural disasters led to an average worsening of the trade balance, owing to an increase in import growth and, to a lesser extent, a reduction in exports.[6] Another review concluded that an important indicator of the deterioration in the trade balance was the country's dependence on agricultural exports.[7]

■ ***Foreign aid*** – It might be thought that natural disasters would result in a surge in foreign aid. But not necessarily. Some studies have concluded that only a large-scale natural disaster causes an observable increase in foreign assistance.[8] And others suggest that this emergency assistance is likely to be offset by a decrease in development assistance in subsequent years.[9] Still others contend that, although foreign assistance increases after a natural disaster, the surges are typically small in relation to the size of the affected economies or the economic damage.[10] It has also been suggested that the effect depends on the type of disaster: foreign aid tends to increase after a climatic disaster and decrease after a geological one.[11] A surge in aid also raises the spectre of 'Dutch disease' – an increase in the real exchange rate that erodes export competitiveness and slows economic growth. Even if it has this effect, however, foreign aid can, by restoring infrastructure, add to productive capacity which also fosters growth – so the net effect is ambiguous.

■ ***Formal labour market*** – Large-scale damage and destruction are likely to disrupt manufacturing as well as agriculture and thus reduce both employment and wages. One study on Bangladesh estimated that, five years after the 1998 flood of the century, for each one-foot deviation from the normal flood level, agricultural and non-agricultural wages decreased by 4 to 7 per cent.[12] However, in some circumstances wages could rise. A disaster that leads to high mortality, for example, could seriously reduce the labour force; even a limited loss of life can cause certain labour markets to tighten significantly. This can also happen, for example, if workers withdraw from the labour force to secure family and property or if they move to the booming reconstruction sector. Wages can then rise even for semi-skilled or unskilled workers – eroding the competitiveness of the tradable sectors and acting as a drag on economic recovery.

There is some evidence that this is indeed what happened in the aftermath of the Indonesian earthquakes between 2000 and 2007. Reconstruction in the affected communities caused wages to rise and encouraged workers to move from agriculture and manufacturing to the services and non-tradable sectors. This reduced the growth in agriculture and eroded the competitiveness of the tradable sectors.[13] The 2008 earthquake in Sichuan, China also saw a reallocation of workers – in this case between private manufacturing and the public reconstruction and rehabilitation activities. However, the outcome here was different. Reconstruction enhanced productivity in manufacturing and led to readjustments in the labour market.

■ ***Public finances*** – There is also an impact on fiscal balances and public debt. As a result of natural disasters, governments will spend more on emergency relief, reconstruction and social welfare for the poor. They may also offer financial support to affected businesses and to financial institutions. If they have to borrow for this purpose, there will be an increase in public debt. At the same time disasters will also affect public revenues. A fall in output is likely to reduce revenue from taxes and duties. And even

a rise in imports of emergency-related goods is unlikely to generate much revenue as most of these tend to be exempt from duty.

The net effect on the budget will depend on the particular circumstances, but generally the budget effect is likely to be lower in developed economies – which have stronger financial sectors and extensive disaster insurance. In this case a larger chunk of the output loss will be absorbed by the private sector, so the fiscal impact is lower. In most developing countries, on the other hand, the brunt of the responsibility for rehabilitation and reconstruction falls on the government which can see its budget deficit increase. One survey of middle- and upper-income countries found that natural disasters led to an increase in government expenditure by 15 per cent and a decrease in government revenue by 10 per cent, increasing the budget deficit by 25 per cent. As the budget deficit increases, there may be an increase in public debt.[14]

When a natural disaster leads to a sharp increase in the fiscal and current account deficits, there is likely to be an increase in prices and interest rates. The impacts on the exchange rate, however, are less clear. But none of these outcomes are automatic; much will depend on government policies, and private-sector expectations and responses.

DIFFERENT IMPACTS OF ECONOMIC CRISES AND NATURAL DISASTERS

Natural disasters and economic crises both affect the economy, but in different ways. Natural disasters destroy property and productive capacity and deliver adverse shocks to the aggregate supply curve. Economic crises, on the other hand, do not destroy anything directly but do deliver adverse shocks to the aggregate demand curve.

As a result they have different impacts on inflation. A supply shock from a natural disaster will increase inflationary pressure, while a demand shock from an economic crisis is likely to be deflationary. Natural disasters and economic crises that are simultaneous may thus mitigate each other's impact on the price level. So getting policies right will mean considering both impacts.

Adverse aggregate demand and aggregate supply shocks both reduce GDP, which in turn exacerbates fiscal imbalances. If a natural disaster follows in the wake of an economic crisis, it will compound the fiscal imbalance.

While both types of shocks can wreak havoc on any developing country, some countries will take longer to recover. One study covering the period from 1970 to 2001, found that the costs were greater, and the recovery period longer, in the world's poorer developing countries.[15] On average, both emerging market economies and the poorer developing countries experienced a drop in output every 16 years. But while the emerging economies suffered a cumulative loss of 40 per cent of GDP, and took six years to return to the pre-crisis per capita output, the low-income countries had twice the losses and took twice as long to recover. It was also found that some countries were more susceptible to particular types of shock. While the emerging economies were more vulnerable to shocks relating to financial flows, the low-income countries were more susceptible to adverse terms-of-trade movements.

However, such studies are more suggestive than definitive and indicate the need for more empirical research. Indeed they do not necessarily accord with the experiences of many Asian economies. In Bangladesh, Indonesia, and the Philippines where natural disasters are

frequent and severe, a large measure of output variability does stem from natural disasters.

So far this section has considered cases when macroeconomic crisis and natural disasters happen separately. Recent years, however, have seen multiple, simultaneous crises which compound each other's adverse impacts. Economic analysis is still at its infancy when it comes to dealing with such interlinked crises, perhaps because they arise from fundamentally unpredictable processes.[16]

Nevertheless, there has been some qualitative work. One sociological study covers the period from 2008 to 2011 in 17 countries – including Bangladesh, Cambodia, Thailand and Viet Nam – looking at the effects of simultaneous crises in finance, fuel and food, exacerbated by natural disasters.[17] This found that whatever the shock those hit hardest were the poorest and most vulnerable, with devastating impacts on their long-term well-being – a subject addressed in Chapter 3.

ADDRESSING NATURAL DISASTERS

For natural disasters, there is a fairly large body of literature on the macroeconomic impact, but much less on the appropriate policy response. Governments need an effective macroeconomic response:

- To ensure that those affected can preserve core consumption;
- To restore damaged or lost property, capital and infrastructure;
- To avoid a rise in inequality; and
- To ensure sustainable long-term growth.

PHOTO COURTESY OF MSNBC

The appropriate response will depend on the nature of the damage. A disaster that has demolished key roads and power plants will have a different economic impact from one that has destroyed subsistence agriculture or an island's fishing boats. But in all cases, countries will need an appropriate macro-economic framework, including both annual budgets and longer-term investment plans.

Country experiences suggest that such a framework would include the following elements.

- ***An explicit disaster strategy*** – This should be well integrated into national development strategies, such as on poverty reduction, and also connect with cross-cutting concerns such as environmental protection. The disaster strategy thus needs to be incorporated into national development planning – in all relevant sectoral strategies and at all levels of government. The ways of doing this were detailed in the Hyogo Framework of Action 2005-2015. This considered disaster risk reduction within the management of environmental and natural resources, social and economic development practices, and land use planning, building codes and other technical measures. In this regard, however, Asia and the Pacific, and especially the least developed countries are falling behind global performance.[18]

Nevertheless, the region does offer examples of good practice. The Philippines' Development Plan 2011-2016, for example, treats disaster risk reduction as a component of the development process. The plan is then integrated into public-sector management functions of planning, investment programming, budgeting, implementation, monitoring and evaluation.

- ***Participation of stakeholders*** – This should involve community leaders, civil society, and the private sectors. This has been achieved in Indonesia for example. The Government based the National Disaster Management Plan of 2010-2014 and the National Action Plan for disasters on the experiences of the 2004 tsunami that hit Aceh and Nias and the 2006 earthquake that hit Yogyakarta. These plans engage all key stakeholders and operate horizontally across line ministries, as well as vertically down to provincial and district levels. They also have a strong legal foundation – the Disaster Management Law 2007.[19]

- ***Measures for disaster risk reduction*** – Successful disaster strategies require investment in disaster risk reduction as well as financial protection against disasters. Such investments would include making school buildings and other structures disaster resilient. Such measures not only reduce risk, they are good for development.

Across the region, many countries, particularly those in disaster-prone areas, now realize the importance of including disaster risk management in their macroeconomic frameworks. Over the past 25 years, Bangladesh, for example, has invested more than $10 billion in disaster risk management – which has contributed to the current decline in disaster losses. Indonesia, between 2006 and 2012, increased the proportion of the budget going to disaster risk management from 0.6 to 1 per cent. China in 2011 created a Comprehensive Disaster Prevention and Reduction Plan (2011-2015) which envisages wide-ranging investments in early warning, risk assessment, community-based disaster risk management, and education and awareness. The aim is to reduce annual disaster losses from 8 to 1.5 per cent of GDP.[20]

DISASTER RISK REDUCTION IS COST EFFECTIVE

Macroeconomic management of crises has two dimensions. The first concerns policy choices related to pre-disaster risk management. The second concerns post-disaster relief and reconstruction – to restore the economy to its pre-disaster long-run growth path with the least disruption to the economy.

Pre-disaster risk management should have four distinct components (Figure II-1):

1. Risk identification – This involves identifying risks and social vulnerabilities. It is important to note that risk has both structural and social dimensions. It is essential to identify both. Empirical studies suggest that societies with adequate social safety nets are better prepared to face a natural disaster than those without.

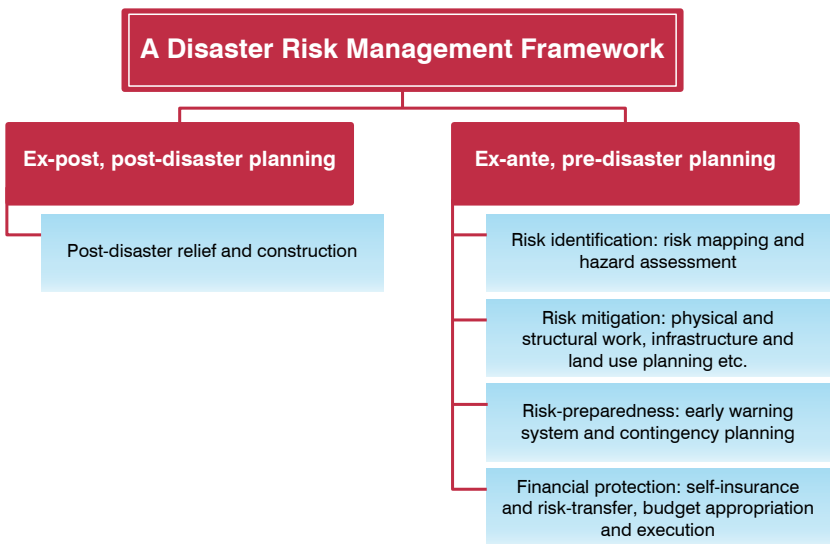
2. Risk mitigation – This can include reforming land planning, strengthening building codes, retrofitting existing buildings, and constructing dams in drought-prone areas.

3. Risk preparedness – This includes early warning systems, contingency planning and public training on risk prevention.

4. Financial preparation – Part of this will take the form of self-insurance which will mean accumulating savings and foreign reserves in normal times to draw down in the event of a natural disaster. This can reduce economic growth since using scarce resources to build reserves will reduce those available for physical and social infrastructure. The other form of preparation is risk transfer – buying commercial insurance that transfers risks externally to capital markets and investors. Catastrophe insurance is discussed in Chapter 5.

FIGURE II-1

A disaster risk management framework



Source: World Bank, 2011a.

While it is well understood that prevention is better than cure, in practice there are many obstacles to this approach. As suggested in Chapter 1, human societies seem to have innate problems in assessing risk. But countries may not consider risk prevention an efficient investment. This is indeed the case when the effects of disasters are relatively small and can easily be coped with. But there can also be situations of 'moral hazard': low-income countries may be tempted to underinvest in prevention if they believe they will always receive external post-disaster assistance.

Probably the biggest hurdle, however, is the difficulty in comparing the immediate and real costs of prevention with the potential costs of rehabilitation. If the disaster does not happen then the country will appear to have lost funds that could instead have been used for other important investments. Risk avoidance today also appears to have no tangible financial or political return. Today's policymakers may therefore be tempted to defer expenditure until a disaster happens, preferably on someone else's watch.

Policymakers who do attempt to assess the comparative costs of prevention and rehabilitation will face a number of problems. Apart from the difficulty in estimating future costs, there can also be the issue of attaching a monetary value to a human life. This is standard practice for insurance companies, but for governments there are significant moral and ethical implications. Risk reduction investments are also likely to have distributional consequences as well as opportunity costs. Investing in the more vulnerable areas will divert resources from elsewhere. This may also transfer risks – for example, a dam that protects one group can increase the flood risks to another.

Many developing countries may also lack the institutional capacity (Box II-3). Often the budgetary and planning processes are rigid and clogged with red tape, and afford little flexibility in transferring and reallocating funds across expenditure categories. Even if the framework includes various disaster-related expenditures, it may be non-transparent, uncoordinated and scattered across ministries.

BOX II-3

Pacific island countries - limitations in disaster risk management

Inefficient risk management in the Pacific island countries is eroding development gains and incurring large costs for national and local governments. The existing macroeconomic framework tends to underemphasize risk reduction and overemphasize support for relief operations – which have higher political payoffs for politicians.

This subregion is highly dependent on foreign aid which funds much disaster relief. Progress in reducing vulnerability has been slow, in part because of problems with coordination and cooperation among relevant actors, including donors. There is also a disjunction between policy frameworks and the stakeholders' responsibility in carrying out disaster risk reduction and climate change adaptation. In short, significant improvements are needed in coordination between the diverse stakeholders.

Source: World Bank, 2012a.

Arriving at the best balance between investment in risk reduction or in rehabilitation is not easy. These are ultimately issues of public choice. Determining public priorities in disaster risk reduction will therefore benefit from extensive stakeholder participation in national planning and budgetary processes. Nevertheless, countries at high risk appear to be giving greater priority to risk reduction.

- ***Japan*** – Here disasters are an inevitable part of life. Budgetary allocations are made for four broad categories of risk reduction and recovery: scientific technology research; disaster prevention and preparedness; national land conservation; and post-disaster recovery and rehabilitation.[21] On average, from 1995 to 2004, the Government allocated $50 billion each year – representing 5 per cent of general funds in the national budget, of which 75 per cent was spent on mitigation and preparedness. Around half the budget is allocated to national land conservation projects, such as soil erosion control, river containment and soil and coastal conservation. Another quarter goes to prevention and preparedness, such as enhancing communication systems, preparing evacuation plans, and conducting drills and exercises. Science and technology research receives a little over 1 per cent.

- ***The Philippines*** – Located on the Pacific 'ring of fire', the Philippines also gives high priority to disaster risk reduction. On average from 2009 to 2011, 70 per cent of the annual DRR budget was set aside for projects and programmes that reduced the exposure of population and assets. These included projects on flood control, forest management, soil conservation and watershed management. In comparison, only 27 per cent of the budget was allocated to disaster response and recovery.[22]

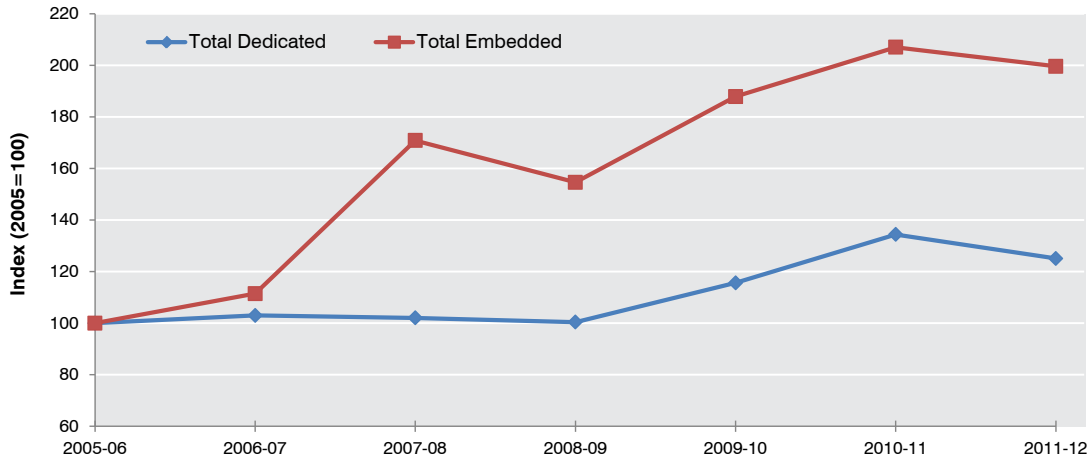
- ***India*** – Budgetary allocation for disaster risk reduction is not well coded across the sectoral ministries so it can be difficult to estimate the real amount invested. But it is possible to identify two categories of expenditure on disaster management.[23] Simplest to track are the 'dedicated' schemes: those governmental programmes where 100 per cent of the allocations are for disaster response and relief. The second category comprises 'embedded' schemes: programmes not formulated specifically for disaster risk reduction but which nevertheless, contribute substantially to this objective. For example, the Mahatma Gandhi National Rural Employment Guarantee Act (NREGA) contributes to risk reduction by employing people to carry out works on soil and water conservation, building embankments, and developing watersheds. NREGA programmes thus have 'embedded' DRR strategies. Increasingly India's expenditure balance is shifting from dedicated to embedded schemes (Figure II-2).

Embedded schemes are more difficult to monitor. Nevertheless, for fiscal year 2011-12, 85 embedded schemes were identified, sponsored by 75 ministries or departments, for a total of $79 billion, amounting to 32 per cent of total budgetary allocations, and equivalent to 3.38 per cent of GDP. Around 80 per cent of these expenditures contributed to disaster risk reduction.

- ***Indonesia*** – Between 2006 and 2012 the proportion of the central government budget allocated for disaster risk reduction increased from 0.58 to 1.02 per cent, reaching 0.12 per cent of GDP (Figure II-3). Most national-level investment is dedicated to disaster mitigation and prevention, accounting for almost 80 per cent of the total $1.02 billion.[24]

FIGURE II-2

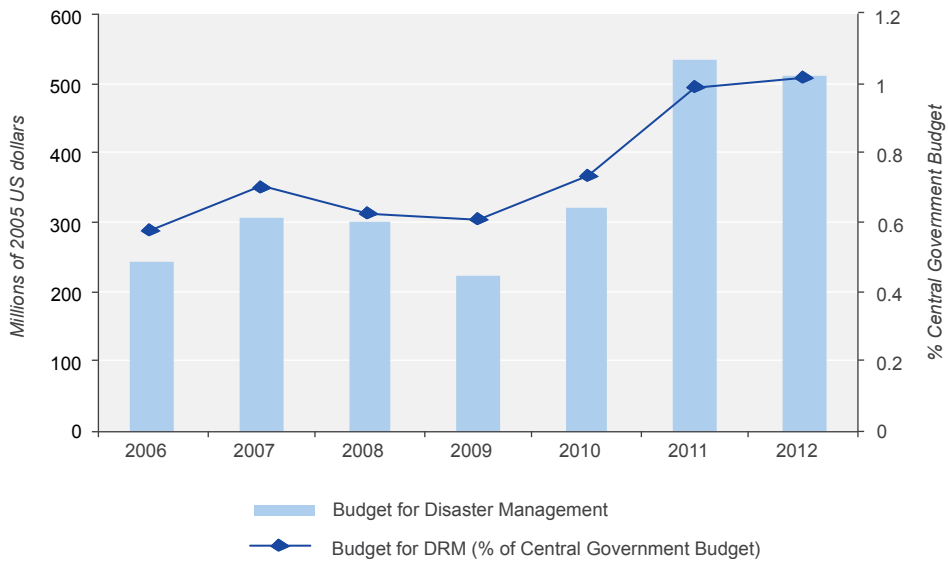
India, evolution of dedicated and embedded schemes for disaster management, 2005-2012.



Source: Based on the data from Chakrabarti, 2013

FIGURE II-3

Indonesia, investment in disaster risk reduction, 2006-2012



Source: ESCAP based on the data from Disaster Risk Reduction Investment Tracking: Case Study Indonesia – draft submitted to UNISDR and ADB, 2013.

The risk of disaster varies considerably across this vast archipelago. So risk-sensitive, smart investment in Indonesia is increasingly decentralized. Each province can choose to allocate resources according to the exposure to risks across its constituent districts. The province of Central Java, for example, which is exposed to inundation, floods and tsunamis, uses most of the disposable resources for flood control and coastguards. The different responsibilities of central and provincial governments are indicated in Box II-4.

■ ***Bangladesh*** – Over time, Bangladesh has shifted its disaster management focus from disaster relief to risk reduction and resilience – which has resulted in a dramatic reduction in the number of disaster-induced deaths and damages. This approach is built into national development efforts and strategies on poverty reduction. At the national level 12 key ministries and departments coordinate their efforts under the Comprehensive Disaster Management Programme. In disaster-prone areas the Government promotes safety net programmes

BOX II-4

Indonesia – national and provincial disaster management responsibilities

Indonesia is a vast archipelago. Although many provinces are at risk of disaster, the nature of the hazard varies from one part of the country to another. These risks can be more efficiently managed by provinces and districts. The distribution of functions is as follows:

Central government

Disaster risk reduction

- Integrate disaster risk management within the national development programme
- Transfer sufficient funds to state budgets to execute risk mitigation activities
- Ensure adequate 'on call' funds are available to all line ministries for emergency response efforts
- Develop and enforce land use planning through line ministries
- Develop and enforce building codes through line ministries

Disaster response

- Provide support to communities and refugees
- Transfer sufficient funds, based on requests from local governments, to the provincial governments who then transfer to local governments for recovery/reconstruction.

Local Government

Disaster risk reduction

- Integrate disaster risk management within local development planning
- Allocate funds for disaster risk management in local budgets
- Protect communities and reduce disaster risks by utilizing the funds allocated in the Regional Revenue and Expenditure Budget

Disaster response

- Provide assistance to communities
- Reallocate budget resources for emergency and r-ecovery efforts – prior to the receipt of Central Government funds.

Source: Indonesia, 2007.

and food security measures to protect the most vulnerable, especially women, children and the elderly. For the 2012-13 financial year, for example, the social protection programme accounted for 15 per cent of the total budget – almost 2.5 per cent of GDP.

The Government also supports community action. This includes community activities for risk assessment and reduction, hazard assessment, and contingency planning. The Government assists with training of community-based volunteers, as in the successful Cyclone Preparedness Programme through which cyclone forecasts are followed up by thousands of volunteers who disseminate the messages to all affected villages. Disaster risk reduction is also incorporated in the climate change adaptation strategy – which includes developing drought- and saline-resistant crops, raising the levels of houses, building multi-purpose cyclone shelters, dredging major river systems, and reforesting coastlines, along with interventions for community-based health and preventing disease.

Bangladesh has invested more than $10 billion during the past 35 years: setting up networks of early warning systems; raising agricultural productivity in low-lying areas: improving flood protection and drainage in urban areas, installing irrigation schemes to enable dry-season crops; and implementing a coastal green belt project. These investments resulted in a significant decline in disaster losses.[25]

A number of Asia-Pacific countries are thus shifting the emphasis from disaster response to disaster risk reduction. And while the priority areas depend very much on country circumstances, there are some common elements – soil and water conservation, flood control, watershed development, coastal management, early warning systems, and reducing risks for vulnerable populations. These issues are discussed in subsequent chapters.

POST-DISASTER RESPONSE: FINANCING VERSUS ADJUSTMENT

The typical macroeconomic policy response to a natural disaster is a combination of drawing down reserves, seeking new finance, and macroeconomic adjustment. Indeed, a well-accepted tenet in macro management of disasters is: "Finance if you can, adjust if you must".[26]

Where can the finance come from? One option is to set aside contingency funds for various emergencies, and calamity funds especially for disasters. To avoid moral hazard, such funds should only cover risks that cannot be absorbed by private insurance – such as disaster-related damage affecting small farmers and the urban poor who are unable to afford private insurance, along with social assistance for disaster victims.

The poorer developing countries should also be able to rely on concessional aid or grants from international donors. In addition they might see an increase in workers' remittances to families in distress; remittances tend to be counter cyclical and counter disaster.[27]

In principle the government could also increase commercial borrowing. But this may be difficult. Many low-income countries do not have access to the international capital markets and will struggle to borrow commercially. Even emerging economies that have access to these markets will find foreign borrowing expensive, especially after a disaster. They may also find

it difficult to raise funds domestically. This is partly because the local debt market is likely to be underdeveloped, but also because a natural disaster can trigger a massive withdrawal of private savings – as happened in Bangladesh after the 1998 floods. This makes it much more difficult to borrow from the banking system.

The choice between domestic and external financing depends on many factors including:

- The nature of the disaster-whether it is temporary or permanent;
- The country's fiscal position;
- The external balance and the exchange rate; and
- The availability of domestic and external financing.

If the disaster is a one-off shock, it makes sense to finance the impact through foreign aid or borrowing. If the disaster or its impact is likely to be permanent, however – as will increasingly be the case for Asia and the Pacific – the country will need to adjust to the 'new normal'.

Governments that do not have access to debt financing will need to adjust through fiscal policy. There are three options:

1) redirecting funding from planned projects;
2) cutting existing discretionary expenditure; or
3) raising taxes on high-income earners.

The choices will depend on the current state of the economy. If it is overheated and policy makers fear inflation they might impose a temporary tax on high-income citizens in the form of a 'reconstruction levy'. This will not only reduce private demand, but also help finance much needed reconstruction. Australia used this kind of levy following the 2010-11 floods in Queensland.

The role of monetary policy after natural disasters is, however, the subject of some controversy. Natural disasters are likely to increase prices while lowering economic output. This presents a classical monetary policy dilemma: how to use one instrument to reconcile two competing objectives – maintaining price stability while restoring pre-disaster levels of output and employment. [28]

Some argue that the priority should be price stability. This would mean tightening the money supply. But this may not be the best policy in developing countries where economic output is some way below its potential and many people are engaged in vulnerable and informal employment. In this case monetary tightening will further worsen unemployment and poverty. In such circumstances there is less risk that an expansionary monetary policy will stoke inflation. In sum, for many low-income countries this dilemma may not exist. Nevertheless, if the disaster causes price hikes, workers may demand higher wages – which would have a second-round inflationary impact. In such circumstances, the authorities may need to tighten monetary policy to prevent a wage-price spiral.

There is also the risk of inflation if there is a sudden inflow of foreign aid. This could increase aggregate demand while supply is constrained. An upsurge of foreign aid may also cause the exchange rate to appreciate. But the effect of aid on the real exchange rate is ambiguous. Much depends on the way in which foreign aid flows are absorbed into the economy. If fiscal spending is sluggish or the central bank saves much of the available foreign exchange as reserves, and sterilizes its monetary implications, then large inflows of aid should not exert inflationary pressure or cause real exchange rate appreciation.

It should be noted that much will also depend on the country's institutional capacity to formulate efficient macroeconomic policy and carry out efficient disaster management. This requires robust institutions and analytical capabilities that low-income countries may lack. If so, the recovery process could be delayed.

One of the most difficult tasks is coping with the sudden arrival of large amounts of aid. In the past some fiscal authorities have found such flows difficult to absorb. To address this issue, Indonesia, for example, in 2007 introduced a Law on Natural Disaster Management which enables the fiscal system to be more flexible and accommodative while responding to the needs for post-disaster response and recovery (Box II-5).

Another problem with aid is the need to deal with multiple donors. Some assistance will come from the traditional development partners, but a large proportion of disaster relief also comes through individual, private, and non-government organizations. This raises many issues of coordination and information sharing – a major concern, for example, in the aftermath of the 2004 Indian Ocean tsunami.

To address this issue and help governments prepare their regulatory systems for international disaster response, the International Red Cross and Red Crescent at its 2007 International Conference adopted a set of recommendations – 'Guidelines for the domestic facilitation and regulation of international disaster relief and initial recovery assistance'.[29] These guidelines, which have since been widely endorsed, suggest how governments can prepare their disaster laws and plans for common regulatory problems. They also indicate minimum quality standards for humanitarian assistance.

BOX II-5

Indonesia – Law on Natural Disaster Management

Indonesia previously had an ad hoc inter-ministerial council for dealing with disasters. The Law on Natural Disaster Management passed in 2007, however, established a dedicated body – the national disaster management agency, BNPB. It has a strong mandate to coordinate line ministries in implementing preventive measures and leading recovery. In line with the law, all 33 provinces and 306 of 450+ districts have established disaster management agencies. Subsequently, Indonesia formulated a national action plan for disaster risk reduction along with a national disaster risk financing strategy that includes budget reserve funds and disaster risk transfer instruments.

The financial responsibility of central and local governments is defined by law. Major disasters are financed with support from the central budget through exceptional transfers to the provincial budgets. Post-disaster financing of minor disasters is generally from local and provincial governments. The source of emergency response funds, covering the first weeks after a disaster, depends on whether the event is declared a national disaster or a disaster of national significance. If so, the Central Government takes responsibility through the BNPB with line ministries and the BNPB disbursing resources through their 'on call' funds for emergency response. On call funds are a separate line of the budget that can be engaged to support post-disaster early recovery activities while emergency status is still in effect. If not declared a National Disaster, local governments provide financing through their contingency budgets. The Law also addresses the issues related to managing donor assistance.

Source: Indonesia, 2007

In summary, the range of post-disaster macroeconomic policy options will depend on previous macroeconomic policy choices and efforts at disaster risk reduction. Risk reduction can lessen the disruption caused by natural disasters, save lives, and protect property.

BUILDING A MORE RESILIENT MACROECONOMIC FRAMEWORK

Faced with multiple overlapping crises, how can governments strengthen their macroeconomic frameworks so that their people are protected and their economies can withstand, adapt to, and recover from multiple shocks quickly and efficiently? What follows is a set of guidelines for a more resilient macroeconomic framework for Asia and the Pacific.

Macroeconomic stabilization as a means to an end

Macroeconomic stability exists when key economic relationships are in balance – for example, between domestic demand and output, fiscal revenues and expenditure, and savings and investment. The government will also be concerned about the balance of payments.[30] Most definitions of macroeconomic stability also include manageable levels of external and internal debt, moderate inflation, realistic exchange rates and smoother business cycles. Nevertheless, all the relationships need not be precisely in balance. Fiscal and current account deficits or surpluses, for example, are quite compatible with economic stability, provided they can be financed sustainably.

Moreover, macroeconomic stability is not an end in itself-it is a means to an end. One of its objectives is to inspire business confidence. Businesses are more likely to invest if there is a degree of certainty in price levels, exchange rates, interest rates, the tax burden and the availability of credit. This helps create an environment conducive to high savings, efficient investment and steady growth, all of which affect the welfare of the poor.

Another benefit of macroeconomic stability is that it helps governments create fiscal space and build greater resilience to economic shocks – and thus helps preserve policy autonomy. During the good times, therefore, all countries should aim for macroeconomic stability, creating a policy space that will offer the flexibility needed to confront sudden shocks.

The value of a stable macroeconomic environment has been demonstrated by the recent experience in Asia and the Pacific. In 1997, the Asian financial crisis had a severe impact because many of the region's economies confronted it in a weakened macroeconomic environment. However, by 2008 in the run-up to the global financial crisis they were in much stronger positions. This enabled them to sustain economic activity by swiftly launching large stimulus packages. As a result, they avoided lasting damage to their real economies and employment – and most importantly, were able to protect the poor and most vulnerable.

Much of this strength was based on fiscal prudence and the accumulation of large foreign exchange reserves. Most governments were in a position to efficiently finance their budgets without generating explosive increases in public debt. Nevertheless, aggregate figures mask substantial variations across subregions as well as countries. The following highlights some subregional difference.[31]

- ***Fiscal balances*** – These were generally positive though there were small deficits. The deficits were somewhat larger in the Pacific and South Asia where they exceeded 5 per cent of GDP.

- ***Primary fiscal balances*** – These are the fiscal balances minus interest payments on public debt. The position varied significantly across the region. South-East Asia was the only subregion that ran a relatively large primary surplus. South Asia had large and persistent primary deficits.

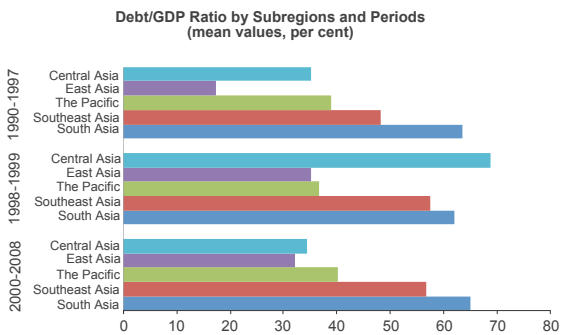
- ***Government spending and revenues*** – In Asia and the Pacific these tend to be relatively low, at around 20-25 per cent of GDP, which is below the average for many parts of the world, particularly Europe.

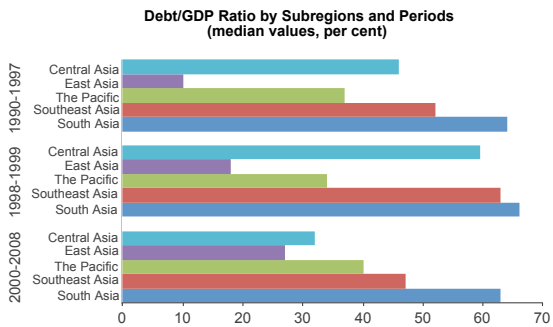
- ***Public debt-to-GDP ratios*** – On average these were below 40 to 50 per cent of GDP. But they varied considerably across the region: In South-East Asia 50 to 60 per cent of GDP; in South Asia more than 60 per cent, and in the Pacific around 40 per cent (Figure II-4). There are also significant cross-country variations. At the beginning of the global economic crisis, public debt in the Marshall Islands, Fiji, Tuvalu and Tonga, already exceeded the 40 per cent threshold.

Because public debt was relatively low and fiscal accounts were healthy, countries across the region were able to respond to the recession with large stimulus packages. The average stimulus was equal to 7.5 per cent of GDP, compared with 2.8 per cent for packages in the G7 countries (Figure II-5). The stimulus package of China amounted to a sizeable 13 per cent of GDP. Even low-income countries such as Cambodia and Lao People's Democratic Republic implemented programmes through domestic sources. Among the Pacific island countries, Papua New Guinea, which benefited from commodity price increase and had some fiscal space, increased spending by about 5 per cent of non-oil GDP. The structure of the stimuli differed across countries-but common to all were the efforts to minimize the social consequences of the crisis by bolstering social

FIGURE II-4

Debt-to-GDP ratios in Asia and the Pacific, 1990-2008

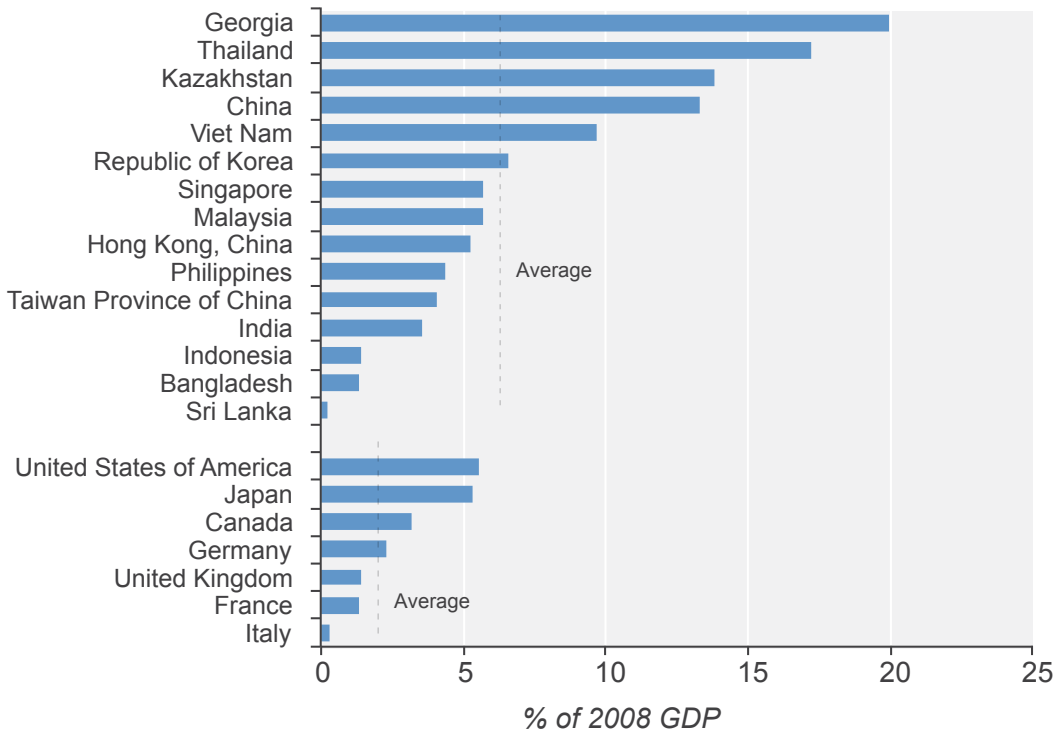




Source: Adams and others, 2010.

FIGURE II-5

Stimulus expenditures in selected economies



Source: Based on ADB, 2010.

safety nets and other social sector spending; and undertaking strategic long-term investments in physical and human capital.

To maintain adequate liquidity for the economy, most Asian countries adopted expansionary monetary policies. These efforts went beyond cutting policy rates; they also included direct injections of liquidity, especially for affected sectors and SMEs. As in most economies there was an increase of money and credit. Governments cut policy interest rates sequentially from the last quarter of 2008 and, in most economies, have kept them low since. These monetary operations, along with fiscal expansion, mitigated the adverse impact of the global slowdown and steered the region's recovery.

The Pacific island countries, however, generally recovered from the recent global financial crisis more slowly than the Asian low-income economies. Recovery was slower in Fiji and also in Samoa where the already weakened economic system was hit by natural disasters (Box II-6).

Though the economic stimulus played a major role in the region's V-shaped recovery, this was followed by a number of macroeconomic developments:

- ***Fiscal deficits and public debt*** – There was a sharp increase in fiscal deficits and the ratios of public debt to GDP. This reflected the cost of the stimuli as well as the adverse effects of the

BOX II-6

Pacific island countries – facing multiple shocks

Compared to the rest of the region, the Pacific island countries were in general on a slower path to recovery from the recent global financial crisis. However, there were significant variations in the recovery process. These partly reflected their different economic structures and macroeconomic imbalances but also the natural disasters they faced. The recovery was slower in Fiji due to floods in 2012 and in Samoa due to an earthquake and tsunami in 2009. Except for commodity exporting economies (Papua New Guinea and Solomon Islands), economic growth remained low in all Pacific island countries.

Fiscal space remains limited in Pacific island countries, particularly in microstates such as the Marshall Islands, Tuvalu and Tonga. Since the beginning of the global economic crisis, fiscal balances have deteriorated in Vanuatu, Samoa and Tonga. Public debt and external debt ratios remain relatively high for a number of countries. For Samoa, public debt and external debt exceed the prudential limits prescribed by the IMF. Several island economies such as Fiji, Papua New Guinea, Tonga and Vanuatu have accumulated comfortable levels of reserves that could provide temporary buffers against external shocks. Pacific island countries remain highly dependent on foreign aid which is equivalent to 20 per cent of GDP.

crisis on GDP and tax revenues. In some cases, additional support and guarantees to financial and industrial sectors also played a part.

- ***Inflation*** – A number of economies saw an increase in inflationary pressures. These were partly the result of rises in food and fuel prices. But they also reflected expansionary monetary policies, as in China, India, and most ASEAN countries. Central banks in these economies kept interest rates low and soaked their economies with liquidity so as to sustain the recovery.

All in all, even in the midst of a global recession the region has so far avoided accelerated fiscal consolidation and monetary tightening. This again contrasts with the response to the 1997 Asian financial crisis when most of the affected countries tightened fiscal and monetary policy, without giving much consideration, especially at the beginning, to the impact on the real economy or employment.[32] Macroeconomic stabilization is thus important, but experience shows that it should not be considered an end in itself.

A continuum of thresholds

International financial institutions and academia have recently been giving greater attention to macroeconomic resilience, but there have been few empirical studies of the determinants of resilience, particularly for developing economies. One such study was the *World Economic Outlook 2012*.[33] However, this largely addressed economic shocks and did not include natural disasters. Moreover, its policy prescriptions, which did not have a rigorous empirical foundation, were largely mechanical one-size-fits all measures. These were:

– ***Monetary policy*** – Whether the central bank has adopted inflation targeting and achieved an inflation rate below 10 per cent.

– ***Fiscal policy*** – Whether the government is running a fiscal surplus or deficit; whether it has had a high public debt, the threshold of high public debt being defined at 50 per cent. Whether the government has fiscal space to run counter-cyclical policies if required.

– ***External sector policy*** – Whether the economy has a current account surplus or deficit; a high or low ratio of external debt to GDP (above or below 40 per cent), or a high or low ratio of international reserves to GDP.

The IMF study also highlighted a set of structural policies. These include increased trade openness and diversification; increased financial openness and a change in the composition of capital flows, along with income inequality.

Such prudential macroeconomic parameters provide general guidelines. But they should not be interpreted as iron-clad rules – rather, to be interpreted flexibly based on national circumstances.

This is because the midst of a crisis or a disaster is not the best time to mechanically pursue prudential norms of macroeconomic stabilization. The overarching aim should be to arrest the spread of the shock to the real economy, labour markets and above all to the poorest and most vulnerable. Employment, real wages, and poverty reduction take much longer to recover than GDP.[34] A review of financial crises in 80 countries found that real wages take an average of three years to pick up again, while employment growth does not regain pre-crisis levels until several years after that.[35]

Moreover, even in 'good times', evidence shows that there is no unique threshold of stability for each macroeconomic variable – growth,

inflation, the fiscal deficit, the current account deficit, international reserves. Rather, there is a continuum of thresholds for various combinations of these key variables which could indicate a degree of macroeconomic instability. It may be relatively easy to identify a country in a state of macroeconomic instability – for example, one with large current account deficits financed by short-term borrowing, high and rising levels of public debt, double-digit inflation and stagnant or declining GDP. And it is relatively easy to identify at the other end of the spectrum the contributors to macroeconomic stability – current account and fiscal balances consistent with low and declining debt levels, inflation in low single digits and rising per capita GDP. But there is also a substantial grey area: indeed this is where most developing countries operate in reality.

This has been the case, for example, in the high-performing Asian 'miracle' economies. In general they have had a history of fiscal prudence and discipline, but not all have achieved the same degree of macroeconomic stability. Take inflation. Between 1961 and 1991, Malaysia and Singapore consistently maintained low, single-digit inflation – around 3.5 per cent. But the Republic of Korea and Indonesia, on the other hand, regularly posted double-digit inflation rates – around 12 per cent.[36] There is a similar diversity in budget deficits. In the 1980s, Singapore always maintained a budget surplus and the Republic of Korea's deficit at 1.9 per cent was below the OECD average. On the other hand the average deficit in Thailand was 6 per cent of GDP and in Malaysia 11 per cent. These economies also took different approaches to foreign borrowing. Singapore along with Hong Kong, China and Taiwan Province of China avoided borrowing abroad, while the Republic of Korea and Indonesia relied on substantial foreign borrowing during the 1980s and 1990s.

It should also be emphasized that prudential parameters simply represent policy outcomes. They do not indicate policy content or quality. The same outcomes can be achieved in many different ways using different institutional designs and policies that are sensitive to local constraints.[37] In the absence of other complementary conditions, particularly those related to governance, mere adherence to macroeconomics norms will not always yield the best outcomes.[38]

Nor are these norms likely to take the form of specific 'safe levels'. How high is too high for inflation? Or, how high is too high for the budget deficit? Much will depend on local circumstances. For example, if an economy is growing briskly, the government can sustain a fairly large budget deficit. What matters more in this case, is how the expenditure is being financed and what it is being used for. If the deficit is large and financed by monetization, it may lead to inflation; if it relies on heavy domestic borrowing, it may lead to an increase in the interest rate and crowd out private investment; and if it relies on large external borrowing, it may build up an unsustainable debt burden.

Also important is the purpose of the expenditure. If it is for physical infrastructure that relieves a critical constraint on economic growth, the budget deficit may have little adverse impact on the debt burden in the medium term. Many possible combinations can work. It should also be borne in mind that while investors or rating agencies and international financial institutions do care about public debt and inflation, they

also worry about a country's long-term growth prospects. Therefore, policymakers must avoid an excessive focus on stabilization which may make macroeconomic policies pro-cyclical.

Macroeconomic policies for stabilization and development

Developing countries should thus not have an overly mechanical interpretation of macroeconomic prudence. Instead, while maintaining short-run stability they should be guided by the goals of long-run economic development and poverty reduction. This may require striking a balance between development and stability. Promoting economic development will mean mobilizing public investment and allocating it efficiently. Stabilization will mean creating macroeconomic buffers that will act as self-insurance against future external shocks, economic or natural. The exact balance will depend on national circumstances, but is likely to include some of the following elements.

- ***Fiscal policy*** – This should support public investment in social and physical infrastructure, including disaster risk identification, mitigation, and preparedness. For this purpose low-income countries will probably need to increase fiscal space – for example, by improving domestic resource mobilization, expanding public-private partnerships, enhancing the efficiency of public expenditure, and creating an environment that attracts investment.

- ***Monetary policy*** – This should aim to provide affordable credit to agriculture and manufacturing, especially to SMEs. Governments can also improve prudential regulation of the financial sector and ensure that it deals effectively with non-performing loans.

- ***Exchange rate policy*** – This should support export competitiveness, while regulating the capital account until the financial sector becomes more robust.

- ***Macroeconomic policy buffers*** – Governments also need to strengthen existing shock absorbers, including social safety nets.

- ***Poverty-sensitive response*** – This will mean protecting spending that benefits poor people, if necessary by introducing guidelines to protect such programmes as part of the public finance law. Governments that are aiming to accelerate growth and human development are not, however, going to achieve this simply through macroeconomic and financial reforms. They will also need structural reforms to boost production, diversify exports, and increase spending for health and education.

Moreover, some countries are unlikely to make sufficient progress in macroeconomic resilience solely through their own efforts. Many of the least developed countries, and some Pacific island countries, will require continued external assistance from the international community. Currently, international financial institutions and other donors assist countries affected by external shocks. There are a number of ways this assistance can be improved (Box II-7).

Upgrading macro tool kits to manage complex risks

Investing in disaster risk reduction pays off. Nevertheless, many developing countries still spend more on response and reconstruction. For financial crises too, countries tend to employ vigorous ad hoc and arbitrary measures, such as bailing out struggling banks and industries.

BOX II-7

Development assistance for addressing shocks in low-income countries

Development assistance can help developing countries which have been affected by shocks.

– In many cases assistance should be concessional. However, some heavily indebted countries would have trouble servicing even highly concessional loans, so the only option would be grants.

– Aid is at its most effective immediately after a shock so the international community should avoid delays in response. One way of achieving this might be to bring forward existing commitments, and temporarily reallocating these to help counter the effects of a shock.

– Large and highly visible natural disasters tend to attract more foreign assistance, while smaller disasters or silent crises from terms-of-trade shocks are largely ignored. Donors need to make sure they allocate external assistance in accordance with real needs.

– If a country knows that external assistance will be readily available if it is hit by a shock, it may lose the incentive to take preventive measures. To overcome such 'moral hazard' the international donor community can direct some of its assistance to risk reduction; this would benefit both donors and recipients by introducing predictability in their respective financial plans. Furthermore, donors may link their external assistance to efforts by recipient countries to reduce their economic vulnerability to shocks. International financial institutions can also provide technical assistance to develop domestic insurance markets.

– Recent years have seen the emergence of innovative capital market-based risk financing mechanisms. These include catastrophe bonds, contingent credit and regional catastrophe insurance pools. International financial institutions can help countries gain access to such mechanisms. They can also assist with the development of an Asia-Pacific catastrophe risk pool.

This short-sighted behaviour is partly the result of human cognitive failures in understanding and internalizing risks. But politicians are also reluctant to invest either financial or political capital in preparing for events that might not occur. In addition it is the difficulty in applying systems thinking to complex and inter-connected challenges posed by multiple shocks.

To overcome such constraints, governments need to develop risk management frameworks. These should develop greater understanding of nature of the risks, wider dissemination of the necessary information and knowledge, and making resources available to poorer households for risk reduction and management.

In some cases even the most conscientious policymakers will struggle to act. The necessary information may not exist, or there could be deep uncertainties about a model's underlying assumptions – key variables, for example, and probability distributions. In such circumstances traditional cost-benefit analysis may offer little guidance. Instead they may need to turn to some of the emerging, highly sophisticated decision making tools and methodologies based on scenario analysis and vulnerability identification.[39] These can accommodate different assumptions and stakeholder value systems, and provide a more balanced analysis on unpredictable events for which there is very little knowledge.

REGIONAL COOPERATION CAN HELP BUILD ECONOMIC RESILIENCE

National authorities alone cannot deal with economic shocks. In a globalized world such crises now have trans-border implications. Natural disasters too frequently cross national borders and wherever they occur can have international implications. Nowadays such issues also need to be addressed by collective action, especially regional cooperation.

This principle has already been established in terms of economic cooperation. The Chiang Mai Initiative Multilateralization, for example, can provide emergency liquidity to members, and there has also been a regional bond market initiative – though these initiatives are largely concentrated in South-East Asia, and are at various stages of implementation.

Other potential areas for cooperation are macroeconomic management and exchange rate policies. So far, however, most activities have remained at the level of information exchange and dialogue. Some of these initiatives, particularly the coordination of exchange rate management, may not fully succeed unless they are part of global financial architecture reforms, but there are still opportunities at the regional level. Countries across the region would also benefit from better coordination of financial policies in the face of volatile capital flows, and better fiscal coordination for building resilience to economic shocks.

Similarly, countries can work together to address risks related to natural disasters. One possibility is to establish regional risk insurance. There is, for example, an on-going initiative by the Pacific island countries to create a regional insurance pooling facility, the Pacific Disaster Financing and Insurance Programme.[40] Other areas where countries can make efficient use of limited public resources include pooling of resources for disaster preparedness and systems for monitoring and early warning. Chapter 7 addresses regional cooperation in depth.

In the face of multiple shocks, countries across Asia and the Pacific that wish to preserve and extend development gains will need to build greater economic resilience against shocks. But this will not happen automatically. Governments will need to fundamentally rethink macroeconomic policy making, take measures to prepare for shocks and mitigate risks, and apply new decision-making tools and models to incorporate risks into macro-economic frameworks. They will also need to work together more closely. There is much cause for optimism. Countries across the region have successfully learnt from past crises. What is needed now is the political will to move forward.

ENDNOTES

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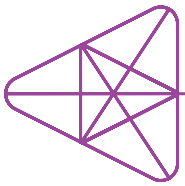
ESCAP PHOTO

3

BUILDING RESILIENT COMMUNITIES



BUILDING RESILIENT COMMUNITIES

Those most exposed to economic crises and disasters are the poor. With few savings and living in precarious circumstances, they have few buffers against shocks. Nevertheless, poor communities and their most vulnerable members can learn from past adversity and can even bounce back stronger and better prepared for future shocks – especially if they can rely on social protection schemes and inclusive and adaptive governance.

People who are already disadvantaged are likely to be hit hardest by economic crises and natural disasters. Rural communities, for example, rely heavily on natural resources for their livelihoods and are at greater risks from droughts and floods. Poor urban communities in precarious housing, such as slum dwellers and those living on riverbanks, are also more exposed to hazards. And the poor who will generally be working in informal employment also have fewer and less effective economic buffers, so at times of crisis may resort to high-interest loans, postpone health-related expenditure or withdraw children from school.

Within poor communities, some people are especially vulnerable. These would include children, older persons, ethnic minorities, and those with disabilities or living with HIV and AIDS. Such excluded groups often lack the social buffers to protect them from extreme weather events or economic downturns. In many societies, in times of difficulty girls are the first to be taken out of school.

Nevertheless, despite tremendous hardships, communities and their most vulnerable members can learn from past adversity and can even bounce back stronger and better prepared for future shocks. This Chapter examines the potential for building community resilience. It reviews the capacities and strategies that allow communities to recover, showing the importance of equitable and sustainable economic development, of ensuring strong social capital, and of empowering communities. It also considers further ways of enhancing resilience to disasters and economic shocks.

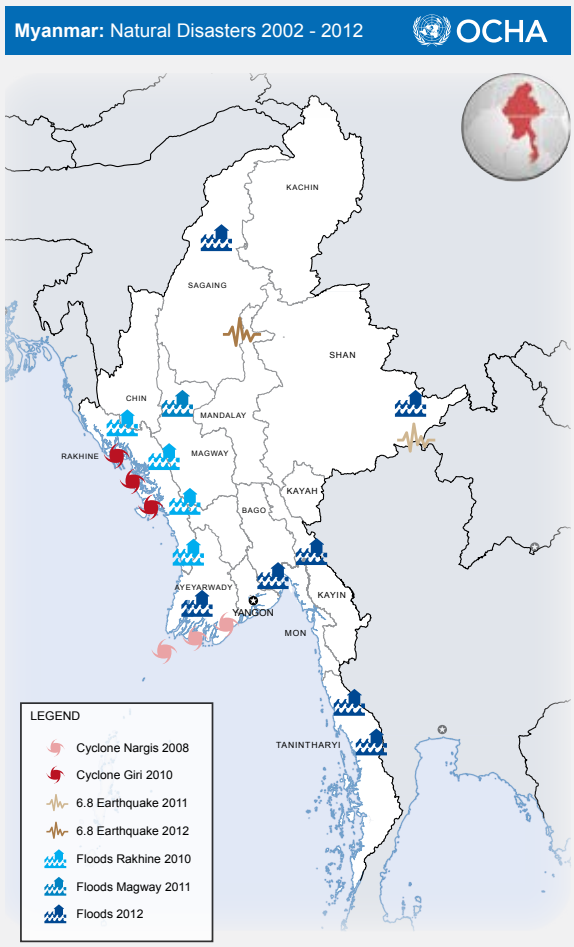
THE VULNERABLE POOR

In both natural disasters and economic crises those who are most vulnerable are the poor (Box III-1). Without the safety net of savings, property and other buffers – they have less capacity to cope and often experience multiple and repeated shocks that further erode their capacity to cope.[1] Already disadvantaged by social and economic imbalances, the poor can thus be further marginalized into vicious cycles of chronic hardship, sometimes for generations.

The poor tend to be more exposed to natural disasters because they live on hazardous land – on earthquake fault lines, floodplains, and in coastal

Box III-1

Myanmar – the impact of cyclones on poverty



Map provided by OCHA

Myanmar is exposed to many natural hazards. In 2012 it was ranked the Asia-Pacific country 'most at risk'. Between 2002 and 2012, it experienced three cyclones, affecting 2.6 million people, three floods, affecting 500,000 people, and two major earthquakes, affecting 20,000 people. Particularly exposed are the eastern and southern coastal regions (see map).

Although it is not possible to correlate poverty levels with disasters, it is noticable that following the most devastating cyclone, Nargis in 2008, poverty levels rose in four southern and western coastal states: Kayin, Yangon, Ayeyarwadi and Rakhine, which are those most exposed to cyclones.

Sources: UNU, 2012; Myanmar Information Management Unit, 2013; UNDP, 2013.

areas that are highly exposed to cyclones and typhoons. In the Asia-Pacific region, more people are living in coastal areas and cities, especially in the megacities that have more than 10 million inhabitants. In 2011, ten of the world's twenty largest megacities were located in Asia.[2] Within these cities many people are packed into informal housing areas with poor infrastructure where they are particularly vulnerable to natural disasters. Thus when severe tropical storm Washi (Sendong) hit Mindanao in the Philippines in 2011, it was informal communities living in poorly constructed houses that suffered most of the damage; within the formal housing zones, however, only 5 per cent of homes were damaged.[3]

The poor are also likely to be hardest hit by economic crises. Most will be low-skilled, casual, seasonal or contract labourers with precarious or irregular work and low earnings. In Nepal, India and Pakistan, around 80 per cent of non-agricultural workers are engaged in informal employment. In Indonesia, the Philippines and Viet Nam, the proportion is around 70 per cent. Those in the informal sector are often hit hardest by external shocks; lacking effective social protection coverage, they rely on the flexibility of shifting between different, if low-paid, tasks.

In addition to those living below the poverty line there are millions more who can easily fall

PHOTO: MARIE ANGE SYLVAIN-HOLMGREN

into poverty.[4] In Indonesia, for example, 12 per cent of the national population live below the official poverty line, but nearly 40 per cent live below just 1.5 times this value.[5] In Kazakhstan, whilst 65 per cent of the population are considered non-poor, 13 per cent are estimated to be vulnerable to poverty.[6] Even small shocks can propel them into poverty. Governments designing policies aimed at generating resilience thus also need to consider the vulnerable non-poor.[7]

EXCLUDED GROUPS

Also particularly vulnerable to disasters are 'excluded' individuals – who are outside many societal bonds and relationships. When adversity strikes they are more isolated, with less access to networks and relationships of support. They can also be disadvantaged when it comes to emergency relief. Air drops delivering supplies, for example, can exclude the young, the elderly and persons with disabilities. Poorly designed emergency shelters or camps can also exclude persons with disabilities, make women vulnerable to sexual violence, or inadvertently prevent minorities from accessing aid.[8]

Women – The largest excluded group are women, who often suffer more in disasters. After the 2004 Indian Ocean tsunami, 70 per cent of fatalities in Banda Aceh, Indonesia, and 80 per cent of those in Sri Lanka, were women. In 1991, following cyclone Gorky in Bangladesh the majority of those who died were women. Women also accounted for 61 per cent of total deaths during Cyclone Nargis in Myanmar in 2008.[9] Women are also disadvantaged during relief operations. Following the 2010 floods in Pakistan, for example, women were either overlooked in the relief distribution, or were unable to reach places where relief was being distributed because of social norms that restricted their mobility.[10] After disasters women come under further pressure, particularly those in female-headed households, because of their traditional responsibilities for caring for the elderly and children. Although active in all stages of a disaster, women continue to be seen as passive victims and their capacities in building community resilience are rarely recognized.[11]

Children – Children are also vulnerable to multiple shocks. The Indian Ocean tsunami caused high mortality among children in Sri Lanka: 31.8 per cent of the total mortality rate for those aged 0-5 years, and 23.7 per cent for those aged 5-9 years.[12] Furthermore, at times of economic crises, children's health and education can come under threat.[13] In Thailand during the 1997 financial crisis, many more schoolchildren became malnourished and there was a higher proportion of low birth-weight babies, particularly among the poor, as well as higher incidences of measles, malaria and diarrhoea.[14] Girls are especially vulnerable: in many countries they are the first to drop out of school after disasters, and can face the additional hazard of being forced into sex work.[15] In Indonesia after the 1997 financial crisis, the number of street children increased by 43 per cent, with 30 per cent of those becoming sex workers.[16]

Older persons – By 2050, the number of older persons in Asia and the Pacific will triple – to an estimated 1.3 billion.[17] Older people are also more vulnerable to shocks. Following the 1997 financial crisis, older persons in the Republic of Korea and Indonesia were more likely to lose their jobs and incomes.[18] And following the Wenchuan earthquake in China in 2008, 70 per cent of older persons suffered greatly after

losing the support of their children.[19] In the 2011 Japan earthquake, for example, while only representing 31 per cent of the population in the three most affected prefectures (Iwate, Fukushima and Miyagi), 65 per cent of victims were aged 60 or over – because they were less mobile their evacuation was delayed.

Persons with disabilities – During certain disasters, people with disabilities are more likely to die.[20] They can be additionally vulnerable because of poorly designed physical infrastructure or inadequate emergency information.[21] Following the 2011 Japan earthquake and tsunami, more than 2 per cent of persons with disabilities were killed or missing compared with 1 per cent of those without a disability.[22]

COPING WITH SHOCKS

At times of crisis and disaster, some groups and individuals are more vulnerable. However, they are rarely passive victims. Different groups and individuals react differently (Box III-2). Most will try to cope with adversity by drawing on all their economic, social and natural resources. In many cases they can 'bounce back better'. But under pressure they can also be forced into 'erosive' strategies that lead to a vicious cycle of poverty (Box III-3).

Erosive strategies

Sometimes people take actions that offer immediate relief but can undermine their livelihoods in the long run. For example, they might sell their working or breeding animals or agricultural or fishing equipment. Or they may take out high-interest loans. As a last resort they may pull children out of school.[23] They can also reduce the quantity or quality of food, forego medical treatment, or overexploit natural resources.[24] All these measures can perpetuate poverty and reduce the incomes of future generations.

Following crises, access to finance typically becomes even more difficult. In Cambodia, the Philippines and Thailand, for instance, during the 2007-2008 economic crisis, many people pawned assets such as jewellery or sold

Box III-2

The Philippines – coping mechanisms during the 1991 Mount Pinatubo eruption

In 1991 in the Philippines, one of the world's largest volcanic eruptions took place at Mount Pinatubo. Different communities in the surrounding areas coped in different ways. Some felt they could not rely on the Government or anyone else and a feeling of mutual distrust emerged, so they resorted to the *kanya-kanya* syndrome – everyone for themselves. The alternative was *pakikipagkapwa*, that is, being in harmony with another person, helping or connecting with them: by talking to a companion they could give vent to their feelings and help ease and relieve their pain. The disaster affected various ethnic groups, which had different coping responses based on their own cultural norms and values. In some cases the disaster eroded social cohesion whereas in others it strengthened community resilience.

Source: Guss and Pangan, 2004; Jocano, 1997.

Box III-3

Coping with disasters – erosive and non-erosive strategies

Erosive	Non-erosive
▪ Selling productive livestock such as working or breeding animals ▪ Eating very little or very unpleasant food resulting in less physical health ▪ Selling agricultural or fishing equipment ▪ Mortgaging or selling land ▪ Borrowing money at very high interest rates ▪ Over-exploiting natural resources	▪ Selling excess animals ▪ Consuming less-expensive or less-preferred food, or gathering wild foods. ▪ Drawing on kinship transfers of food or money, or reciprocal labour exchange ▪ Migration and remittances ▪ Casual local work or temporary migration ▪ Drawing on existing savings

Source: Heltberg and others, 2012.

productive equipment such as motorbikes or boats. Similarly, in Kazakhstan, people sold houses, cattle and cars.[25] In Mongolia, poor herders severely affected by declining world prices of cashmere had to sell a larger number of animals while the wealthier herders could rely on savings and other sources of income and could wait for the prices to recover.[26] In Viet Nam, rural communities had to rely more on natural resources and extracted more forest production, often beyond sustainable limits.[27]

In the most extreme circumstances, people may even work as illegal migrants under severe oppression, sell body organs or become victims of human trafficking (Box III-4). In many countries in Asia, unsuspecting women who are trying to eke out a living can be trafficked into commercial sex.[28] For a few, the final resort is suicide – a recurrent tragedy in some parts of India when indebted farmers cannot repay loans to moneylenders or banks.

Non-erosive strategies

On the other hand, the more resilient groups or households respond with non-erosive strategies that do not endanger their future livelihoods. They might, for example, be able to draw on existing savings, sell non-essential possessions, or consume less-expensive or less-preferred food. They might also seek additional work, either locally or by migrating to another area or a nearby city.

People can also draw on family or social solidarity networks for food supplies or informal loans, or engage in reciprocal labour exchange. During the 2008 crisis, women in Bangladesh showed great skill and flexibility; though women are often seen as vulnerable during a disaster, they can also be resilient shock absorbers (Box III-5).

Some households will have diversified their sources of income through international migration – and benefit from remittances from family members overseas. In 2011, countries in South Asia, South-East Asia and the Pacific received almost half the world's remittances and the volume continued to increase in 2012.[29] Indeed remittances are now on such a scale that they exceed government social expenditure or official development assistance. In the year ending June 2012 Bangladeshis sent home $13 billion, more than all the Government's social protection programmes put together.[30] Remittances have the advantage that they are often counter-cyclical, rising during economic downturns and natural disasters as migrants send more cash to meet their families' emergency needs.

SUPPORTING COMMUNITIES

Many vulnerable communities, faced with perennial disasters and weak government support have organized themselves to prepare better against disasters and crises by undertaking community-based disaster risk reduction.[31] Supporting community resilience involves focussing on what communities can do for themselves and enabling them to strengthen their capacities. This process is illustrated schematically in a model in Figure III-1. This has two levels: the first identifies the necessary adaptive capacities; the second identifies the required mechanisms or strategies.

Figure III-1

The community resilience-building process

Box III-4

Coping with shocks

Ms. Eni Lestari Andayani Adi came from a small town in Indonesia, and like other girls her age, had big dreams of pursuing college and becoming a professional. However, her dreams were shattered when her family lost their small business in the wake of the Asian financial crisis in 1997. The family then became trapped in debt, unable to make a living. Torn between her dreams, and the responsibility to support her family, Ms. Eni decided to leave Indonesia to become a domestic migrant worker abroad.

As a female domestic migrant worker, she faced unbearable injustice and gender discrimination. She says, "The recruitment agency forced me into confinement in a training camp for five months. I was made to sleep on the floor with hundreds of other women, verbally abused, and even witnessed torture and rape of my friends. I had no access to family and friends and just hoped to leave this place soon." Ms. Eni was relieved when she found a job in Hong Kong as a domestic helper, but her happiness was short-lived. She was denied wages for the first few months, cut off from the outside world, and was given no holidays. She found herself trapped with no support network, living in a foreign country with an abusive employer. Yet she stayed because she was the main breadwinner for her family back home.

When she could not bear the sufferings any longer, she managed to escape from her employer's house and take refuge in a shelter for domestic workers in Hong Kong. There she learnt about her rights as a migrant worker and found solace in the company of other women of different nationalities who had faced similar fate. She realized that she suffered mainly on account of being a female migrant worker. Ms. Eni says, "I have learnt that discrimination is not only in the form of employment or physical abuse but also in the form of structural abuse. Government policies fail to treat women as equal to men." Now, as the founder of the Association of Indonesian Migrant Workers in Hong Kong, she is strongly committed to help other millions of female migrant workers who are vulnerable to external shocks and gender discrimination, through education, awareness, and promotion of protection and rights.

Source: From the speech of Ms. Eni Lestari Andayani Adi, founder of the Association of Indonesian Migrant Workers in Hong Kong, at the International Women's Day, Bangkok, 8 March 2013.

Box III-5

Bangladesh – resilient women during the 2008 crisis

During the 2008 financial and food crisis, poor Bangladeshi women demonstrated great resilience and resourcefulness. In response to the spike in food prices, many rural women diversified their sources of income. Some participated in the Government's new 100 Days Employment Guarantee schemes. Others took jobs previously considered taboo for Muslim women, such as working publicly in restaurant kitchens or managing market stalls. One new niche livelihood involved the gathering and sale of vegetables rejected by local wholesale markets. Overall in Bangladesh, women and girls whose labour is often priced lower than market rates, showed great resilience and initiative in finding alternative sources of livelihoods for themselves and their families.

Source: Heltberg and others, 2012.

To build resilience, communities can draw on three types of capital: economic, natural and social. Economic capital provides economic and material capacities, and natural capital provides them with ecosystem goods and services that are essential for survival and well-being. But people can also be vulnerable to disasters because they lack bonds of solidarity and cohesiveness. They also therefore need sufficient social capital – in the form of durable networks of trust and solidarity that enable collective action.

To enhance these three adaptive capacities there are five main strategies: strengthening social protection; fostering mechanisms for risk transfer; enhancing local governance; promoting partnerships; and using information and communications technology.

Strengthening social protection

Resilient communities are built on sustainable and inclusive development. For this they will need economic resources, decent employment and access to social services, including health and education. And over their lifetime they need economic security. Most of this they should be able to provide themselves directly, but they should also be able to take advantage of more formal systems of social protection. This can take the form of old age and disability pensions, unemployment pay, maternity and child benefits, and universal access to essential health care. In many developing countries, however, such systems fall short. Some are poorly designed or offer scant benefits – and often fail to address the particular vulnerabilities of those who need protection the most. As a result, people tend to rely primarily on their families or communities.

Providing a strong social protection floor that guarantees certain basic rights for all citizens is critical. The State plays a pivotal role in the development of integrated approaches to social protection rooted in universalism and a rights-based framework. Building a social protection floor must be seen as an investment in human capacity and capabilities. Once established by offering a minimum level of access to essential services and income security for all, social protection programmes can be built incrementally, with the capacity for extension according to the needs and aspirations of countries, and the level of economic development.

Effective social protection programmes should be all inclusive and maintained or enhanced in times of crisis. Viet Nam, for example, has a wide range of programmes (Box III-6). And

Box III-6

Viet Nam – The National Target Programme for Poverty Reduction

Arising out of the country's socialist legacy, Viet Nam has a wide range of social policy and protection programmes. One is the all-inclusive National Target Programme for Poverty Reduction. This has a wide range of instruments, including preferential credit to poor households and subsidies for education. The Programme also offers subsidies to poor communities in mountainous areas to support their agricultural and residential land, including housing and water supply.

In addition, the Government has developed the Socio-Economic Development Programme for Ethnic Minority Areas or 'Programme 135'. This targets communities and villages of ethnic minorities and those in mountainous areas, and has four primary components:

1. Market-oriented agricultural production, providing agricultural extension and marketing services to improve household income.

2. Community infrastructure development to improve access by the poor to various social services as well as increased economic opportunities.

3. Capacity building for local officials and communities to better plan, manage, implement and monitor investments.

4. Improve socio-cultural livelihoods by providing social services, which includes safe water and sanitation, and assets such as housing and land.

The first phase of the Programme from 1998 to 2005 covered 2,410 of Viet Nam's poorest communities. Of these, 1,938 (1.1 million households) were in mountainous areas, while 472 (over 6 million people) were in the lowland areas.

Source: ILO, 2010.

Indonesia has demonstrated the value of a comprehensive response to a crisis (Box III-7).

Social protection systems cannot be set up overnight, so crisis interventions are more effective if they build on pre-existing mechanisms.[32] For example, after the financial crisis in 1998, Indonesia started a system of community-linked cash transfers. So when a tsunami hit Aceh province in 2004, the Government was able to strengthen the system to make it a central delivery mechanism for rebuilding community livelihoods and infrastructure.

Social protection systems also need reliable funding. During economic crises, the tax revenues and contributions reserved for social protection may decrease just when more people are seeking assistance. It is important therefore to ensure that the financing systems are flexible and can be scaled up for episodic shocks, with elements of contingent targeting.[33] India and the Philippines have successfully managed to maintain calamity funds – with an annual pool of reserves to deal with more frequent small-scale disasters.[34]

Dealing with multiple shocks is, however, best achieved in a more comprehensive way through 'adaptive social protection'. This involves integrating social protection with disaster risk reduction and climate change adaptation.[35] Thus far these fields have largely developed in silos – within ministries of the economy, environment, interior or civil protection, and social affairs – leading to duplication, inefficiency and competition.

In the Philippines, Samoa and Maldives, governments have introduced legal frameworks and national action plans to integrate disaster risk reduction and climate change. They are building on existing systems by ensuring the programmes are sufficiently flexible.[36] Households can then cope with higher levels of everyday risk – regardless of the source: disasters, economic crisis or changes in average climate conditions.

To achieve long-lasting results, social protection systems need to be accompanied by longer-term measures for poverty reduction. These could include social assistance programmes to protect the vulnerable as well as child-care facilities to enable women to join the workforce. After the 2008 global financial crisis, the Russian Federation, for example, provided livelihood support to vulnerable groups such as young professionals, persons with disabilities and mothers with small children. These measures are expected to generate over 14,000 jobs annually between 2013 and 2015 (Box III-8).

Informal social protection

In the absence of formal social protection, many people rely on a variety of traditional or informal protection within households, groups and networks. People can use such networks, for example, to find jobs through friends, relatives, neighbours and communities – or through other workers in the same occupational group. They may exchange meals and small loans and receive emotional support. For many people, such as excluded groups or migrants from other countries, this support may be all that is available.

If the crisis is prolonged, however, with high levels of stress, solidarity mechanisms can start to weaken. They are unlikely to be completely destroyed but will have less capacity, perhaps providing aid to only the neediest or to older persons.[37] Reports from Cambodia showed that during the economic crisis of 2008-2009, although stretched and weakened by the shock,

Box III-7

Indonesia – social protection response to the 1997 financial crisis

During the 1997 financial crisis, Indonesia's poverty rate doubled within a year. The Government responded quickly with a National Safety Net Programme which between 1998 and 2000 helped reduce the poverty rate from 33 to 12 per cent. The programme is also thought to have contributed significantly to the country's wider economic recovery. The success of this programme also encouraged the Government to set more ambitious social objectives, as demonstrated by the launch of an unconditional direct cash transfer programme in 2005, and a conditional cash transfer programme in 2007.

Sources: Davies and McGregor, 2009; Prichett, Sumarro and Suryahadi, 2003.

mutual support offered the most important safety nets for rural poor households, and the only ones for rural migrants in cities.[38] Nevertheless, in the face of multiple, covariate shocks, even informal community-based safety nets may eventually collapse.

In developing countries, adequate coverage is likely to involve a combination of formal and informal channels - taking advantage of informal connections and systems but supporting these by formal mechanisms where appropriate. Indeed there are increasing calls for traditional mechanisms to be incorporated in more

Box III-8

The Russian Federation – response to the 2008 global financial crisis

The National Government of the Russian Federation responded to the 2008 global financial crisis with measures for employment generation. These projects targeted young professionals, persons with disabilities and their parents, and mothers with young children. The Government coordinated and organized activities aimed at providing livelihood support by improving social security and offering subsidies.

Young people, including those unemployed and at risk of dismissal, were assisted through vocational training and internship programmes. At the end of this training, workers obtained a certificate to prove their professional qualification to potential employers. There were also programmes to support small and medium enterprises and encourage individuals to set up their own businesses.

Source: The Russian Federation, 2013.

formal programmes.[39] In Samoa, informal systems work alongside formal systems to reinforce social protection and enhance community resilience (Box III-9).

Fostering risk transfer

While richer individuals might be able to take out their own insurance against disaster, poorer households cannot afford such coverage. One alternative is 'microinsurance' which pools the risks and resources of whole groups. Micro-insurance is valuable for people who are excluded from social protection schemes, particularly informal workers and their families. It can offer protection against a variety of shocks, including illness, old age, natural calamities, death of the family bread-winner, and theft or damage to assets or means of production.[40] Coverage may include: repair of damaged assets, funeral services, cash transfers, concessionary credit, and the provision of permanent shelter. In addition, there may be donations for health treatment, or purchase of household commodities.

Most microinsurance mechanisms involve a small premium. Some schemes are linked to loans and allow lenders to stop their repayments when a disaster strikes.[41] Some boxes in this Chapter illustrate the recent experiences of India (Box III-10), Tajikistan (Box III-11), Solomon Islands (Box III-12), and Pakistan (Box III-13). They describe how these schemes have evolved to respond to frequent disasters and form part of resilience-building strategies.

However, one of the biggest challenges in microfinance is debt management. In Cambodia, for example, prior to the 2008 crisis a number of communities had taken significant amounts of credit from microfinance institutions. Some villagers resorted to borrowing from informal moneylenders to service their debts, but interest rates were high and many ended up losing their houses and their sources of income.[42]

Box III-9

Samoa – combining formal and informal social protection

As a small island country, Samoa is highly vulnerable to disasters and global economic crises. It is one of the five most vulnerable states on the Commonwealth Vulnerability Index. To address such vulnerabilities, Samoa has both formal and informal mechanisms for social protection. For those in formal employment the Government provides a National Provident Fund and a worker's compensation scheme – with voluntary participation by those working in the informal sector. The Government also provides a pension for everyone older than 65.

But Samoa also provides support through traditional and customary practices: *'fa'a* Samoa'. This is based on *matai* system of heads of families and the traditional obligations of the extended family to provide both social and financial security and protect the vulnerable. Communities collect cash and food which the *matais* allocate according to individual needs or for village enterprises, the church and ceremonial activities. Finance is primarily received from wages and remittances.

The *matai* system is also embedded within national politics and government. *Matais* take almost all the parliamentary seats. This facilitates a strong combination of formal and informal social protection mechanisms.

Source: Amosa and Samson, 2012.

Some of the most effective microinsurance schemes have been index based. These schemes assess the exposure to extreme weather events and compensate vulnerable groups for the associated loss of income without people having to make individual claims. In the Republic of Korea, the Ministry of Food, Agriculture, Forestry and Fisheries has started a crop disaster insurance programme and a fisheries disaster insurance programme. The intention is to cover all natural disasters such as typhoons, floods and storms. In recent years, formal insurers have also seen the potential in low-income markets, encouraging them to offer products, mainly in health and life insurance.[43]

Enhancing local governance

Local governance institutions have an important part to play in enhancing community resilience. They can support local responses, engage vulnerable groups in decision-making and help them become self-reliant, independent, and resilient. For this purpose they need to involve vulnerable communities and other stakeholders in every step of the development process – from vision setting, planning, and implementation to monitoring and evaluation.[44] In rural areas one of the most important functions would be to improve the productive capacities of small farmers to maintain food supplies at times when international prices are

Box III-10

India – microinsurance schemes after the 2001 earthquake

The 2001 earthquake in Gujarat left over 12,000 people dead and caused damage of approximately $2.5 million. As people turned to the Government for financial support, it became clear that funding was limited. In response, the All India Disaster Mitigation Institute created an all-hazard insurance programme, AfatVimo, for men and women in Gujarat running microenterprises. Unlike other insurance schemes, AfatVimo covers 19 disaster risks and includes groups based in different geographic locations that are not equally exposed to disaster risks. Through the scheme, risk is transferred from the individual to the community or inter-community levels. The policy is available for an annual premium of less than $5 (a four-day wage) and is supported with micro-mitigation measures, such as fire-safety training, seismic-safe construction practices and business development services.

Insurance schemes have now evolved into an effective means of reducing vulnerability to climate-related events, as well as other disasters. Thanks to a favourable regulatory environment, microinsurance schemes have been spreading. For example, insurers are now required to increase their number of low-income clients.

Another channel for microinsurance is through microfinance institutions. To protect their microcredit and savings operations, these institutions have started to offer microinsurance schemes to their debtors. Sometimes microfinance clients are required to have insurance alongside their loans and savings, as is the case in Swayamkrushi, a saving and credit cooperative in Andhra Pradesh.

Index-based microinsurance policies have also been pilot-tested in India. As they use an objectively calculated index, they also reduce moral hazard and the potential for manipulating claims.

Sources: UNISDR and UNDP, 2007; Mechler and others, 2006; ESCAP, ADB and UNEP, 2012.

Box III-11

Tajikistan – disaster risk reduction through community endowment funds

The Disaster Preparedness Action Plan focuses on community mobilization, disaster mitigation, and capacity building. Launched by CARE International in 2003, the project has sought to reduce disaster risk through better preparedness among vulnerable people. Sixty-four community-based organizations have been formed. Each organization establishes an endowment fund to enable the community to tackle and finance problems locally using its own resources.

Source: UNISDR and UNDP, 2007.

Box III-12

Solomon Islands – developing community resilience

Kahua region, on the eastern Solomon Island of Makira, has been facing rapid changes through population growth and economic development. The region, with 4,500 people, is relatively isolated; it has little government presence and receives little assistance from external institutions. In 2000, community leaders established the Kahua Association (KA). KA acts as a bridging organization both between communities as well as externally with development organizations.

Despite having no formal controlling authority, KA has stimulated cross-community discussion and more equitable decision-making, with a horizontally structured hierarchy that limits the potential for power imbalances. The organization has been helping communities learn more about external market forces and appreciate the risks they face, while helping them enter into partnerships with development agencies.

Sources: Schuett and Fazey, 2010; Schwartz and others, 2011.

Box III-13

Pakistan – disaster risk insurance for low-income communities

Traditional insurance cover for low-income communities would require an extensive network of trained people to assess the value of the asset being insured as well as claims for individual losses. In addition to the cost, this would be time consuming and involve long pay-out times. An alternative is index or 'parametric' insurance. Such contracts are written against a physical trigger such as an earthquake of a predetermined magnitude. Each time there is an earthquake of the magnitude above the agreed level the people of the area would become eligible for certain amount irrespective of their actual losses. In the case of weather derivatives, farmers collect an insurance payment if the index reaches a trigger level – for example a certain measure of rainfall.

In Pakistan, index-based crop insurance schemes are promoted and distributed by microfinance institutions, with technical assistance from the World Bank. The risk is borne by commercial or public insurers.

Source: Pakistan, 2013.

high. This could take the form of technological support and improved access to seeds and fertilizers.[45] Strong links between communities and local governments are important also for successful collaboration in times of emergency.

An important contribution to greater local resilience is effective decentralization which can improve the delivery of key public services. Regional and local authorities can have a more complete understanding of local conditions and better respond to emerging needs. But decentralization is not always effective. Decentralization can only be effective if local governments have the necessary capacity, resources, accountability and transparency. In the absence of these conditions, decentralization can lead to capture by local elites.

In principle, the government should address the poverty and vulnerability in each region through fiscal transfers, especially for natural disasters. In reality such transfers generally give little weight to levels of poverty or vulnerability – being based more on the size of the population or the geographical area. Fiscal transfers thus fail to address regional inequalities; indeed the rich regions may get more than the poor. The problem is exacerbated when the grants are distributed in an ad hoc and discretionary manner. For example in India, the state governments often allocate and disburse funds to the *panchayats* depending on the project and on a case-by-case basis. This can result in an inequitable distribution of grants.[46]

It is also important to monitor expenditure carefully to account for the flow of funds to the local levels. There are a number of important tools for analyzing the efficacy of fiscal decentralization in providing basic services to the poor. These include fiscal incidence studies and public expenditure tracking surveys – which have been used successfully in many countries such as Uganda, Peru and Zambia.

Across Asia and the Pacific many local governments have helped communities build greater resilience to economic shocks and natural disasters:

- *Sri Lanka* – The Ministry of Local Government and Provincial Councils carries out an annual performance appraisal for municipal councils, urban councils and *pradeshiyasabas* – using 78 indicators to gauge how local governments work on many issues, including disaster risk management. In 2009, Matara, a city on the southern coast, was recognized for its excellent performance and for integrating disaster risk reduction into the structures and work of the local government – in particular for managing flood risk by integrating disaster risk reduction in land use planning and for increasing public participation. Also, the local government partnered and collaborated with different stakeholders to ensure a comprehensive understanding of the city's vulnerability.[47]

- *The Philippines* – The Community-Based Disaster Risk Management and Local Governance programme is implemented by the Centre for Disaster Preparedness in Dagupan, north of Manila. This seeks to integrate community-based disaster risk management projects into good city governance. It has helped city officials re-engage with urban communities and provided training on disaster risk management – bridging the gap between high-level officials and local communities.

Promoting partnerships

An important activity for both national and local governments is to promote public-private

partnerships (PPPs). An Asia Pacific Economic Cooperation workshop on PPPs and disaster resilience in 2010 pointed out that the private sector has much to offer in terms of resources and expertise and essential services. In many economies, the private sector operates critical infrastructure.[48]

Governments can also work closely with civil society organizations – which can help communities to organize themselves more effectively to prepare for disasters and crises.[49] There are many examples of successful collaboration:

- *Bangladesh* – Practical Action Bangladesh and its local partner NGOs have an ongoing project with marginal farmers, fishermen, daily-wage labourers, local elected bodies, local educational institutions and government service providers. These projects have strengthened community capacity in livelihood-centred disaster management and awareness.[50]

- *Cambodia* – The Asian Disaster Preparedness Centre has embarked on community-based flood mitigation and preparedness with 23 communities – based on partnerships with international organizations. Community members contributed money and labour as well as their knowledge and expertise on which projects would be most effective.[51] The exercise resulted in the construction of emergency evacuation routes, elevated roads and more bridges.

- *India* – The NGO Gram Vikas has been working in Samiapalli village which lies five kilometres from the coast of the Bay of Bengal – one of the world's most cyclone-prone regions. The NGO has helped the community raise a bank loan to buy additional land for the construction of disaster-proof homes.[52]

- *Indonesia* – East Nusa Tenggara has an annual drought season that lasts nine months, and the province regularly experiences food shortages. A local NGO Yayasan Pikul in 2005 started working with rural farmers on a community-based disaster risk management initiative in Sikka district. The community now has its own monitoring system for food security and a food early warning system, and is now in a stronger position to adapt and respond to climatic variations.[53]

Using information and communications technology

Community resilience and response to disasters demands rapid production and dissemination of information between communities, governments and supporting organizations. Fortunately this can now be done more effectively through a variety of information and communication technologies – print, radio, television, the internet, and mobile and smart phones. Social media platforms are also proving invaluable in facilitating the exchange of information in times of crises.

Early warning systems are usually managed nationally, but the onus lies on communities to receive this information and respond accordingly. In addition, communities need to be prepared to react to disasters such as flash floods or earthquakes that can occur without warning. A variety of programmes within the Asia-Pacific region seek to inform, encourage consultation, and empower communities to respond during times of crisis.

- *Lao People's Democratic Republic* – The Mekong River Commission and the Asian Disaster Preparedness Center have implemented a project called Flood Emergency Management

Strengthening. This has focused on community and public awareness, and initiated various engagement campaigns such as the School Flood Safety Program. Through this, 40 schools in Nongbok and Xebangfai areas used role playing and games to engage students, parents and community members.

- *Afghanistan* – In 2006, in partnership with the BBC World Service, the international NGO Tearfund produced radio dramas aimed at strengthening local capacity for disaster risk reduction. Disaster risk reduction messages were integrated into the story lines of a successful programme called 'New Home, New Life' – exploring issues concerning earthquakes, droughts and floods through drama set in a fictional remote village.[54]

- *Indonesia* – In the city of Yogyakarta, people are continually threatened by Mount Merapi, the country's most active volcano, which is believed to have an average eruption span of 3.5 years. The most recent eruption in 2010 claimed 302 lives.[55] In 2010, the local government started providing information to communities within a 7-kilometre radius of the peak of the volcano about the condition of Mount Merapi. The government has also been refurbishing early warning devices.[56]

- *Australia* – The Queensland floods of 2010 and 2011 proved a significant testing ground for the Queensland Police Service's new social media platform. Using the social media, Facebook and Twitter, the service provided followers who had access to the Internet and smart phones with real-time, centrally-coordinated and authoritative information. Within 24 hours of the flash flood in the Lockyer Valley on 10 January 2011, the number of followers had reached 165,000 – receiving a record 39 million story views, the equivalent of 450 hits per second. In addition, residents stranded in cars by flood waters were able to watch live press conferences on their smart phones, share information, and generally be kept abreast of the developing crisis.[57]

The need for disaster statistics

If governments are to prepare effectively for disasters, and respond rapidly, they need timely and reliable data. In particular, they need accurate information on the situation of the poor and most vulnerable. The starting point should be a full vulnerability assessment. Until recently, both governments and development partners would have been daunted by this task, feeling they lacked the necessary resources or skills. Nowadays, however, they can take advantage of new and innovative technology. A number of governments, including Indonesia and the Philippines, have been using satellite data and geographic information systems to produce multi-hazard maps showing where the poor are at greatest risk. Indonesia, for example, has been using such techniques as the basis for one of its main anti-poverty, community empowerment programmes: PNPM Mandiri. Data are fed into an information management system which keeps track of all poverty programmes, resources and beneficiaries across the country. As a result, the Government has a clearer picture of the gaps and can design the necessary interventions.

In most countries, when a disaster strikes, data collection is not a high priority – and is complicated by the involvement of many different relief organizations. In addition, staff of the national disaster management agency may not have the appropriate training. National statistical office staff have the

skills but may not be involved in collecting disaster-related data.[58] Governments should therefore prepare in advance the systems and protocols for collecting data during emergencies, aiming to ensure consistency in reporting and methodology.

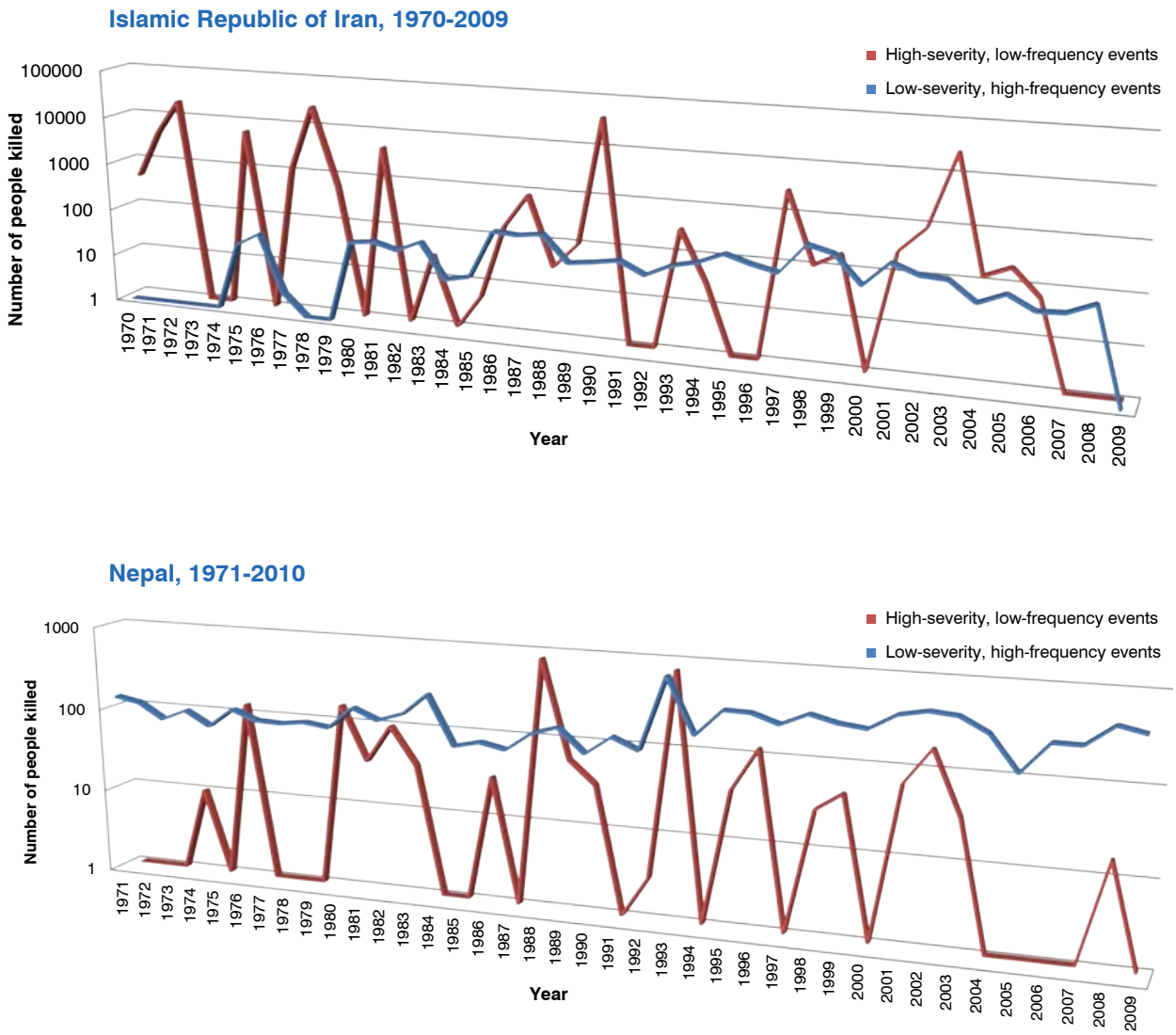
Another concern is that international data systems for disasters do not cover low-severity, high-frequency events. The leading publicly available international database, the Emergency Events Database (EM-DAT), has many advantages but its unique methodology means that it only covers disasters where ten or more people have been reported killed or 100 or more have been affected.

However, even small-scale disasters can have a wide economic, social and environmental impact particularly among the poor as each shock further erodes their coping capacity and traps them in a cycle of poverty.[59] To address this issue, a number of countries in the region have been building national disaster databases to analyze the effects of low-severity, high-frequency events. Data from Nepal and the Islamic Republic of Iran, for example, show that similar numbers of people die in a large number of smaller-scale disasters as in a few large-scale ones (Figure III-2).

Ultimately, when faced with natural disasters or economic shocks communities have to fall back on their own resources, especially in the least developed countries. But many governments are now discovering ways of helping communities become more resilient (Box III-14). Policy makers now have many more options. Some of them are opening up as a result of new technology, but the most effective methods are those that engage local people themselves, capitalizing on their knowledge and enabling them to build more resilient communities.

Figure III-2

Total deaths due to large- and small-scale disasters



Source: UNISDR from Desinventar Project Team, Disaster Information System Database. Available from http://www.desinventar.net/DesInventar/profiletab.jsp?countrycode=or (accessed 20 May 2012).

Box III-14

Thailand – multiple community strategies

Over the past two decades, Thailand has felt severe impacts from both disasters and economic crises. But it has also capitalized on these experiences to achieve greater community resilience by building on social capital, strengthening partnerships, empowering women and enhancing the use of ICT while expanding the coverage of social protection. Activities have included:

Early warning systems – An important consideration was the development of early warning systems, including the erection of tsunami warning towers, with strong linkages to the community level. However, local communities have been long been able to detect environmental abnormalities and changes – often as fast as high technology equipment.

Civil society partnerships – Civil society entities, including the Save Andaman Network, helped more vulnerable groups, such as fishermen, rebuild their traditional capacities while focusing on long-term livelihood security. Community-based revolving funds helped ensuring equal access to resources and improve sustainable livelihoods.[60]

Private partnerships – Following the 2004 tsunami, resort owners in Phang Nga province on the Andaman coast of southern Thailand worked with long-established European partnerships to revive tourism in the main resort area. Small resort owners reached independent travellers, through locally-controlled websites and through exposure in guidebooks.

Rebuilding ecosystems – Replanting native trees and grasses helped increase biophysical resilience and prevent further erosion by creating a natural barrier against the impact of tsunamis or storm surges.[61]

Communications –Civil Defence Volunteer Units have been trained to inform communities of emergency operations, rules, directions, procedures, evacuation and emergency responses, and shelters. They have also disseminated information through hotlines and amateur radio networks. The Department of Mineral Resources and the National Disaster Warning Centre has provided a toolkit along with pocket books to schools to educate children in disaster risks and responses.[62]

Social protection – The 2003 Social Welfare Promotion Act provides social insurance for workers in key areas, including benefits for unemployment, sickness, disability, maternity and old age.[63] As a result, when the 2007/2008 economic crisis struck, the social protection response was considerably more effective, helping households to receive government support so that there was no significant reduction in consumption.

Countercyclical policies – The Government managed to quickly implement countercyclical policies to avert the most severe social impacts, which in turn restored domestic demand and maintained short-term productivity and thus promoted the country's competitive edge for the future. People could also borrow from relatives and friends to purchase food and basic products on credit, while assistance was given to the poorest from local temples.

Cash transfers – Through 'Help the Nation' the Government's direct cash transfer programme for low-income earners, one-time payments of 2,000 Thai baht (THB) ($67) were made to workers earning less than THB 15,000 ($500) per month, and contributions were made to the social security fund. However, these only reached civil servants and formal-sector workers, while around two-thirds of the workforce is in the informal sector. In 2011 therefore the Government proposed to expand the

social protection fund to initially 20 million informal workers and later extend coverage to all informal workers.[64]

Community networks – When the 2011 floods struck, community networks organized relief and food centres, and provided emergency supplies, tools and food. Members of the national network of low-income community organizations each agreed to contribute THB 30 ($1) to assist those who had been affected. These funds and others were to be managed by community networks working on flood relief activities.[65] Committees of community leaders, many involving women in leadership roles, mobilized resources and drew up daily plans to cook and to feed households.

ICT – The newly independent and volunteer-run ThaiFlood.com served as a clearinghouse for information provided on the websites of other relevant ministries or departments as well as from independent postings to Facebook and Twitter.[66] This was supplemented by a mobile crowdsourcing application providing GPS-located information. In addition, easily accessible information on the floods was provided by RooSuFlood ("know and combat the flood") videos posted on YouTube. Recent tsunami warnings, such as that of April 2012, were met with rapid evacuations from low-lying areas of the Andaman coast.

Governance – Partnerships, which include the Ministry of Public Health, Ministry of Information and Communication Technology, the Ministry of Justice, the Thai Red Cross Society and IBM's Crisis Response Team have worked to establish the technology infrastructure, technical services and logistics support.[67]

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4 LAND, WATER, ENERGY NEXUS: PREVENTING CATASTROPHIC FAILURE

THE LAND, WATER, ENERGY NEXUS AVOIDING CATASTROPHIC FAILURE

Constantly producing more goods and services is pushing the countries of Asia and the Pacific towards catastrophic ecosystem collapse. Much of the land is facing serious degradation, water resources are being used wastefully or polluted, and it is becoming increasingly difficult to find sufficient energy. Economic planning needs to incorporate the true value of ecosystem services, while reducing the use of resources and preparing for climate change.

Though natural ecosystems have large capacities to absorb and respond to many pressures, once tipping points are reached, there could be a rapid collapse that would cascade across our economic and social systems, threatening development gains. Building resilience for Asia and the Pacific means considering the long-term implications of our actions and addressing this nexus of converging threats.

GROWING LAND CONSTRAINTS

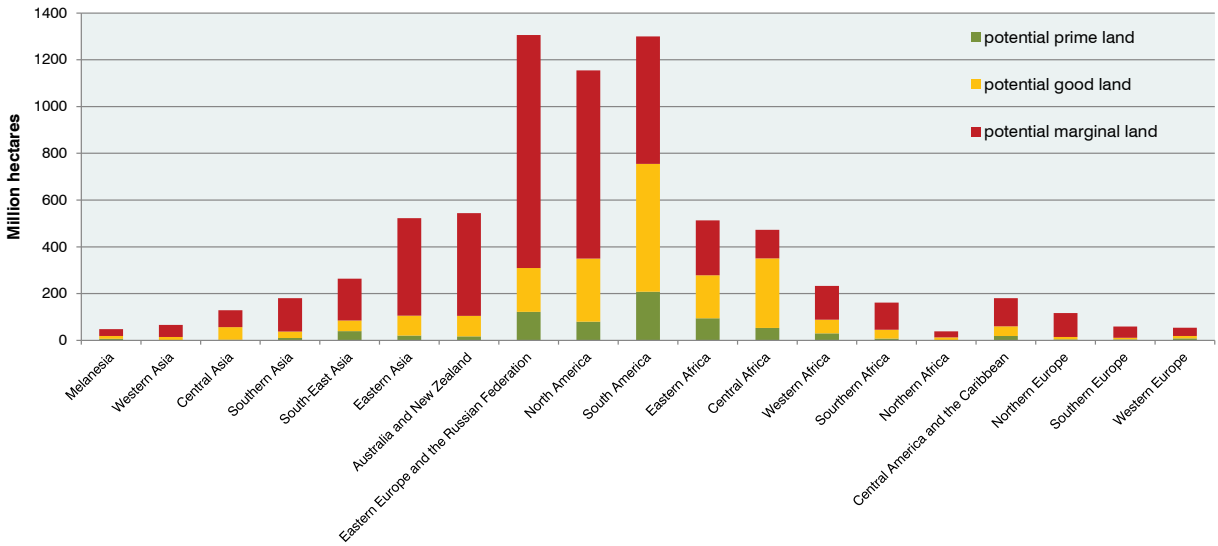
Land for agricultural production is becoming increasingly scarce. Of the world's remaining arable land that could be brought into agricultural production, most is in Latin America and Sub-Saharan Africa. While some is available in East and South-East Asia, there is virtually none to spare in South and West Asia (Figure IV-1). Moreover, in South Asia around 45 per cent of land with crop production potential is currently used for human settlements and there is concern that urban areas will encroach on the remainder. [1]

In addition, much of the land currently under cultivation is becoming degraded – reducing productivity and threatening persistent crop failure. Globally, almost 2 billion hectares of land – an area twice the size of China – are already seriously degraded; in some instances irreversibly.[2] In Asia, this is the result of erosion, nutrient depletion, chemical contamination or encroaching salinity (among other things) – which have degraded vast areas of cropland, grassland, woodland and forest. In South and South-East Asia, around 74 per cent of agricultural land has been severely affected by wind or water erosion or has been polluted to the extent that it is no longer productive. China alone has lost 3.5 million square kilometres of topsoil to water and wind erosion.[3]

Asia has the largest amount of land affected by desertification – around 1,400 million hectares. Millions of people rely on this land for survival: in India, 26 per cent of the population; in China, 17 per cent; and in the remainder of the region, 18.3 per cent.[4] People living in

FIGURE IV-1

Potential arable land available for agriculture by region, 2009



Source: Fischer, G and others, 2010.

these fragile areas struggle to cope – lacking the capacity and technology to adjust their agricultural practices.

When their land is no longer productive, people are often pushed into ecologically fragile areas such as forests and wetlands.[5] Putting extra strain on these areas could have major long-term ecological consequences. These complex and diverse ecosystems act as buffers against changing environmental conditions. Forests and wetlands, in particular, are important for purifying water and attenuating floods (Box IV-1). The Muthurajawela wetland in Sri Lanka, for example, is responsible for wastewater treatment worth an estimated $654 per hectare per year and generates flood attenuation benefits worth $1,907 per hectare per year.[6] Similarly in Cambodia, the watershed catchment of the Bokor National Park provides water purification and attenuation services worth around $2 million annually for the downstream Kamchay Hydropower Scheme. [7]

Of particular concern is the loss of forests. A substantial proportion of the earth's natural forests have already been destroyed – seriously impeding the water cycle. Deforestation reduces cloud-forming evapotranspiration and thus decreases rainfall. The local climate then becomes drier, which in turn accelerates ecosystem changes: the soil is less able to absorb rainfall and rivers fill with sediment.[8]

Land degradation has also led to many countries investing in land in other countries to secure this basic resource. In what has been dubbed 'land grabbing', many large food companies are buying land in both developed and developing Asia-Pacific countries, creating further possible competition for local farmers and threathening domestic food security. [9]

BOX IV-1

Viet Nam – restoring mangrove forests

Since 1994, the Viet Nam Red Cross, along with other donors, has initiated a project of restoration, rehabilitation and management of coastal mangrove forests. Mangrove and wetland ecosystems help protect coastal communities from storm surges and erosion, and mitigate climate change by absorbing carbon dioxide.

A recent analysis of the costs and benefits of this restoration activity found that the mangrove forests had a substantial impact on reducing disaster risk and had enhanced community livelihoods. The overall cost of the project, spanning 17 years, was approximately $8.8 million, but the benefits were felt by approximately 350,000 people directly, with another 2 million protected indirectly through the afforestation efforts. Savings from dyke maintenance was estimated to be around $80,000, but in addition, avoided damage to communities were approximately $15 million. Also, the mangrove forests were able to provide additional income for coastal communities through an increased yield in aquaculture products, and other economic activities such as honeybee farming.

Source: IFRC, undated.

WATER SCARCITY

Only 2 per cent of the planet's water can be used for drinking or agriculture. But these freshwater systems are coming under increasing pressure as a result of over exploitation and pollution. Most of this is due to cultivation. Almost 80 per cent of the region's freshwater is used for agriculture, though the proportion varies by country: 20 per cent in the Russian Federation, for example, but up to 90 per cent in many least developed countries as well as India.[10]

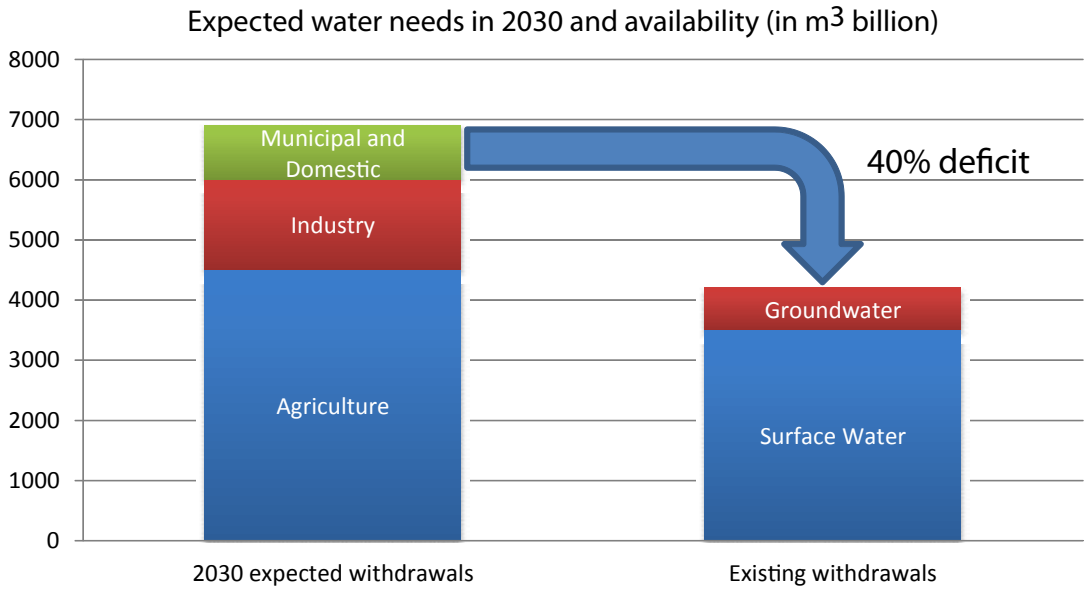
This water usage is likely to increase. Agricultural water consumption could grow by around 19 per cent per year by 2050,[11] but without using water more efficiently, the world will need 40 per cent more than will actually be available (Figure IV-2).

In Asia and the Pacific only around 9 per cent of water withdrawal is for domestic consumption. Even so, almost 380 million people in the region do not have access to clean water (Table IV-1).

PHOTO KIBAE PARK

FIGURE IV-2

Potential global gap between water supply and withdrawals by 2030



Source: Based on UNESCO, 2012.

TABLE IV-1

Consumption of water and population without access to improved water

	Total water withdrawal (billion m^3 per annum)	Total freshwater withdrawal (% of total renewable water per annum)	Withdrawal for agriculture (% of total water withdrawal)	Withdrawal for domestic (% of total water withdrawal)	Withdrawal for industry (% of total water withdrawal)	Population without access to improved water in 2010 (thousands)
Asia and the Pacific	2,261.3	11.3	78.5	9.3	12.3	379,634
East and North-East Asia	677.5	21.5	64.1	13.8	22.1	123,271
South-East Asia	339.7	4.5	84.4	6.7	8.9	73,483
South and South-West Asia	995.2	26.2	88.6	6.9	4.5	163,981
North and Central Asia	222.8	4.5	68.6	8.8	22.6	14,431
Pacific	26.2	1.6	72.4	17.5	10.1	4,405
World	3,689.0	7	68.7	11.3	20	798,983

Source: ESCAP Annual core indicators online database. Available from: www.unescap.org/stat/data/statdb/DataExplorer.aspx (accessed, February 2013).

Around 12 per cent of water in the region is used for industrial production. The most water-intensive industries include electronics manufacturing, pulp and paper production, textile production, food and beverage production, metal mining, chemical manufacturing and refining. A number of enterprises are becoming concerned about supplies: corporations such as Coca-Cola and Nestle now take into account future water availability when choosing manufacturing locations. [12]

Water is also needed for the production of energy – as well as for transport and processing of primary fuels. In 2010, around 15 per cent of the world's total water withdrawals were for energy purposes.[13] Water is also used in the production of biofuel crops. Several Asia-Pacific countries are expanding their production of biofuels – for purposes of energy security, climate change mitigation, foreign exchange savings and rural development. This also adds pressure to the land and water requirements; one litre of ethanol from sugarcane uses enough water to produce food for one person's daily consumption.[14] To a limited extent, energy can also be used to increase freshwater supplies through desalination – though this is extremely energy intensive.

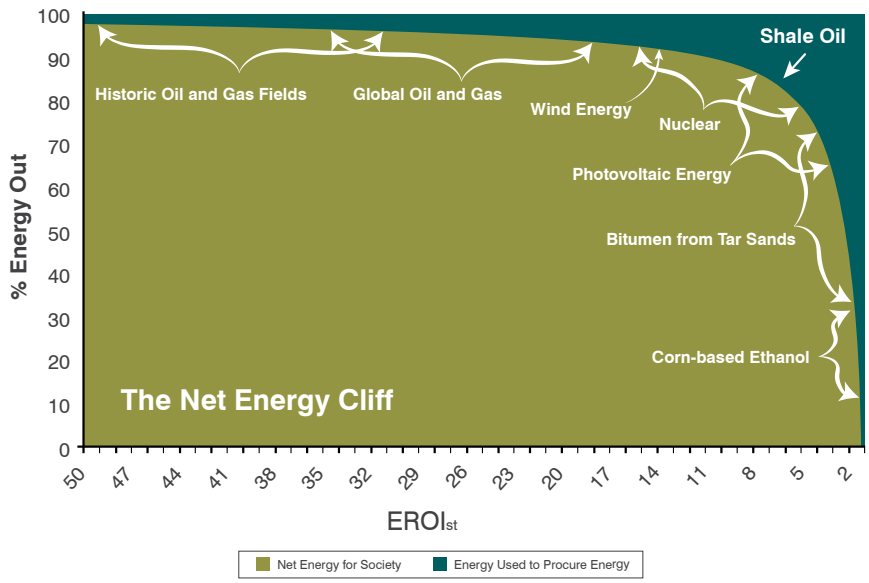
REACHING ENERGY THRESHOLDS

Across the world, energy consumption has been growing rapidly whether for industrial processes, for transport, or for households for cooking and heating. This has given rise to increasing concerns about future availability. Some energy sources such as coal, are still relatively abundant. And fossil fuel sources, such as shale oil and gas, seem to be increasing as further reserves are discovered. However, these new reserves are more difficult to exploit – demanding significant amounts of energy for extraction. This can be assessed through the energy return on investment (EROI) – the amount of energy required to extract a unit of energy. At one end of the spectrum are oil and gas reserves that historically have been easily accessible. At the other end are fuels derived from tar sands or corn. As illustrated in Figure IV-3 EROI can fall exponentially – disappearing over what has been called the 'net energy cliff'. These new extraction and energy production methods could thus lead to more price shocks.

Beyond the availability of fossil fuels there is the even greater concern for climate change since fossil fuel combustion is one of the primary sources of CO_2 emissions. Figure IV-4 projects Asia-Pacific energy demand according to two scenarios – one based on business as usual, the other assuming effective efforts at mitigation which are detailed in Box IV-2.

FIGURE IV-3

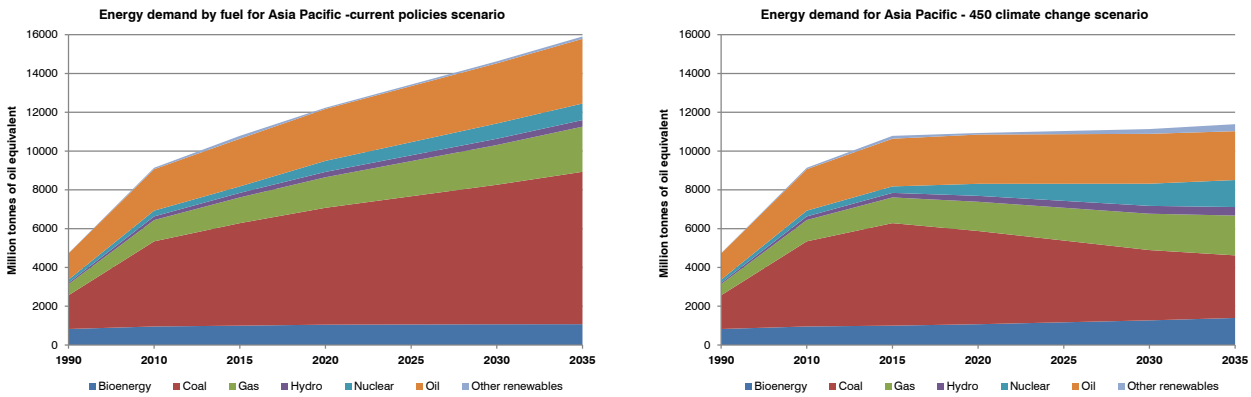
The net energy cliff – energy ratios for different technologies



Source: Lambert, Jessica and others, 2012.

FIGURE IV-4

Asia-Pacific energy demand, with and without CO_2 mitigation, 1990-2035

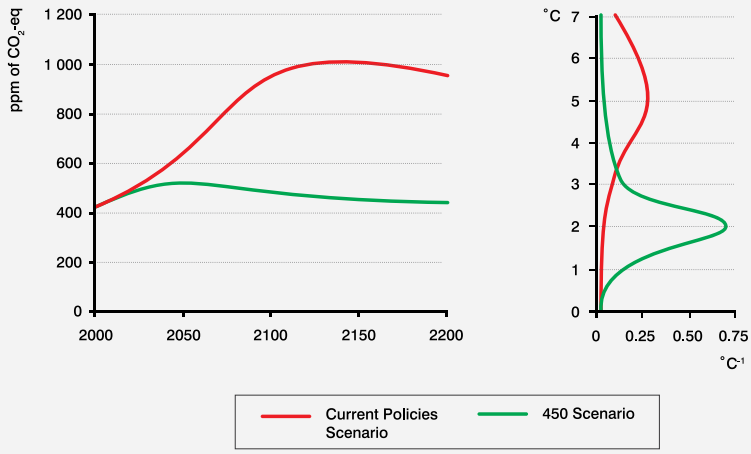


Source: Derived from IEA, 2012.
Note: Central Asia not represented.

BOX IV-2

Energy and climate change

The International Energy Agency has developed a number of scenarios including current energy policies (current policies scenario), and the energy policy requirements to limit carbon dioxide levels in the atmosphere to 450 parts per million, which could stabilize the average global temperature rise to 2°C (the 450 scenario). This modest temperature rise is already likely to happen; as the temperature rises further, the impacts will become more extreme. The chart below shows the potential outcomes.



Source: IEA, 2012.

SCARCER MINERALS

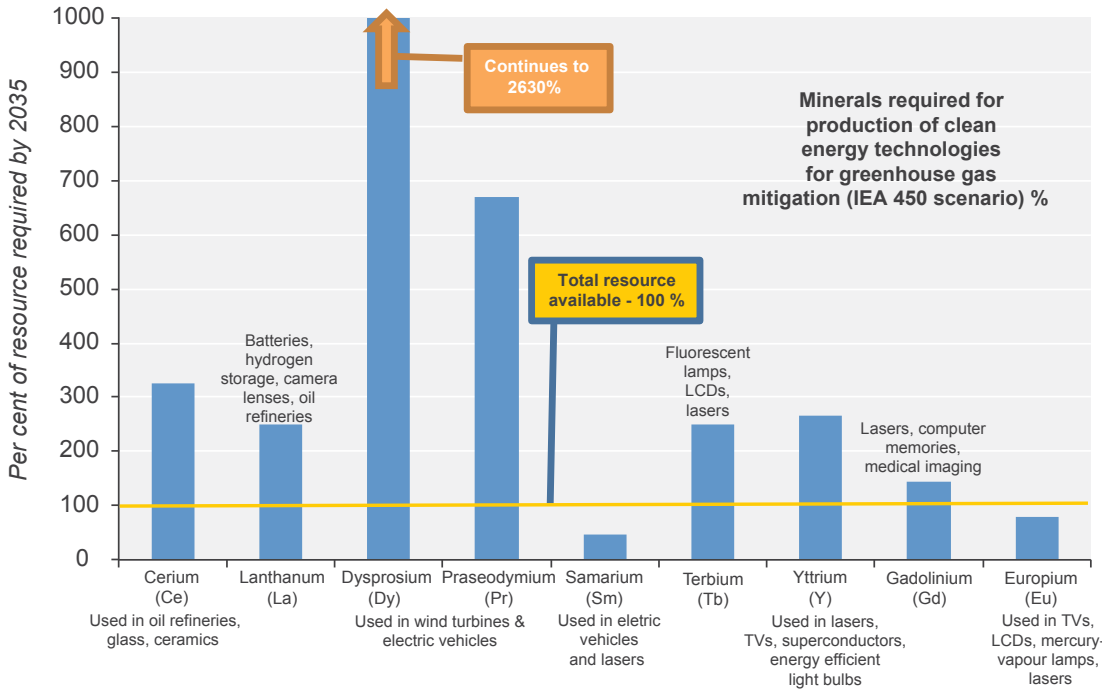
Another concern is the future availability of minerals. Between 1970 and 2008, the use of metals and minerals for industry and construction, grew on average by 7 per cent per year. Much of this was extracted from within the region: in fact, in 2008, Asia-Pacific countries extracted over 1,100 per cent more minerals and metals than in 1970.[15] Both within the region and beyond, however, some of these minerals are becoming uneconomical to extract.[16]

Of particular concern are the 'rare earth' elements such as cerium, lanthanum and dysprosium. These are critical for several important industries, including the manufacture of renewable energy technologies, electronic equipment, vehicle parts, batteries, components for power stations, semiconductors and computer chips.[17] Such has been the pace of consumption that for some elements mineral reserves are likely to last only 4 to 20 years.[18]

These elements are also vital for the production of clean energy technologies such as wind turbines, hybrid vehicles and energy-efficient light bulbs. One estimate suggests that by 2035 the demand for these elements will be between 600 and 2,600 per cent of the amount known to be extractable – economically or non-economically (Figure IV-5).[19] This has serious implications for climate change mitigation.

FIGURE IV-5

Rare earth element requirements as a percentage of available supply by 2035



Source: Derived from Alonso, Elisa, 2012.

IMPLICATIONS OF CROSSING THRESHOLDS

Crossing one or more of the converging thresholds of land, water and energy would have dramatic and widespread impacts:

Economic – Some of the effects are already being felt. Energy prices are volatile but on an upward trend. The prices of rare earth minerals rose significantly in 2011: for some of these around 95 per cent of extraction is in China which has instigated strict export quotas.[20]

Social – One of the most immediate impacts will be on food supplies. Between 2012 and 2050 the Asia-Pacific population is expected to rise from 4 to 5 billion.[21] This, combined with changing diets, is likely to increase the demand for food by 50 per cent by 2030 and by 70 per cent by 2050.[22] Already, over 510 million people in Asia and the Pacific suffer from undernourishment. And, with little extra land becoming available, prices are likely to soar. Water supplies too will come under increasing pressure. Some 380 million people have no access to clean water as indicated earlier in Table IV-I, and it may become increasingly difficult to ensure universal access.

The compounding effect of climate change

All these issues will be exacerbated by climate change. This is already reducing crop

yields in some places and affecting glaciers which for several countries are important sources of water (Box IV-3).[23] Rising temperatures and extreme weather events are affecting production of rice, maize and wheat (Box IV-4 and Box IV-5). By 2020 crop yields could fall by between 2.5 and 10 per cent and by 2050 by between 5 and 30 per cent. On this basis, by 2020 some 49 million people could be at risk of hunger, rising by 2050 to 132 million. By the end of the twenty-first century, rice production in Asia is projected to decline by 3.8 per cent – due to a combination of the fertilization effect, thermal stress and water scarcity.[24]

Climate change will also add to water stress. The projected increase in air temperature in north-western China, for example, will likely result in a 27 per cent decline in glacier area, a 10 to 15 per cent decline in frozen soil area, and an increase in flood and debris flow. In parts of China, temperature rise and declines in precipitation have already resulted in dried-up lakes and rivers. By 2025 the population exposed to increased water stress could increase to 120 million-1.2 billion people.[25]

Rising temperatures will lead to rapid thawing of permafrost, triggering landslides, and will also degrade forest ecosystems. In addition, a 2ºC to 4ºC increase in sea surface temperature is projected to increase tropical cyclone intensities by 10 to 20 per cent in East Asia, South-East Asia and South Asia.[26]

Australia and New Zealand are already coming under greater water and agricultural stress, with changed natural ecosystems and reduced seasonal snow cover. Some areas are experiencing extreme events, such as wildfires, heat waves, cyclones, droughts and flooding.[27] But the most vulnerable countries in the Pacific are the small island States (Box IV-6). Here sea level rise will affect coral reef and fisheries and reduce water supplies. Moreover, most infrastructure and settlements are along the coasts and thus vulnerable to storm surges and extreme weather events. Climate change is also likely to alter the distribution of vector-borne diseases.[28]

However, the impact will vary according to location, with some areas suffering more droughts and others experiencing more floods.

BOX IV-3

Nepal – climate change impacts

A recent social survey of climate change impacts in Nepal indicate that many people have seen a reduction in rainfall, an increase in temperature, more frequent extreme weather events, and a lower agricultural productivity over the past 10 years. Though many have enough information to know about the impacts of climate change, those currently most affected do not think they have the right information to be able to respond to the impacts. They recognize the need to make changes to their livelihoods, yet are unable to do so due to lack of resources, access to information, and limited government support.

Source: BBC, 2013.

The frequency and intensity of tropical cyclones in the Pacific have increased over the last few decades, whereas the cyclones in the Bay of Bengal and Persian Gulf have decreased in number but are becoming more intense. In both cases, the damage caused by cyclones has risen significantly, notably in India, China, the Philippines, Japan, Viet Nam, Cambodia and the Islamic Republic of Iran.[29]

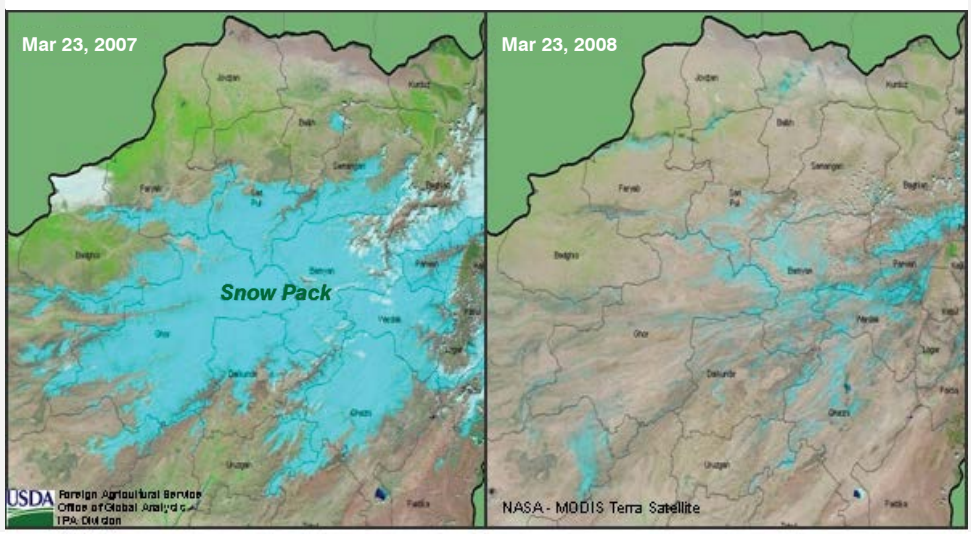
BOX IV-4

Afghanistan – the 2007/08 drought

Rainfall and winter snowfall across the majority of Afghanistan during late 2007 and early 2008 were well below normal and led to the worst drought for a decade. Severe drought in 2008/09 caused a precipitous decline in grain production resulting in an acute food supply crisis. In 2008/09 wheat production in Afghanistan was 1.5 million tons, down 60 per cent from the year before. Losses to winter grain production were substantial enough to have serious ramifications in the domestic food and feed grain market during the 2008/09 marketing year.

In recognition of the severity of the grain production shortfall, the Government of Afghanistan and the United Nations in 2008 issued an emergency appeal for donations of up to $400 million to cover the sizable wheat import and food aid needs for the 4.5 million Afghans affected, as well as to prepare for the next winter cropping season. Irrigated wheat production in Afghanistan accounts for roughly 70 per cent of output, and is nearly totally reliant on the surface water flow through mountain streams and rivers from snowmelt. Low snowfall in 2008/09 caused the majority of the grain losses, and there the frequency of low rain- and snowfall seems to be increasing.

Central Afghanistan: Winter Snow Pack Comparison



Source: United States Department of Agriculture, 2008.

BOX IV-5

Viet Nam – protecting the rice supply chain

In Viet Nam, rice production not only ensures national food security but also accounts for around 20 per cent of global rice exports. Now the paddy fields are being affected by climate change and sea level rise. In response, in June 2012 the Ministry of Industry and Commerce embarked on a new project: "Protecting the rice supply chain of Viet Nam in response to climate change and sea level rise."

This initiative integrates the protection of rice supply chains into national development strategies and planning. It addresses the impact of climate change on the current rice supply infrastructure, establishes standards for businesses and enterprises that make up part of the rice supply and export chains, and provides incentives for construction works and projects that deal with climate change response and supply chain protection.

Source: Viet Nam, 2013.

BOX IV-6

Maldives – climate change impacts

The average height above sea level in the Maldives is 1.5 metres, with over 80 per cent of land area less than 1 metre above sea level. Even a slight sea level rise would have devastating consequences, including land loss and beach erosion, and damage to infrastructure and coral reefs. The 2007 IPCC report suggested that by the end of this century sea levels could rise by between 190 and 590 mm. The two figures below graphically represent the inundation of Male, the capital, in 2100 based on IPCC best- and worst-case scenarios.

Best case scenario: 50 per cent inundated

Worst case scenario: completely inundated

A number of adaptation measures have already been implemented, including protecting the Male' International Airport, building breakwater walls around islands, constructing safe shelters, and facilitating migratory movements of the population.

Source: Maldives, 2012

RESPONDING TO THE CONVERGING NEXUS

Governments and societies need to recognize the limits to the natural resource base and the potential tipping points that could lead to ecosystem collapse. They can no longer view economic and social systems separately. They can take some incremental steps to use resources more efficiently, but ultimately will need to adapt and diversify their systems of production. Other chapters in this report consider how the countries of Asia and the Pacific can respond to immediate shocks. This chapter considers strategies for responding to longer-term disasters such as droughts and shortages of food and water.

1. *Ensure widespread participation*

The best results will come from involving stakeholders and communities. The first step is to raise public awareness – either through broad public media campaigns or specific measures such as labelling appliances according to their use of water or energy. Popular involvement is particularly important in rural areas where local people have extensive knowledge that can feed into actions by government and civil society organizations. In a semi-arid region of Maharashtra State in India, for example, local communities are working with an NGO, the Watershed Organization Trust, to carry out a series of restoration measures including soil, land and water management while also diversifying livelihoods so that households are less exposed to shocks.[30]


ESCAP PHOTO

2. *Place value on natural resources*

One reason why natural resources can rapidly be exhausted is that they are not properly priced and are consequently used inefficiently. Changing this would require significant investment: globally, the cost of introducing the technology to use energy more efficiently has been estimated at $11.8 trillion, but this would be more than offset by the reduction in fuel expenditures of $17.5 trillion and of supply-side investment of $5.9 trillion. It has been estimated that more efficient energy use could increase economic output through to 2035 by $18 trillion. Some of the greatest gains in GDP would be in China, 2.1 per cent, and in India, 3 per cent. [31] In Mongolia, for example, it has been estimated that retrofitting buildings could reduce energy costs by 60 per cent – which could save half a million tonnes of coal per year, worth almost $6.5 million.[32]

A good starting point for more efficient energy use is to remove fuel subsidies. Indonesia, for example, was by 2008 providing subsidies that cost 20 per cent of the government budget – more than its spending on housing, education, law and order and health combined.[33] Moreover, the subsidy was badly targeted – only 15 per cent reaching the lowest-quartile income households.[34] The Government has reduced some of the subsidies, triggering widespread protests; even so, Indonesian energy prices are still heavily subsidized.[35]

Energy efficiency measures can be paid for by levies on energy use. Thailand, for example, has since 1992 applied a small levy on petroleum sales for its Energy Conservation Fund which generates between $67 million and $168 million per year – for activities such as revolving loans, subsidies for renewable energy, research and development on clean energy technology, and pilot studies and demonstration projects.[36] China too has been encouraging enterprises to become more energy efficient: since 2010, the Government has offered tax exemptions and other financial benefits for enterprises that sign contracts with energy service companies to improve their efficiency.[37]

Water and other natural resources can also be undervalued and wasted. Some countries have therefore been making efforts to use water more efficiently. Since the 1980s, Singapore has had a comprehensive water management system which includes carefully designed water pricing structures. As a result, between 1994 and 2008, Singapore reduced the proportion of water that was imported from 50 to 33 per cent, and by 2061 aims for self-sufficiency. Strategic long-term investment in national water projects has also spawned a thriving water industry; more than 50 international and local companies are active in the Singapore water market.[38]

3. *Make better use of urban space*

Roads and bridges usually last for decades. Indeed, the way cities are built generally locks societies into fixed consumption patterns for generations. Cities also suffer from a legacy of underinvestment in public transport. Faced with inefficient transport systems, people will prefer to use their own vehicles – heightening traffic congestion, polluting the air and adding to greenhouse gas emissions. Many cities also lack effective controls that improve energy efficiency: buildings contribute around 35 per cent of greenhouse gas emissions.[39]

Instead, city planners can take account of both current and future demands. Good urban planning allows for city growth – considering the

needs of its inhabitants yet also allowing more efficient use of resources (Box IV-7). Yokohama in Japan has demonstrated how this can be achieved. As the population grew, new satellite towns arose. The city authorities quickly installed efficient public transport systems such as railways. They also rehabilitated a water and parkland network along the coast to enhance ecological sustainability and serve as recreational area. Energy-saving houses were promoted, requiring mandatory building certification with subsidies for the assessment costs. Low-interest loans were made available for house owners wishing to construct green houses.[40] The city has also been retrofitting buildings in industrial areas to minimize environmental harm.

BOX IV-7

The Philippines – building resilience to disasters in Metro Manila

Reducing the exposure of people and assets to disasters requires good land use planning. In 2011, the project 'Building Resilience and Awareness of Metro Manila Communities to Natural Disaster and Climate Change Impacts' (BRACE) was established. Starting as a pilot in Taguig city, this project aimed to reduce vulnerability and enhance resilience to risks posed by disasters and climate change. It developed a social housing model that builds safer disaster resilient settlements by addressing the needs of urban poor communities.

The BRACE project builds the Government's capacity to understand and map the risks from disasters and to strengthen community-based disaster risk management. It integrates disaster risk reduction and climate change adaptation into urban land use planning, and provides safer settlement and livelihood support for up to 1,800 vulnerable families living in hazard-prone areas.

Source: Australia, 2012.

4. *Exploit new technology*

Many new technologies, some initially with government support, now offer opportunities to diversify sources of natural resources, and use them more efficiently. In Cambodia, for example, some pilot villages without access to electricity have been trained in the manufacture of solar cooking stoves and have received entrepreneurial training so they can set up businesses to produce other clean technologies that meet basic household needs.[41]

New technologies are also available for monitoring climate impacts and for disaster early warning systems. These include information and communication systems, space technologies, and automatic weather stations (Box IV-8 and Box IV-9).

The shortage of 'rare earth' minerals could be offset by technological advances that allow the use of alternative and more abundant resources, though in the short term, as prices rise, more extreme extraction techniques may become economically viable.[42]

BOX IV-8

Bangladesh – regional early warning system

The international community has been helping Bangladesh – one of the world's most disaster-prone nations – to strengthen its early warning systems. The ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness, in collaboration with the Asian Disaster Preparedness Centre has supported the establishment of the Regional Integrated Early Warning System for Africa and Asia (RIMES). RIMES helped Bangladesh develop long-lead flood forecasting and concurrent monitoring of depressions and cyclones in the Bay of Bengal. It has developed and transferred technology to the Bangladesh Meteorological Department and Flood Forecasting and Warning Centre and is providing back-up support to both institutions until new technology is fully integrated into their operations.

RIMES has also been working with Bangladesh user agencies such as the Disaster Management Bureau and the Department of Agricultural Extension so that they can better interpret forecasts and translate these into impact outlooks and response options for resource and disaster risk management. The Government of Bangladesh has mobilized $28 million from the Climate Resilient Fund for a comprehensive early warning system improvement project, of which $4 million is budgeted for technical inputs for RIMES.

Source: ESCAP, 2012b.

BOX IV-9

Maldives – climate resilient development

Maldives is working with the UN country team and RIMES to apply global climate change models at the national level. As part of a "Low Emission Climate Resilient Development" (LECReD) programme this aims to 'statistically downscale' the models using historical data and satellite imagery.

For one pilot atoll the LECReD Programme takes a climate-resilient, low-carbon development approach in order to visibly reduce its vulnerability. The programme integrates approaches related to energy security, rising sea levels, water, sanitation, livelihoods, food security, human health, governance, disaster risk reduction and natural resources. By demonstrating integrated climate resilient development in one atoll, the aim is to generate a robust climate resilient development model that can be replicated in all atolls.

Photo: Satellite imagery of a Maldives atoll
Source: : ISLES provincial information management system, Government of Maldives, http://isles.egov.mv

5. *Integrate policies and regulation*

Many countries have policies, regulations and statutory tools aimed at conserving resources and decoupling resource consumption from economic development. In some instances these are sectoral – as with the Malaysian National Renewable Energy Policy and Action Plan (2010). Others take a more integrated approach such as the Singapore Sustainable Development Blueprint (2009), Japan's Law on Promotion of Circular Society (2001) and the Republic of Korea's National Framework Act and Presidential Decree on Low Carbon Green Growth.

National level policies will benefit from an integrated approach, even if the regulations are implemented in a more sectoral manner. China, for example, has a Circular Economy Law 2008 which specifies responsibilities across a number of sectors including government, business, industry and consumers. This includes tax incentives to promote water, energy and material conservation, and pricing policies to support resource efficiency, reuse and recycling, along with restrictions on the production or import of wasteful products. India similarly has a National Environmental Policy (2006) which encourages the efficient use of environmental resources per unit of economic output and encourages actions for recycling and reuse of waste.

Unfortunately, governments often develop policies but do not implement them. This may be because of a lack of resources, poor planning, conflicts between sectoral priorities and institutions, bureaucratic inefficiencies or corruption. Regulations can only be effective if supported by strong and effective administration, monitoring and enforcement (Box IV-10).

BOX IV-10

The Philippines – Legal enforcement of environmental rights

Serious concerns over environmental degradation, exploitation of the environment and unsustainable consumption patterns have resulted in a programme between UNDP and the Supreme Court of the Philippines to ensure accountability for resource management, enforcement of environmental laws, and the promotion of public awareness to prevent environmental damage.

After much multi-sectoral consultation, new Rules of Procedure for Environmental Cases were established in 2010, laying down the procedures governing the civil, criminal and special civil actions in all trials regarding environmental cases. The ultimate purpose is to recognize the constitutional rights of people to health and to a balanced, healthy ecosystem, by providing a simplified, speedy and inexpensive procedure for the enforcement of environmental rights under Philippines law. To ensure that the law works in practice, a number of initiatives and capacity building programmes were developed, particularly for judges and other stakeholders.

Source: UNDP, 2012.

ADAPTIVE GOVERNANCE

Adaptive governance involves integrated and forward-looking analysis, along with regular policy review. It also demands active consultation with all stakeholders but particularly with disadvantaged groups who are vulnerable to economic shocks and natural disasters.

Institutions need to be well informed and sufficiently flexible in the face of complexity and change to recover from shocks. And given the cross-cutting nature of threats some of these institutions will need to operate at the highest levels. For climate change, for example, such institutions include the National Development and Reform Commission in China, the Prime Minister's Council on Climate Change in India, and the Office of the President in Indonesia.[43] These institutions are in a strong position to assess the threats and develop integrated responses. In Indonesia, for example, the President has announced that the savings from cuts in fuel subsidies would be redirected to other programmes for food security, social protection and education.[44]

Adaptive governance should consider all stakeholders, including local communities that have shown great flexibility in the face of a crisis. The most effective programmes at the community level have involved governments at various levels working to establish strategies with communities and other key stakeholders (Box IV-11).

Building resilience means recognizing the significance of natural resources and ecosystem services in economic and social development and recognizing the full cost of consumption. Governments need to integrate the true value of ecosystem services in their national economic strategies while preparing for resource constraints and climate change. Adaptive strategies that are inclusive and flexible will lead to better systems of governance and more resilient societies.

BOX IV-11

The Philippines – resolving water supply disputes

Disputes over access to water resources already occur in some regions of the Philippines. In one example, an important water source in the south of the Philippines was located within the ancestral lands of an indigenous community. With some mediation, an agreement was reached between the municipal government and the local community for the construction of a reservoir, with piping for the indigenous community for free, while both parties agreed to maintain the water source to ensure good quality water for all users.

In another case, a local authority established a pipeline to a privately owned water source. The land owner then cut the distribution line. Through mediation, an agreement was reached: the land owner received a regular honorarium to maintain and secure the water source, as well as a free supply of drinking water in exchange for building a reservoir and a water distribution system.

Source: UNDP, 2012.

ENDNOTES

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PHOTO COURTESY OF PROMETHEUS

5

PROTECTING CRITICAL SECTORS

PROTECTING CRITICAL SECTORS

All sectors of the economy need to become more resilient to external shocks, but it is especially important to strengthen certain critical sectors in which any failure is likely to cascade across the whole society. Principal among these are the financial sector, and parts of the physical and social infrastructure.

In recent years, the financial sector has been subject to moral hazard and reckless behaviour with serious ramifications for the entire economy. Similarly, physical infrastructure has been exposed to natural disasters which affect major supply roads, bridges, and power and water systems and communications lines. Social infrastructure too is vulnerable, including schools, hospitals and community buildings. This Chapter identifies the critical sectors that need safeguarding, and outlines what is required to minimize their exposure.

1. FINANCIAL SECTOR

The financial sector is an essential channel of economic development. It transmits money from where it is available to where it is needed – enabling lenders of capital to be remunerated for taking risks while enabling the borrowing institutions and individuals to make important investments. This intermediation function is critical for developing the private sector and for reducing poverty.

A national financial system can be unstable. This is partly because it is sensitive to shocks, either generated within the domestic economy or transmitted through international markets. Moreover, it is different from other sectors in that it is sustained largely by trust and confidence. Normally this functions fairly well: rational behaviour by individuals, despite their gains and losses, allows the whole system to remain stable in aggregate. But financial systems are also susceptible to herd behaviour. Individuals may, for example, collectively move into the same or similar investments largely because many others are investing in those stocks or property – famously characterized by former United States Treasury Secretary Alan Greenspan as 'irrational exuberance'. Then, also on the basis of little evidence, they may all become more risk averse and start to sell simultaneously. Such mass sell-offs may lead to a sudden crisis of confidence. Banks become more risk averse and both raise interest rates and limit lending – triggering credit crunches, declines in production, higher unemployment, declining asset prices and spiralling debt. The circles of contagion can steadily widen and eventually envelop whole economies – with devastating consequences.

Types of financial shock

There are roughly four main types of financial shock: banking crises; the bursting of speculative bubbles; currency or exchange rate crises; and sovereign debt default crises. In reality, crises often evolve from one type to another or show multiple symptoms.

- ***Banking crises*** – These typically result from a loss in confidence that affects one or several banks. This could be due to an internal failure in one bank, such as through rogue trading, or because of an external event if one or more banks are over-exposed to one category of distressed asset such as real estate, and the affected borrowers cannot service their debts. An ensuing drop in confidence can lead to massive withdrawals such that the bank is unable to refund deposits or honour debts. These problems are further compounded by maturity mismatches: the banks' assets are generally long-term loans, while their liabilities are largely short-term deposits. In some cases, a crisis in one or two banks can be contained, but, if not, the shock soon reverberates through the entire banking system and cascades to real economy in the form of a widespread credit crunch.

- ***Speculative bubbles*** – These are often consequences of herd behaviour. If credit is relatively cheap and easy to obtain, investors may seize on specific assets that soon become overpriced – the main driver subsequently being not the asset's real rate of return but rather the common expectation that its price will keep heading upwards. When market expectations suddenly change, asset holders sell as quickly as possible, resulting in a rapid and amplified downward price correction. Bubbles are particularly damaging if they affect commodities such as food or fuel whose prices are of major significance to vulnerable people.

- ***Balance-of-payments crises*** – These may be due to long-term declines in competitiveness, or more immediate shocks such as natural disasters or political or civil conflict that suddenly reduces an economy's capacity to export. A crisis can also arise if there is a massive outflow of portfolio capital. A balance of payments crisis can also trigger a collapse in the exchange rate or make it very difficult for countries to maintain pegged exchange rates. And as the costs of imports rise, there is also likely to be a rise in inflation.

- ***Debt crises*** – These occur after prolonged accumulation of unsustainable levels of sovereign debt and eventually lead to a sovereign default or forced structural adjustment. A default has severe economic and social repercussions. Domestically this often results in steep cuts in government expenditure and tax hikes, frequently provoking political and social unrest. Often, governments will introduce drastic austerity measures that deliver a shock to the real economy – which further reduces tax revenues. There are also long-term reputational costs: the country will face higher borrowing costs in international and national capital markets.[1]

Economic and social impact

The economic and social impact of financial collapse can be demonstrated by two Asia-Pacific experiences – the 1997 Asian financial crisis and the global recession of 2008 – both of which affected the region, but in different ways. The 1997 crisis had its origins in South-East Asia.[2] After a long period of economic growth, and a series of measures in the early 1990s to liberalize capital accounts, residents found it

relatively easy to borrow in foreign currencies. And since a number of countries pegged local currencies at relatively high rates against the dollar such borrowing was also cheap. The consequence was large capital inflows which in turn fuelled bubbles in real estate and stock markets. Furthermore, in the period immediately preceding the crisis, South-East Asian countries experienced large deteriorations in their balances of payments. Initially, this did not cause alarm as inflation was low and capital inflows were high which seemed to make these deficits sustainable.

However, in early 1997 there was a sudden large correction in real estate prices in Thailand. This triggered a massive capital outflow. The Central Bank initially attempted to defend the Thai baht but on 2 July 1997 it removed the peg and allowed it to float. The baht went into free fall, and as interest rates rose, many banks and financial institutions faced bankruptcy. Having borrowed in dollars, after the exchange rate depreciation they could no longer honour much more expensive repayments. The crisis rapidly enveloped the real economy, and spread throughout the region. In 1998 growth in the developing economies of the region as a whole sank to 0.4 per cent. And a number of countries saw their economies contract: -13.1 per cent in Indonesia; -6.9 per cent in the Republic of Korea; -10.5 per cent in Thailand.[3] The IMF and other external lenders intervened with massive assistance to contain the spread.

Worst affected were the most vulnerable groups – poor women and girls, young people, and low-skilled urban workers. In the aftermath of the shock, many affected households started to reduce expenditures on health and some withdrew children, particularly girls, from school.[4] Many women who had lost formal jobs also had to accept precarious employment in the informal sector. In Thailand, job losses were particularly severe in construction. Previously, poor farmers had migrated seasonally to earn extra income on construction sites but now they and other low-skilled workers had to return to rural areas.[5]

The 2008 global recession was very different. This had its origins in the United States where from the late-1990s to the mid-2000s, home prices had risen rapidly. Much of this increase was driven by an expansion of risky lending to sub-prime borrowers. Encouraged by financial deregulation and low interest rates, agencies started lending heavily to borrowers who had limited capacity to repay, while the financial industry repackaged these low-quality loans as complex mortgage-based securities. Though many of the underlying loans were risky, the rating agencies rated the securities highly,[6] encouraging banks and funds to acquire large quantities of these assets. In 2006 however, real estate market started experiencing a downturn and more homeowners started to default. This forced the banks to write down large amounts of assets – rapidly undermining confidence in financial institutions, pushing up interest rates for inter-bank loans and causing a sudden crisis in liquidity.[7] In the autumn of 2008 this led to a succession of bankruptcies, culminating in the collapse of Lehman Brothers. Many banks had to be either nationalized or bought by other banks.

The sub-prime crisis in the United States turned into a debt crisis in the European Union. Investors became wary of the quality of sovereign bonds and doubted the capacity of some European Union member states, which had high levels of debt and ageing societies, to finance their fiscal deficits. A number of

European Union member states, in particular Greece, Italy, Spain, Portugal and Ireland, found it difficult to borrow on international markets. With the support of other European Union countries, and in some cases the IMF, they had to undergo drastic fiscal austerity reforms. This further depressed economic activity which, at a time of shrinking demand, pushed these countries deep into recession.

The crisis was felt in the developing countries of Asia and the Pacific primarily through a fall in exports. A sharp fall in world demand saw their exports decline by around 10 per cent in the last quarter of 2008. And in 2009 developed countries suffered a 5.5 per cent decline in growth. Nevertheless, overall the region as a whole proved rather resilient. In 2009 China's economy grew by 9.1 per cent and India's by 8.0 per cent, while the developing countries as a whole managed an average of 4.7 per cent. This was largely because many countries went into the crisis period with sound fiscal positions and could sustain their economies with large stimulus packages. Moreover, as a result of widespread financial sector reforms implemented after the 1997 crisis, Asia-Pacific developing countries maintained the confidence of international investors. Indeed they became anchors of stability and were soon seen as the drivers of world growth.

PREVENTING FINANCIAL CRISES

Each financial crisis gives rise to a new impetus of reflection and discussion. How can individual countries and the world as a whole make financial systems not just crisis resilient but also crisis resistant?

Governments and financial regulators have taken measures to make financial markets more stable and reduce the potential for future crises. They have for example, increased surveillance by regulatory authorities, and reinstated controls on the riskiest of behaviours, notably taming large-scale speculative short-term capital flows. At the same time, they have been aiming to make markets more transparent. In doing so, they need to strike a fine balance. On the one hand they want to make the financial system less volatile and vulnerable. On the other hand they do not want to excessively restrain capital markets and limit their capacity to allocate funds and finance legitimate risk-taking that encourages innovation and productivity and boosts economic growth.

Increasing financial depth and regional capacity to absorb investment

The experience of the 1997 crisis encouraged many countries in the region to build large foreign-exchange reserves to protect their currencies from speculative attack. By 2011, official reserves across Asia and the Pacific had reached $6 trillion.[8] While these reserves may provide some safety and offer buffers against large swings in exchange rates, they come at a cost. First because they are often 'parked' in foreign government treasury bonds which offer low rates of return. Second, because they represent large amounts of capital that are being put to little productive use so there is a significant opportunity cost.

Just as official reserves are held outside the region, so are private funds. In 2008, Asian wealthy individuals had invested up to 94 per cent of their total assets outside the Asia-Pacific region.[9] Likewise, the bulk of portfolio investment, 84 per cent in 2009, was invested outside the region.[10] As a result, Asian financial systems are over-exposed to risks that originate

outside the region and over which they have little control.

Asia-Pacific financial systems would be more resilient if more of their reserves and savings were invested in the region. There are a number of ways of achieving this. One, recommended by ESCAP in 2012, would be to establish a fund which would finance cross-border infrastructure projects and other regional public goods. This would provide intermediation between the region's large savings and its vast unmet investment needs in infrastructure.

Such a facility would also offer investors higher returns than those from foreign treasury bonds. It would help accelerate economic and social progress, making sustainable use of resources. It could also make development more self-reliant and reduce the region's exposure to external financial shocks. Moreover, it would serve as a counter-cyclical tool that would promote regional growth at times of economic turbulence.[11]

On 27 March 2013 in Durban, South Africa, the fifth Summit of the BRICS countries agreed on the creation of a New Development Bank that would mobilize resources for infrastructure and sustainable development projects in BRICS and other emerging economies and developing countries. The intention is to supplement the existing efforts of multilateral and regional financial institutions for global growth and development and this institution could actively contribute to redirecting some of the regional savings into regional investment projects.[12]

Greater transparency and better regulation

Currently governments and investors find it difficult to assess risk exposure. They are hampered by a lack of transparency, poor accounting standards and weak understanding of financial instruments. This led to inaccurate assessments of the quality of private-sector debt during the 1997 Asian financial crisis, and of the real levels of sovereign debt levels in a number of European Union countries in 2011, and the over-optimistic assessments of sub-prime-based securities in 2008.

This underlines the importance of increased market surveillance, especially in a globalized economy where institutions may be investing in distant markets about which they have relatively little information. To address this issue the IMF and the Financial Stability Board (FSB) have identified major data gaps that the international financial community should fill.[13] These include: financial soundness indicators that assess levels of risk in the financial sector; data on international financial interconnections; and assessments of the vulnerability of domestic economies to shocks. Their report also called for more countries, including developing ones, to develop and disseminate such data.

The Asia-Pacific region has already made progress in this direction. In 2011, ASEAN established the ASEAN+3 Macroeconomic Research Office (AMRO) to serve as the regional macroeconomic surveillance unit of the Chiang Mai Initiative Multilateralization (CMIM). AMRO will monitor and analyse economic situations in countries under its purview and thus help governments detect risks and take remedial action, and generally make CMIM decision-making more effective.[14] However, a truly Asia-Pacific system of resilience would mean expanding AMRO's membership and the scope of its surveillance.

At the global level, the key institution for regulating the international financial sector is

the Bank for International Settlements (BIS). Through the BIS, governments have reached a series of Basel Accords, the third of which was agreed in 2011 with implementation scheduled from 2013 to 2019. This includes prudential measures at both the individual bank and banking sector levels that will push banks into internalizing the costs of risky behaviour. Several Asian countries are signatories of the Basel Accords. Other non-members might also incorporate these measures into their regulatory frameworks, but they should carefully weigh the pros and cons. Applying further constraints to their banks could reduce the availability of funds for investment. Moreover, in the short-term, the region has a relatively limited range of assets to use as safe investments.

One issue that has come under increased scrutiny is the emergence of 'shadow banking'. In this case credit intermediation is provided by institutions that operate outside the regular banking system, without being subject to the same prudential rules.[15] Shadow banking accounts for 24 per cent of the assets held by the global financial system.[16] As shadow banking largely raises short-term funding, there are often maturity mismatches. In some Asian countries there are concerns that shadow banking might be encouraging unsustainable growth of investment in financial assets, particularly in real estate, leading to bubbles.[17] To reduce systemic risks, the FSB is developing regulations that would increase transparency and monitoring[18] but, given the complexity and diversity of shadow-banking, it remains to be seen how effective this will be.

Of particular importance to the stability of the world's financial systems are what are termed 'global systemically important banks' (G-SIBs). The FSB has identified 28 of these – which are essentially the world's largest multinational banks[19] – and is proposing measures to increase their capacity to absorb financial shocks through Basel III. The G-SIBs are expected to meet higher standards of risk management, data collection, and internal controls. Furthermore, and perhaps of more immediate relevance to Asia and the Pacific, the FSB has finalized a principles-based, minimum framework for addressing 'domestic systemically important banks' (D-SIBs). From 2016, in line with the G-SIB framework, national authorities will have to apply these requirements to banks identified as D-SIBs.

Finally, there have been major concerns about remuneration and incentives in banks. Remuneration structures based on large bonuses contributed to the 2008 crisis by encouraging excessive risk-taking.[20] [21] In response, the FSB has issued a set of principles and guidelines for sound compensation. [22]

Overall one of the most important principles should be global harmonization of banking and financial market regulations. Unless similar regulations apply everywhere the more footloose institutions will be tempted to migrate to laxer jurisdictions.

These developments have highlighted the inherent tensions in tightening the regulatory frameworks – setting the need for greater stability against the need to encourage bank lending and investment. Whatever balance is achieved, it will entail higher costs and lower short-term profitability in the financial sector.

As of early 2013, capital markets remained highly volatile. The liquidity glut in developed countries has led to surges in capital flows to

Asia-Pacific countries causing fluctuations in exchange rates. Some countries have responded by accumulating more foreign exchange while introducing direct capital account management measures. In 2010, Indonesia, the Republic of Korea, and Thailand, for example, imposed some capital account regulation measures[23] with some success, but may need to do more by targeting speculative flows. Overall, there is a need to tailor capital control instruments to the type of flows that are likely to affect a given economy, usually by restraining short term inflows while promoting investment in the real economy.[24] Asian countries and a few other developing countries are now in a position to exchange experience and best practices on how to encourage productive foreign investment while reducing cross-border volatility and vulnerability.

Limiting commodity-based speculation

Many Asia-Pacific developing countries, and in particular least developed countries, depend on exports of a small number of commodities. But they, and others, also rely on commodity imports, especially of food and fuel. All countries are thus concerned about the levels of commodity prices.

In recent years, food and fuel prices have been high and volatile. In the case of food this partly reflects rising global demand, but also inadequate supply as a result of under-investment in agriculture, and growing use of some food commodities as biofuels. On top of this the financialization of commodity markets offers greater opportunities for speculation.[25]

Higher prices for food and fuels have serious macroeconomic repercussions – heightening inflation and causing deterioration in balances of payments and in fiscal balances.[26] ESCAP has estimated that in some Asia-Pacific countries high energy prices alone could lead to a loss of GDP growth of up to 1.0 per cent.[27] Likewise, high food prices not only contribute to inflationary pressures, they also affect the urban poor, and the most vulnerable, aggravating their poverty and suffering. In this regard, ESCAP has estimated that due to increased food prices in 2010 an additional 19.4 million people may have remained in poverty.[28]

A number of measures have been proposed to dampen commodity price volatility.[29] [30]

- ***Greater market transparency*** – So that market fundamentals can function more efficiently in setting prices. This could include publishing information on stockpiles.

- ***More information on derivative markets*** – Notably on categories of market participants and on the positions they take.

- ***Stabilization measures*** – This might involve direct government or multilateral interventions to stabilize markets in specific commodities.

- ***Transaction taxes*** – Taxes on trading in commodity derivatives to reduce the number and speed of speculative transactions.

- ***Increasing agricultural production*** – To reverse the long-term neglect of agriculture and rural development, so as to boost supplies and ease prices.

Ensuring robust social protection

At times of economic contraction social protection systems provide useful counter-cyclical measures. In addition to protecting the most vulnerable people by supporting

consumption, they help smoothe the economic impact of financial crises.[31]

Moreover, without such systems, there is the likelihood that bank rescues will absorb large amounts of public funds at the expense of social expenditures. Thus banks are allowed to make excessive profits when times are good while seeking public assistance when things go wrong – 'privatizing profits while socializing losses.' In future economic growth and financial sector resilience will increasingly rely on a more equitable sharing of gains and losses. In Asia and the Pacific, this should form part of a long-term socio-economic security plan, based on a solid foundation of human rights and social inclusiveness, and on a commitment to equitable economic development.[32]

To some extent social protection can involve ad hoc post-crisis response measures. But social protection measures are most effective if they are already integrated into national development strategies; then if necessary they can be expanded at times of emergency. They should therefore be designed to be scalable. Nowadays, such systems can also take advantage of innovations in computerization and automation. Payment schemes can be based on computerized information systems using biometric technology with the option of mobile money transfers. This reduces leakages and the opportunities for corruption.

A further measure that offers social protection more indirectly is to encourage flows of remittances from migrant workers. These transfers accelerate at times of emergencies or economic shocks. Policymakers could facilitate such flows, for example, by temporarily suspending regulatory or fiscal controls at times of shocks.

RESPONDING TO FINANCIAL CRISES

As long as there has been finance, there have been financial crises. It is unreasonable to expect that they could be eliminated. Indeed it might not be desirable to do so entirely – as abrupt corrections should promote prudent behaviour by financial actors. Financial meltdowns on the scale of 1997 and 2008, on the other hand, are systemically disruptive.

Ultimately, regulators also need to prepare for the worst when governments are forced to step in to rescue the banking sector. During the 1997 financial crisis, governments of the worst-affected countries took a series of measures to save banks that were considered domestically 'too big to fail.' They guaranteed liabilities with public funds, for example, recapitalized institutions by opening up the sector to foreign equity investments and separated out troubled assets by creating 'bad banks'. While these measures saved the financial sector from almost certain collapse, they also created moral hazard; banks that assumed they would be rescued might be tempted to take greater risks. In the event, these fears do not seem to have been realized. Banks in Asia and the Pacific have for the most part incorporated lessons from the 1997 financial crisis and showed remarkable resistance to the 2008 financial crisis.

A number of global facilities provide safety nets at the time of liquidity or balance of payment crises. The Chiang Mai Initiative (CMI) developed financial safety nets instruments. BRICS countries are also currently attempting to develop a new financial safety net through the creation of a Contingent Reserve

Arrangement (CRA). Such regional safety nets can have beneficial precautionary effects and further strengthen financial stability. Nevertheless, despite recent progress, there remain limitations on their use. This is further discussed in Chapter 7.

The banking sector has an inherent tendency to fluctuate between boom and bust. Nevertheless, policymakers can encourage greater stability through appropriate regulations and transparency measures, including for shadow banking. They can also use social protection systems not just to protect the vulnerable and sustain consumption but also to allow a more equitable sharing of gains and profits. Finally, facilitating intra-regional investments could increase the self-reliance of the Asia-Pacific financial sector, limit its cross-border vulnerability and facilitate economic growth through the promotion of regional public goods and infrastructure.

2. CRITICAL INFRASTRUCTURE

Even infrastructure that is well designed, constructed and maintained cannot always withstand natural disasters. Governments will therefore need to identify 'critical infrastructure' for which they need higher than usual margins of safety.

What is considered 'critical' may differ from one country to another, but generally governments will try to keep the list as short as possible. Resilient infrastructure includes not just 'hard' infrastructure in terms of buildings or networks, but also the 'soft' infrastructure that supports this – the institutions, users, regulations, and legislation. All of these together should constitute a resilient system. An ASEAN Technical Working Group on Pandemic Preparedness and Response considers critical infrastructure to be that concerned with health, food, water and sanitation, energy, public security and order, finance, telecommunications, and transport.

Each country will have its own specific priorities, depending on local circumstances. Bangladesh, for example, will want schools to be especially robust so they can serve as community cyclone shelters, while Turkey might prefer to invest in resilient hospitals that are needed to treat crushed limbs when buildings collapse in earthquakes. Taking into account the practices across the region Table V-1 summarizes critical infrastructure in Asia and the Pacific.

EXPOSURE OF INFRASTRUCTURE TO NATURAL DISASTERS

While many countries are exposed to similar natural phenomena, some have greater capacity to cope. This is illustrated in Figure V-1 which compares exposure to disaster with coping capacity. The coping capacity measures the ability to reduce the negative consequences during a disaster. Japan and Brunei, for example, are highly exposed but also have high coping capacities so are resilient. On the other hand, countries such as the Philippines, Solomon Islands, Vanuatu and Tonga, are also highly exposed but have less coping capacity so are very vulnerable.

As a result of rapid development across Asia and the Pacific, much more infrastructure is

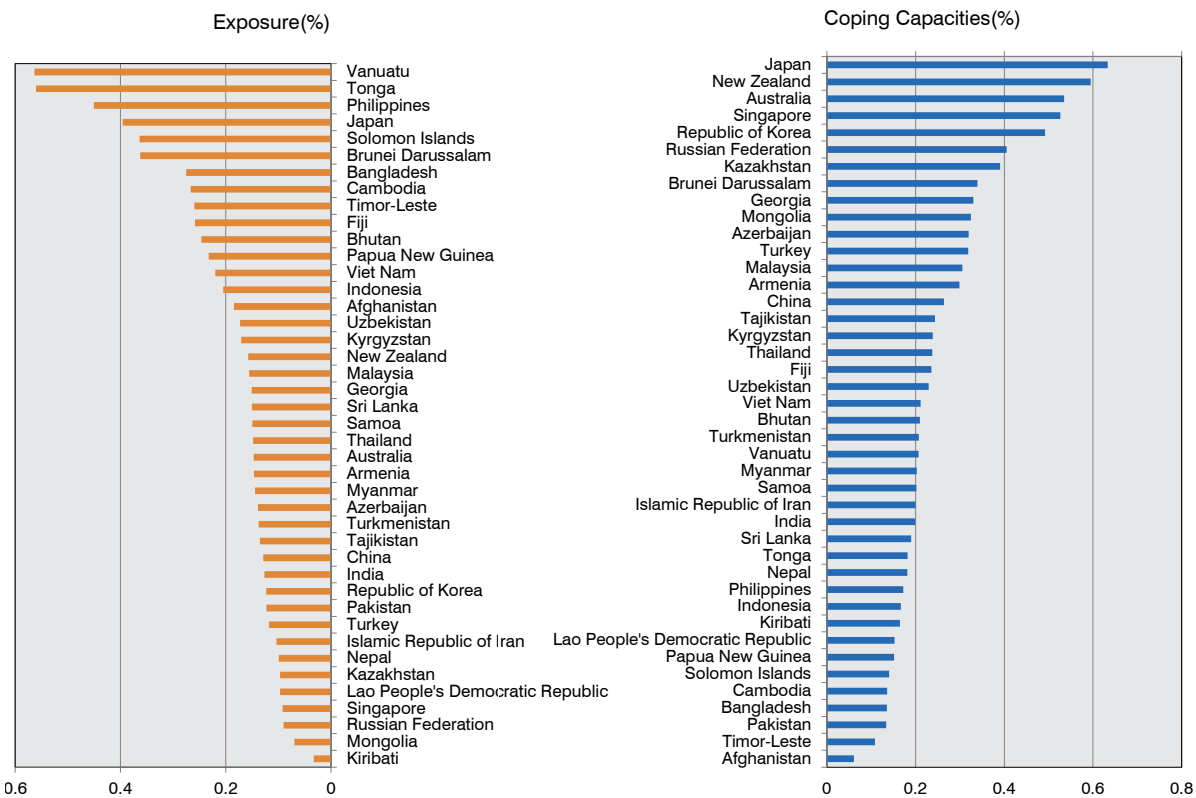
TABLE V-1

Critical infrastructure in Asia and the Pacific

Systems and Services	Sector	Physical infrastructure
Education, health services and shelters	Housing and public buildings	Housing, public buildings, educational buildings (schools, colleges, universities), health centres and hospitals, community buildings, stadium-designated as shelters
Public transport services	Transport	Roads, railways, bridges, maritime ports, inland and river ports, airports, vehicle depots
Telecommunication services	Telecommunications	Telecommunication networks (phone, fax, internet, cables, satellites), transmission towers and cables
Water supply, sanitation services, irrigation and flood management system	Water, waste water, irrigation and flood management	Water intake, storage and diversion dams, water and sewer treatment plants, water distribution pipes, overhead water tanks, tube wells, sea water intrusion infrastructure, rain and storm water drains; irrigation canals, viaducts
Supplies, electric power transmission and oil and gas transportation systems	Energy and power	Power generation plants, electricity transmission and distribution infrastructure (transformers, electric poles, and transmission lines), gas and oil storage depots and gasoline stations
Urban infrastructure system and services	Urban infrastructure	Road, drains, water supply, education buildings, hospitals, community buildings, communication networks, electricity transmission, food storage and supply chains

FIGURE V-1

Exposure and coping capacities in Asia and the Pacific



Source: Based on UNU, 2012.

exposed to disasters. The greatest exposure is usually on marginal land such as floodplains, drought-prone areas, seismic locations and multi-hazard areas. This is illustrated for Samoa in Figure V-2. Although the whole country is exposed to hazards, the losses are concentrated in the more developed areas. Even countries with high coping capacities will suffer considerable losses – as demonstrated by the recent experiences in Japan and Thailand. Overall in 2011, the region's total losses came to $294 billion.[33]

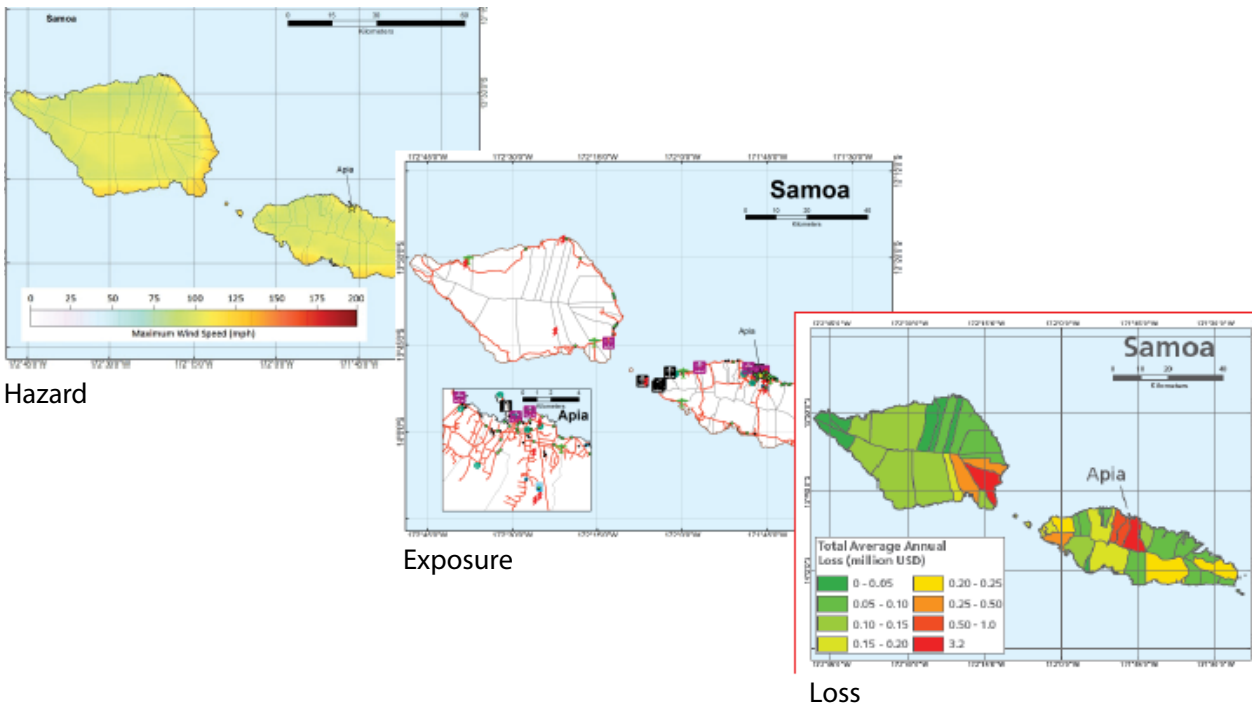
The damages can be assessed, and the losses can be estimated, for both social and physical infrastructure. As indicated in Table V-2 the damages are among the greatest in the housing and transport and communications sectors.

In addition to damage to infrastructure there are also losses. Both contribute to the overall economic impact. The damages refer to the monetary value of the completely or partially destroyed social, physical and economic infrastructure. Losses arise from a change in the flow of goods and services and other economic flows resulting from the damaged infrastructure.[34]

This is illustrated in Figure V-3. The damages to physical and social infrastructure were much higher than the losses in most of the recent disasters. The losses were significant or higher in the case of the 2011 Typhoon in the Lao People's Democratic Republic, and the Pakistan floods in 2010 and 2011.

FIGURE V-2

Samoa – hazard, exposure and losses



Source: Mahul, Olivier, 2012.

TABLE V-2

Damage to critical infrastructure from some recent disasters

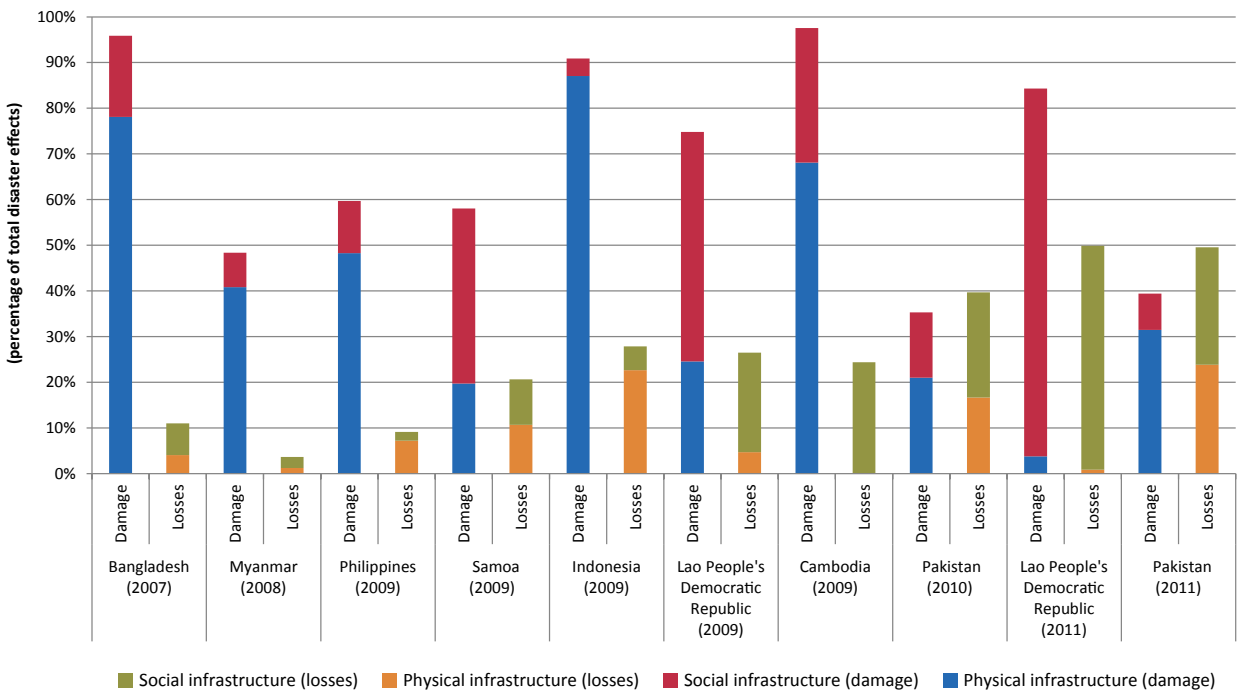
(Millions of US dollars)

Disaster	Critical Infrastructure						
	Housing	Health	Education	Transport & Communications	Energy/ Electricity	Water & Sanitation	Irrigation & Flood Management
Pakistan (Flood, 2011)	889.9	4.9	116.7	188.3	5.3	5.7	55
Pakistan (Flood, 2010)	1,080.5	18.4	259.4	735.2	155.1	37.6	277.6
Philippines (Typhoons, 2009)	541.6	105.5	53.5	142.8	15.2	7.9	15.3
Thailand (Flood, 2011)	1,530.3	56.1	435.0	827.6	106.2	116.6	290.5
Indonesia (Earthquake, 2009)	1,664.8	60.5	63.2	69.7	4.9	78.8	4.15

Source: World Bank, GFDRR, 2012, available from www.gfdrr.org/PDNA (accessed November 2012)

FIGURE V-3

Damage and losses to physical and social infrastructure in recent disasters



Source: World Bank, GFDRR, 2012, available from www.gfdrr.org/PDNA (accessed November 2012)

MAKING SOCIAL INFRASTRUCTURE RESILIENT

Housing

The greatest damage for social infrastructure is typically to housing and public buildings. Housing in informal settlements is unlikely to resist a severe disaster and even formal houses and other low-rise buildings generally with masonry structures are susceptible to damage by earthquakes, or the shear or wind loads due to storms, cyclones and hurricanes. Housing is vulnerable even in developed countries. High-rise 'engineered' buildings have to follow stringent building codes, but the requirements for housing tend to be lower. In the United States the majority of the houses damaged by superstorm Sandy in 2012, for example, were private houses while most commercial high-rises were not much affected.

Much more attention is now needed for houses and other non-engineered buildings[35] – using an interdisciplinary approach that includes both engineering and social sciences. A number of Asia-Pacific countries have been looking at housing resilience. In the Islamic Republic of Iran, for example, the building code for unreinforced masonry buildings now limits these to two storeys and a height of 8 metres and includes provisions for seismic design.[36] Bangladesh, with the support of the Climate Investment Fund, is planning to develop low-cost, storm and cyclone proof housing.[37] For Myanmar, there are now illustrated practical guidelines for retrofitting rural houses.[38]

While codes and guidelines are essential, national and local authorities also have to ensure that builders and homeowners comply with these. It should also be noted that good


ESCAP PHOTO

BOX V-1

Pakistan – earthquake-resilient housing

The 7.6 magnitude earthquake that struck the northern mountainous parts of Pakistan in October 2005 killed 73,300 people, seriously injured 62,400, and displaced 3.5 million from their homes. Some 462,000 private homes were completely destroyed and another 99,300 were severely damaged, many perched precariously on hillsides. Of the estimated $3.5 billion reconstruction cost, almost half was for housing. The Government quickly decided that people should be trusted to rebuild their own houses, though with financial assistance and technical advice.

The Government created the Earthquake Reconstruction and Rehabilitation Authority (ERRA) to provide grants directly to the affected families, conditional on houses being built to acceptable standards. ERRA also trained construction workers, engineers and Pakistani architects and technicians. Over three years, it imparted knowledge on quake-resistant design and construction to 300,000 workers.

The National Society of Earthquake Technology, a Nepalese NGO of earthquake engineers, and the Citizen's Foundation, a Pakistani NGO, along with the United Nation's International Strategy for Disaster Reduction and other partners, imparted a unique mix of community-based artisan training and seismically-resistant construction techniques that included vernacular architecture. Four years after the earthquake, ERRA reported that more than 90 per cent of the 400,000 rebuilt houses complied with safe construction guidelines, and more than 30 per cent used vernacular architecture.

Most families had chosen reinforced masonry using cement blocks to build their homes. Thus many families, who earlier preferred traditional construction techniques not only rebuilt with greater safety but also became more aware about prevention methods. Earthquake-resistant construction also boosted the understanding of skilled craftsmen, who will be able to pass their skills on to the next generation of builders. Pakistan's experience show that good building practices ensure safer structures, and that it is possible even with artisan materials and local construction techniques.

Source: United Nations and World Bank, 2011.

building practices can be fostered even without a code, as shown in the rebuilding after the 2005 earthquake in a remote and mountainous region of Pakistan (Box V-1).[39]

Schools

Worldwide, approximately 1.2 billion students are enrolled in primary and secondary schools. Of these, 875 million live in seismic high-risk zones and hundreds of millions more face regular floods, landslides, extreme winds and fire hazards. Although these children spend up to half their waking hours in school building, all too often these are not disaster resilient.[40]

Over the past decades, the death toll has increased sharply.[41]

- ***Pakistan, 2005 earthquake*** – 17,000 students died under 10,000 collapsed schools.
- ***Indonesia, 2006 earthquake in Yogyakarta*** – 2,900 schools were damaged or destroyed.
- ***Philippines, 2006 Leyte island***– More than 200 students were buried alive in mudslides caused by floods.
- ***China, 2008 Wenchun earthquake*** – Almost 5,400 children died or went missing when 4,500 classrooms were destroyed.[42]

- ***Japan, 2011 earthquake and tsunami*** – 7,735 school buildings were damaged or destroyed.

Had the schools been built more disaster resilient, the losses could have been substantially reduced. 'Safe schools' have three essential elements.[43]

Safe construction – This should be based on legislation, policy, building codes and standards, site location, hazard and risk mapping, verification, inspection, certification and retrofitting of educational infrastructure, whether in public or private facilities.

Emergency preparedness – Plans and policies are needed to reduce risks to students' lives as well as measures to enable resumption of education during and after an emergency.

Culture of safety – Education should be a platform for increasing student, and thereby community, resilience and lead to generational change towards a culture of safety.

The 'One Million Safe Schools and Hospitals Campaign' is a global advocacy initiative as part of the World Disaster Risk Reduction Campaign in 2010-2011.[44] And for all countries, guidelines and manuals are now available for building earthquake-resistant schools. Disasters have also triggered the construction of safe schools in individual countries (Box V-2).

Disaster shelters

Disaster shelters have contributed immensely towards saving lives in several countries. In Bangladesh in 2007, 15 per cent of the affected

BOX V-2

China – Wenchuan earthquake triggers construction of safe schools

After the Wenchuan earthquake of 2008, the Chinese education sector gained knowledge in disaster prevention, risk reduction, and post-earthquake reconstruction. As a result, progress has been achieved due to:

- Prioritization of the education sector in the disaster prevention, reduction and post-earthquake reconstruction programme;
- New standards and codes on school construction;
- Successful school reconstruction in quake-affected areas;
- The National Primary and Secondary School Safe School Building Programme;
- Enhanced education on disaster prevention and relief; and
- Capacity building in disaster prevention and reduction.

The Ministry of Education is implementing a monitoring and warning system to alert local education commissions and education bureaus about possible natural disasters and other safety risks. It is also providing advice about emergency preparedness and response, as well as about disaster reduction in middle schools, primary schools, and kindergartens. In 2009, a nationwide school safety assessment implemented by the Ministry of Education was supported by UNICEF.

In Sichuan Province, annual risks assessment are conducted during the flood season under the guidance of local governments, and in collaboration with concerned sectors, particularly on landslides, mudslides and floods. As part of the Build Back Better project, a study is assessing the status of emergency preparedness and response in kindergartens and preschools in the earthquake-affected areas.

Source: UNISDR, 2011.

population took refuge in cyclone shelters, which saved thousands of lives (Figure V-4). By 2009, when Bangladesh was struck by cyclone Aila the number of cyclone shelters had gone up to 3,000. Bangladesh has also been converting cyclone shelters to multi-purpose disaster shelters, with elevated space for livestock and overhead water storage, that can also double as primary schools or office spaces. The Ministry of Food and Disaster Management estimates that the country needs 5,000 such shelters as part of the country's network of embankments against rising sea levels. Japan also has disaster shelters in the form of school buildings and community centres. All such shelters need to be integrated with early warning systems and form part of national disaster risk reduction strategies.

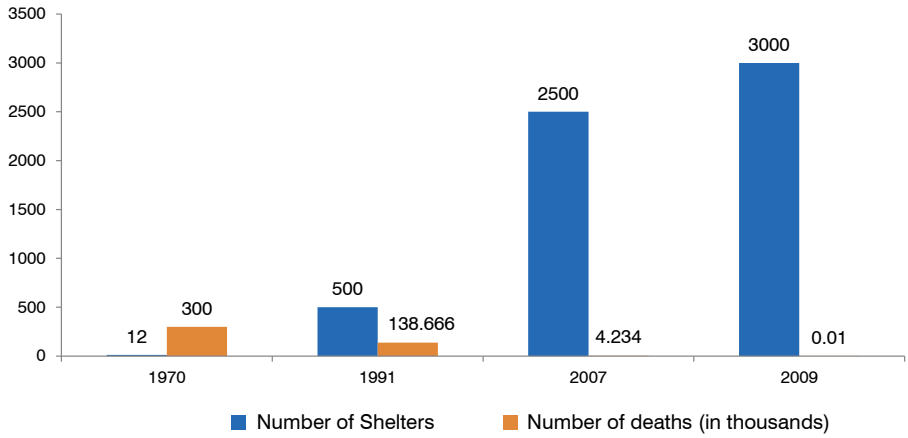
MAKING PHYSICAL INFRASTRUCTURE RESILIENT

Energy and power

Storms, cyclones, floods and earthquakes frequently disrupt community power supplies. They can damage electricity transformers,

FIGURE V-4

Bangladesh – cyclone shelters save lives, 1970–2010



Source: World Bank 2012b.

pylons and poles, not only cutting supplies but also exposing people to live transmission cables. In addition, extreme weather can damage power generation facilities, including hydroelectric power stations, canals and tunnels. Flooding and rises in sea level could affect fuel storage tanks and substations in coastal areas as well as offshore oil rigs and refineries.

One of the best ways to safeguard transmission lines is to move them underground through ducts or tunnels. This is expensive but it is now happening in many countries. Singapore, for example, recently awarded contracts worth $2 billion to construct 35 kilometres of underground tunnels for transmission cables.[45] In Nepal, in Salleri and Chitawan and Chapali, high-voltage underground connections are being built from substations to distribution systems.[46] In Australia, the Government recommends that consideration should be given to undergrounding the electrical infrastructure, while accepting this is an expensive option.[47]

Transport

Recent disasters have caused tremendous damage to transport infrastructure and operations. The Thailand floods in 2011 submerged many roads while the 2011 Japan earthquake damaged roads, railways and airports. Transport can also be interrupted: in coastal areas of Bangladesh, the Maldives, the Pacific islands and Viet Nam, roads will be highly vulnerable to rises in sea levels.

Transport systems can be designed to be more resilient. Generally, this will mean enhancing the capacity of officials and the planning process by incorporating higher design standards. This would also increase the service ability and life of costly structures.[48] [49] [50] For example, in the United States after Hurricane Katrina, the clearance height of bridges was increased[51] and in Canada the design of the Confederation Bridge allows for a one-metre sea level rise.[52]

Coastal sections of roads and railways can be moved to higher ground or given protective walls or embankments. During the 2011 Japan earthquake and the subsequent tsunami, the embankment section of the expressway along the coast protected the inland side from inundation. It also offered an evacuation space, saving many lives. The reconstruction project envisages evacuation stairs for the embankment slopes. A study in Bangladesh found that it was economically viable to raise road embankments from 0.5 to 1.0 metres to protect the roads from floods.[53]

In mountainous areas, roadside slopes can be made more stable through bioengineering using living plants, as in Nepal. Combined with civil engineering measures these can provide cost effective and environmentally friendly solutions.[54] Drains can also be built with extra capacity to cater for surges in water flow. The Bipartisan Policy Center offers a list of options.[55]

It is important to keep transport links open for disaster relief operations. For this purpose, transport planners should incorporate some redundancy – building extra routes in case one is damaged. They can also consider multi-modal networks so that traffic is distributed among different options – such as railways, roads, and water routes. Planning should also reflect the functional hierarchy of transport networks, such as primary trunk roads, national highways, feeder and district roads, and rural roads. Nepal for example, accords priority for upgrading and maintenance of strategic road networks which include important national highways and feeder roads.

Flood control

Flood risk management can employ both structural and non-structural measures.[56] The experience of Thailand has shown the importance not just of increasing the capacity of canals and

pumps but also of ensuring good coordination among various agencies (Box V-3). While planning new infrastructure – including irrigation canals, reservoirs and waste water treatment – it is important to consider demographic trends and likely future demand. It is also imperative to enhance flood protection along rivers.

Climate change will be a major consideration. In Bangladesh, for example, the Climate Investment Fund is now planning to improve water supply and sanitation, construct embankments and undertake reforestation to protect 12 vulnerable coastal communities from cyclones and floods. [57]

Much will also depend on community efforts. In Nepal, for example, communities have constructed flood barriers with stones, bamboo and wood using traditional techniques. [58] In Khulna, Bangladesh, the aim is to make 80 per cent of each ward free from damaging floods by re-excavating drains and building new ones.[59]

Water supplies

At times of disaster, it is vital to maintain adequate water supplies. This can be especially difficult in small island developing States which generally have limited supplies of freshwater and inadequate drainage.[60] In areas with frequent floods it is thus important to protect water and sewerage treatment plants and ensure that they have adequate energy supplies for treatment and pumping. Piped distribution networks also need protection from contamination.[61] When available, it may be possible to include tube wells as a resilient supply. Other options include using recycled water, and supplementing supplies through rainwater harvesting. When the water distribution system is affected, contingency measures such as supply through tankers to the communities should be in place.

BOX V-3

Thailand – flood action plan

In response to the disastrous floods in 2011, the Government has prepared a master plan on water resources management. In addition to measures for water management during emergencies there is a plan for flood mitigation in the Chao Phraya floodplain. The aim is to increase the efficiency of water control buildings and dykes, as well as that of water drainage systems such as pipes, canals, water gates, and pumping stations.

In order to improve the capacity of the Bangkok drainage system, the Government has built a 5-kilometre underground tunnel, 5 metres in diameter, linking Rama IX and Ramkhamhaeng Roads, along with six smaller tunnels with a total length of 14 kilometres. There are also plans to construct three more tunnels at Khlong Bang Sue, Bung Nong Bon and Don Muang districts to divert storm and flood waters into the Chao Phraya River. In addition, there is a vision for a double-deck, 100-kilometre storm water management and road tunnel linking Ayutthaya and Samut Prakhan provinces. This would be similar to one in Kuala Lumpur.

Source: Thailand, 2012.

Telecommunications

Almost 90 per cent of the world's 7 billion people are now connected in one way or another by information and communication technologies. Advances in these technologies are helping improve the disaster resilience of communities and people, and bridging the gaps in last-mile connectivity. Effective disaster response nowadays is also very dependent on information and communications technology. Applications of space technologies, such as satellite remote sensing, positioning and navigation along with other monitoring systems, can give accurate warnings of impending disasters while communications systems guide relief operations (Box V-4).

However, ICT systems themselves are vulnerable. High winds and storms can bring down telephone poles, and changes in rain density may affect mobile phone signals. Services that depend on power supplies can also be interrupted. Both undersea and terrestrial cables carrying voice and data services are vulnerable to natural disasters, even sabotage. The Hengchun earthquake, which struck near Taiwan Province of China in December 2006, devastated the region's services; it took 11 cable repair ships 49 days to fix the damage. In 2009, typhoon Morakot, and the subsequent undersea earthquake, damaged 10 submarine cables and adversely affected voice and data traffic across South-East Asia as well as in China, India and Japan.

In order to make ICT systems more resilient, designers need to ensure robust construction throughout the networks and build in sufficient redundancy. For the internet there is a growing interest in complementing submarine cables with terrestrial cables, as well as satellites.

Urban infrastructure

Urban areas are at high risk from disasters because they not only have high population densities but also high concentrations of economic assets, particularly infrastructure. Moreover, to take advantage of transportation links they have tended to develop around coastal areas and river basins. This also exposes them to climate-related disasters such as tropical cyclones and sea level rise. As a result of climate change they may also face more frequent flooding – with a '1-in-50 years' flood now occurring one year in 15.[62]

BOX V-4

ICT infrastructure: last mile connectivity

While responding to the historic floods 2011 in Thailand, the Government and the affected communities demonstrated the effective use of innovative technologies. These ranged from near real-time satellite imagery, crowd sourcing, and social media, to the use of indigenous knowledge.

The ESCAP Trust Fund supported the establishment of the Tsunami Warning and Mitigation System for the Indian Ocean, which went live in October 2011 – a conservative estimate of which is that it will help save about 1,000 lives every year for the next 100 years.

Source: ESCAP and ISDR, 2012.

A study of nine Asian coastal cities considered five types of resilience: natural, physical, social, economic and institutional, using a climate disaster resilient index.[63] The results showed various levels of vulnerability in Banda Aceh, Bangkok, Colombo, Danang, Hue, Iloilo, Mumbai, San Fernando and Yokohama. The study underlined the need to build community resilience for climate-related disasters.

Ten essentials for making cities disaster resilient are outlined in Box V-5. However, these guidelines focus more on disaster risk reduction rather than on developing resilient infrastructure. Box V-6 provides a comprehensive strategy for protection of critical infrastructure in disaster-prone areas in the Republic of Korea. Guidelines for local government leaders in this area are developed and available.[64]

The challenge for municipal authorities will be to meet realistic and effective standards and acquire the necessary construction skills. A number of guidelines are available, for example, including a step-by-step approach for appraising a project for hazard-risk reduction.[65] Some cities will benefit from greater levels of de-centralization. If they have greater responsibilities for self-management they may be able to raise the necessary funds in domestic capital markets.[66]

BOX V-5

Ten essentials for making cities disaster resilient

1. Institutional and administrative framework
2. Financing and resources
3. Multi-hazard-risk assessment : know your risk
4. Infrastructure protection, upgrading and resilience
5. Protecting vital facilities: education and health
6. Building regulations and land use planning
7. Training, education and public awareness
8. Environmental protection and strengthening ecosystems
9. Effective preparedness, early warning and responses
10. Recovery and rebuilding communities

Implementing these essentials

1. Organizing and preparing to apply the ten essentials
2. Diagnosis and assessment of the city's risk
3. Developing a safe and resilient city action plan
4. Implementing the plan
5. Monitoring and follow-up

Source: UNISDR, 2012.

BOX V-6

Republic of Korea – protecting critical infrastructure in disaster-prone areas

The National Emergency Management Agency (NEMA) of the Government of the Republic of Korea has a system for addressing disasters. This includes: i) pre-disaster impact assessments; ii) a disaster insurance programme; iii) a reinforcement project for disaster-prone areas; and iv) special disaster zoning, which has helped protect critical infrastructure.

With the operating system in place, NEMA is integrating disaster risk reduction into sustainable development. This includes a recovery programme for restoring facilities to their original functions or improving them. For this purpose, NEMA has identified 537 disaster-prone areas that are most susceptible to inundation, collapse and isolation. Under this plan, $141 billion has been invested in 488 areas.

Source: Republic of Korea, 2012.

INTERDEPENDENCIES AMONG CRITICAL SECTORS

All the various forms of infrastructure are becoming increasingly interdependent.[67] [68] Failure in one system can significantly affect many others – with the risk of cascade failure, where a breakdown in one system has knock-on effects on others. For example, relief operations require well-functioning systems for transport, electricity, communications, water supply and food supply. And many forms of infrastructure – from transportation to water supply and sanitation – are critically dependent on supplies of energy. Road links too can be critical. If in aftermath of a disaster a strategic hospital is not connected with a strategic road route, it might be operational but still unable to provide a service. It has been estimated that 'lifeline' systems that includes power, water, wastewater, communication and transportation need to be restored within four hours to support the emergency response operations.[69] Improving overall resiliency thus involves recognizing and managing these interdependencies.

FINANCIAL STRATEGY AGAINST DISASTERS

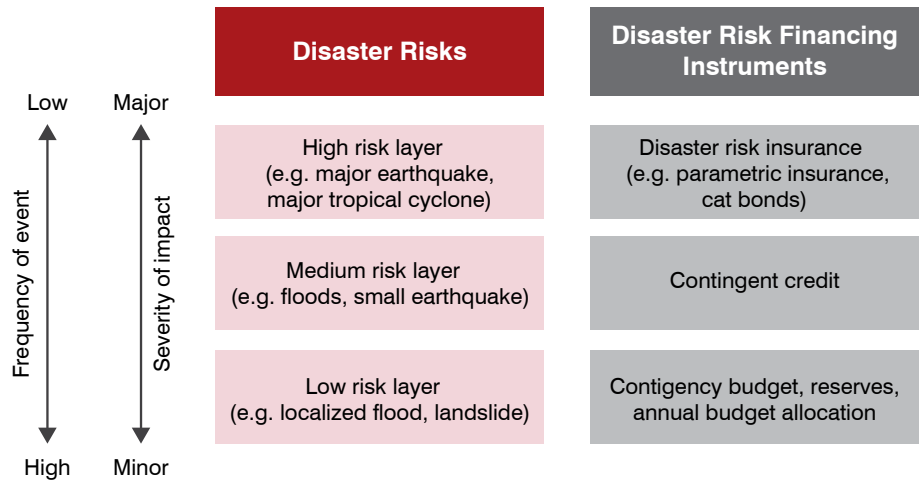
Governments can finance the cost of disasters in a number of ways. They can build up reserves, or they can pay the costs out of current budgets. They can also establish with lenders' 'contingent credit' lines that enable them to borrow in the event of disaster. Or they, and private individuals and corporations, can take out insurance.

In practice, the developing countries of the region rely heavily on annual budget appropriations and de facto post-disaster reallocations – both for immediate relief and recovery and for longer-term reconstruction.[70] This is because they are unlikely to have reserves and if already indebted will find it difficult to get credit.

Countries that have more flexibility, however, can take a 'layered' approach, using different options according to the nature of the potential disaster. The World Bank is helping ASEAN countries with this kind of strategy (Figure V-5). For smaller lower-cost risks such

FIGURE V-5

A three-tier financial strategy against natural disasters



Source: World Bank, 2010d.

as localized floods the government retains the risks and assumes that it can pay for this out of reserves or the current budget. But for more expensive events it aims for a degree of risk transfer by paying for contingent credit or taking out insurance.

For some small island economies in the Pacific the disaster could be on such a scale as to overwhelm the economy. In this case it may be possible to pool the risk with other countries in a similar position, since a disaster is only likely to hit one or two of them at the same time. The Caribbean Catastrophe Risk Insurance Facility, for example, pools disaster risks regionally, and helps countries in such circumstances purchase insurance cheaper than otherwise (see Chapter 7).

Developing countries may also be able to get relatively inexpensive contingent credit through the World Bank's Catastrophe Risk Deferred Drawdown Option. This is a new financial instrument available to countries that take a proactive stand towards reducing their exposure to disaster risk. In this case a loan is disbursed quickly upon the occurrence of a natural disaster in order to provide immediate liquidity.

Governments can also become involved in providing insurance or acting as reinsurers. They can also regulate the private insurance market. This involves difficult choices, particularly when setting premiums. If the premiums are too high this will discourage buyers, or overly favour insurance companies. But if they are too low they will encourage risk taking – as with construction in hazard-prone areas.

The region has several innovative practices in insurance. Turkey, for example, has a pooled homeowner's catastrophe insurance programme. The Government worked with a number of partners, including the World Bank to establish a compulsory earthquake insurance scheme: the Turkish Catastrophe Insurance Pool (TCIP). The aim was to increase the uptake of insurance while building the capacity of the domestic insurance market to underwrite

earthquake risk, and isolating it from the risk of insolvency from an extreme event. Domestic insurers underwrite catastrophe risk, but pass it onto the pool which is supported by risk capital from the international reinsurance community, the Government and donors (Box V-7).

COSTING RESILIENCE

Making infrastructure more resilient requires significant investment. Generally this should be approached using a cost-benefit analysis, comparing different levels of investment with the costs of subsequent infrastructure failure. In the United States, for example, for such disaster risk reduction investments as structural mitigation, retrofitting and creating public awareness, it has been estimated that $1 spent on mitigation generates on average $4 in future savings.[71]

The governments in most developing countries, although aware of the benefits of DRR, may not be able to justify such measures if the benefits seem unclear and can only be realized

BOX V-7

Turkey – Catastrophe Insurance Pool

Turkey is highly exposed to severe earthquakes yet its private insurance market was previously unable to provide adequate cover. This left the Government with a significant contingent financial exposure.

In the aftermath of the Marmara earthquake in 2000, the Government worked to limit its financial exposure through the establishment of the Turkish Catastrophe Insurance Pool (TCIP). This pool enables the Government to ensure that owners who pay property taxes on domestic dwellings can purchase affordable and cost-effective earthquake coverage. This transfers 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 acts as a catastrophe reinsurer of last resort for claims arising out of an earthquake. The full capital risk requirements for TCIP are funded by commercial reinsurance (currently in excess of $1 billion) and its own surplus capital (about $0.5 billion).

The TCIP policy is a stand-alone property earthquake policy with a maximum sum insured per policy of $65,000, an annual average premium rate of $46 and a 2 per cent of sum insured deductible. Premium rates are based on the construction type and property location and vary from less than 0.05 per cent for a concrete reinforced house in a low-risk zone to 0.60 per cent for a house located in the highest-risk zone.

TCIP has sold over 3 million policies at market-based premium rates – achieving 23 per cent penetration by 2009, a considerable advance on the 600,000 households covered when the pool was established. To achieve this level of penetration, the Government invested heavily in awareness campaigns and made earthquake insurance compulsory for home-owners on registered land in urban centres. The legal framework for the programme envisages compulsory enforcement mechanisms in urban settings, while coverage is voluntary for homeowners in rural areas.

Source: Adapted from World Bank, 2012.

in the medium to long-term. Estimating the potential benefits may be difficult. This requires gathering historic data on disasters, assessing the probability that a disaster will occur, and then costing the potential damage. A study in Colombia, using a comprehensive and long-term risk management approach, suggests that governments should concentrate on retrofitting the most vulnerable and critical infrastructure rather than spreading their funds widely over many risk-prone assets.[72]

Pilot projects in India and Bangladesh have used the Opportunities and Risks of Climate Change and Disasters methodology to help development organizations and their partners to integrate disaster risk reduction and adaptation processes into their programmes.[73] UNDP and other organizations have developed methodologies for investments for climate-proofing infrastructure; these include economic analysis through market valuation as well as estimates of the cost of risks to human health.[74]

The United Kingdom Department for International Development has argued that more research is needed on the complementarities between strengthening disaster resilience and other development goals and the cost - effectiveness of individual investments.[75] At present few developing country governments have the capacity for such analyses, especially at subnational levels.

In some cases they should be able to seek support from international financing institutions such as the multilateral development banks. Many banks already incorporate disaster risk reduction into project assessment cycles – not just to protect the infrastructure but also because poor construction could cost lives. Furthermore, the multilateral development banks are often involved in financing rehabilitation and reconstruction after a disaster.

Nowadays much of their investment is closely related to climate change mitigation and adaptation. The Asian Development Bank, for example, is introducing climate adaptation to its projects and programmes.[76] There are also a number of sources of finance for climate change adaptation that governments could tap. These include: the Global Facility for Disaster Reduction and Recovery, managed by the World Bank; the Climate Investment Fund; the Green Climate Fund; the multi-donor programme of the Global Climate Change Alliance; and the Climate Change Fund.[77] There is also funding for projects in developing countries through the Global Environment Facility, the Special Climate Change Fund, the Least Developed Country Fund and the Adaptation Fund within the framework of UNFCCC and the Kyoto Protocol.

Investing in infrastructure through stimulus packages

In normal circumstances strict budgetary regulations governing ordinary capital expenditures preclude a high level of investment in new infrastructure. But these restrictions can be relaxed during a financial crisis, opening up opportunities for building more resilient facilities. Thus during the most recent financial crises, many countries have created large economic stimulus packages which include investment in major infrastructure projects (Table V-3).

TABLE V-3

Infrastructure investment in the stimulus packages of major Asian economies

(Billions of US dollars)

Country	Total fiscal Stimulus	Infrastructure Component	Infrastructure as % of Total Stimulus	Types of Infrastructure
China	600.0	275.0	45.8	Railways, airports, electrical transmission technology, expressways, telecommunications technologies, rural roads, electricity, gas, water, and irrigation projects
India	60.0	33.5	55.8	Highway, port, and power sectors
Indonesia	7.7	1.3	16.9	Communications and transport infrastructure, rural infrastructure, and development of ports and shipping industry
Viet Nam	8.0	4.8	60.0	Infrastructure spending
Thailand	46.7	30.6	65.5	Water resource development and road construction in villages and rural areas along with transport, logistics, energy, and telecom improvements
Malaysia	2.0	0.2	8.5	Low and medium cost housing, upgrade, repair, and maintain police stations and army camps, and public and basic infrastructure project maintenance
Republic of Korea	11.0	3.2	29	Roads, universities, schools, hospitals
Japan	154.6	16	10+	Yen 1.6 trillion for fostering environmentally friendly technologies, including plans to provide cheaper solar power to homes and up to $2,500 as tax breaks to consumers on purchases of "green" cars; subsidies of 5% on energy efficient televisions and other appliances

Source: Bhattacharya, 2010.

Private-sector funding

Another potential source of financing for resilient infrastructure could be the private sector – via public-private partnerships (PPPs). Total PPP investment in the region over the period 1990 to 2011 was around $823 billion, with the largest share in the energy sector. Most investment was concentrated in a handful of countries such as China, India, Malaysia, Turkey, the Russian Federation, Thailand, Indonesia and the Philippines. At a recent ministerial conference on public-private partnerships for infrastructure development in Tehran in November 2012, countries in the region reaffirmed their interest in this option and the need to strengthen their policy frameworks accordingly (Box V-8).

Engaging the private sector in infrastructure development should help improve project design. The private sector can bring in new technologies, innovative management approaches and high-quality skills in engineering, planning and ICT systems. At the same time, there are benefits for the private sector in increasing employment and profit opportunities. Nevertheless, there may be concerns that a PPP enables a private company to make profits while governments shoulder a disproportionate

BOX V-8

Asia-Pacific countries to increase private-sector participation in infrastructure development

In November 2012, the Third Asia Pacific Ministerial Conference on Public Private Partnerships for Infrastructure Development was organised by the Government of the Islamic Republic of Iran with support from the ESCAP secretariat. The Conference, the third in a series following similar ministerial meetings organized in Jakarta in 2010 and Seoul in 2007, was attended by senior officials from 25 countries of the region. The Conference served as a regional platform for representatives of public-sector agencies involved in the development of PPPs for infrastructure development, to share knowledge and discuss new ideas on how to build their capacities in PPP projects.

The Tehran Declaration on Public-Private Partnerships for Infrastructure Development, adopted by the Conference, includes concrete actions for both governments and their development partners to ensure that such PPPs contribute to sustainable development.

amount of the risk. For example, one of the largest PPPs in the world, the Victorian Desalination Plant in Australia, was approved in 2007 because the Government believed that the State would soon face permanent water shortages. But this did not happen. By the time the project was completed in 2012, the local reservoirs were more than 80 per cent full and the plant was immediately put on standby. Nevertheless, the 30 year contract guarantees the private operating company a holding charge for building the plant and being ready to produce water. This has given the Government of Victoria an unexpected fiscal burden.

A PPP will often leave the asset in private hands – which can be disadvantageous at times of disaster. Special clauses may therefore be required in PPP contracts to allow governments to use critical infrastructure, such as roads, for disaster response operations – if necessary compensating the enterprise for loss of revenues.

DISASTER RISK MANAGEMENT FOR PROTECTING CRITICAL INFRASTRUCTURE

Developing resilient infrastructure will demand coordination among many sectors and levels of administration. The focus should be not only on physical infrastructure but also on the associated policies, guidelines and by-laws. It is also imperative to engage communities and different stakeholders. The community can identify the infrastructure that is needed while engineers can come up with solutions. Strategies for disaster risk management should include the following elements:

1. *Reducing exposure*

One of the most difficult tasks is to reduce the exposure of critical infrastructure. Even Bangladesh, which has good record of addressing disaster risks, has not been able to reduce

exposure. The percentage of GDP loss during disasters fell from 5.7 per cent during the 1998 floods, to 0.31 per cent during cyclone Aila in 2009, but the infrastructure loss as a percentage of total loss rose from 51 per cent to 84 per cent (Figure V-6). There are similar concerns about exposure in other countries.

2. *Mapping critical infrastructure*

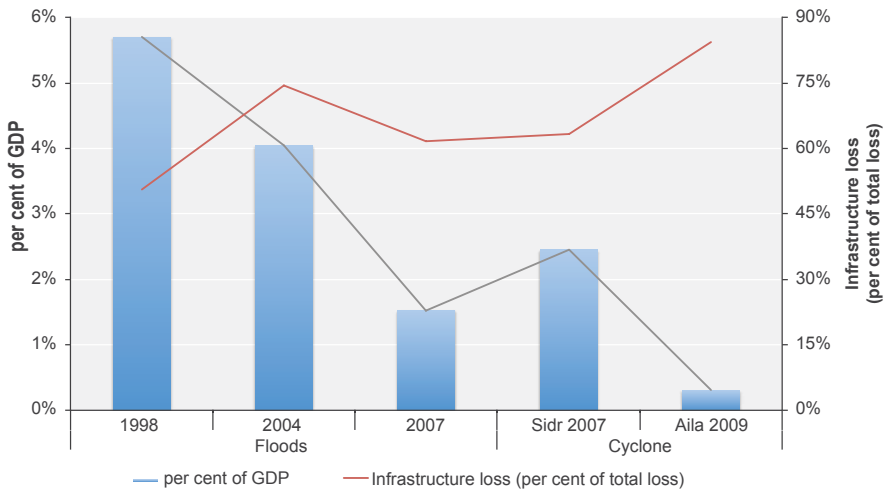
The potential for mapping risks was demonstrated following the 2008 earthquake in Sichuan, China. Immediately after the earthquake, satellite images revealed 56 landslides and eight new lakes they had created. The largest, the Tangjiashan quake lake (Figure V-7) was the biggest ever discovered from a satellite image and contained 200 million cubic metres of water. Downstream, there were cities with more than 1.3 million people, along with critical infrastructure and economic assets worth billions of dollars. The satellite images enabled decision makers to assess the risk, issue urgent warnings and arrange for early response – helping save many lives and protect economic assets.

3. *Strategies for building resilience of critical infrastructure*

Governments typically have three strategic disaster risk management instruments at their disposal: prospective, corrective and compensatory. First, for hazards such as earthquakes or hurricane-force winds, mitigation measures are oriented primarily to reduce the vulnerability of the exposed components. Second, for hazards such as tsunami, storm surges or volcanic hazards, the interventions are oriented primarily towards relocation or restrictions on land use. Third, for hazards whose effects depend more on local conditions, such as flooding or landslides, structural interventions are oriented primarily towards prevention, through the construction of works such as dykes and embankments.

FIGURE V-6

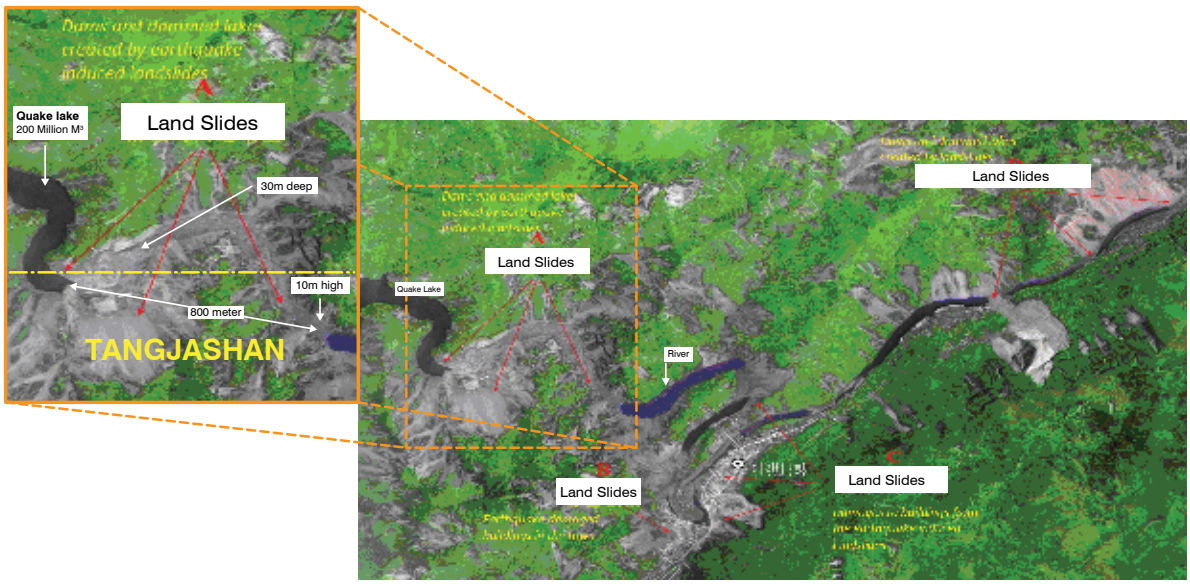
Damage to economic sectors due to major disasters in Bangladesh, 1998-2009



Source: Bangladesh, 2012.

FIGURE V-7

China – Tangjiashan lake formed after Wenchuan earthquake, 2008



Source: China Centre for Resources Satellite Data and Application.

4. *Using existing knowledge and enhancing awareness*

For this purpose there is a large body of research and many technical manuals. These include guidelines on resilient building construction, manuals on flash flood risk management, and guidelines for developing safer urban communities. Many were produced by the ProVention Consortium, a global coalition of governments, international organizations, academic institutions, the private sector and civil society organizations. Many universities have also initiated academic programme and research on resilient infrastructure.[78]

5. *Review of standards, codes and guidelines*

One major problem is inadequate design standards. During earthquakes inadequate standards in road construction can result in the collapse of elevated highways. In the case of large-scale floods or heavy precipitation, parts of roads can be seriously damaged or washed away.

Incorporating new standards is easier during the planning stage rather than retrofitting after construction. There are many examples of projects in highly vulnerable locations that have adopted higher design standards.[79] Countries like Japan provide incentives for retrofitting buildings in high-risk areas. But even what seems like resilient structures may not suffice under extreme conditions (Box V-9).

Many development banks have also realized the importance of climate change resilience and hence provide guidelines on a range of engineering solutions.[80] They and bilateral donors are also integrating disaster risk reduction into their environmental and social impact assessments of infrastructure projects. These include structural measures as well as public awareness, and land use planning. Many countries have

developed environmental impact assessment guidelines and strategic environmental assessments. These guidelines should be extended to cover climate change impacts and incorporate risk assessments of natural hazards.

6. *Land use planning*

Many Asian cities are located in coastal and low-lying areas, which are naturally vulnerable to natural disasters. This exposure to risk is further compounded by the absence of sound urban planning practices, poorly enforced zoning and land use regulations, and in some cases, lack of knowledge about potential hazards.

While planning infrastructure, careful consideration should be given to identifying secure locations. Some local authorities in the United States are even planning to outlaw transport and infrastructure development in vulnerable coastal areas.[81] But it is also possible to realign coastal roads or move them to higher locations. Local authorities should also provide warning signs, and designate emergency rescue routes. Makati City in the Philippines provides a good example of land use planning across different sectors and scales (Box V-10).

7. *Developing resilient local communities*

Local government units and communities should take the lead in disaster risk reduction, in the relief and recovery efforts. They should therefore be given greater capacity to plan, implement and manage disaster risk reduction strategy and develop resilient infrastructure that responds to local needs.[82] There should be greater level of coordination between national and local authorities as well as local agencies managing various critical infrastructure sectors.

BOX V-9

Japan – earthquake and tsunami in 2011, damage to infrastructure

One of the world's biggest breakwaters was in Kamaishi City – 8 metres high and 63 metres deep. However, in 2011 the breakwater collapsed and the tsunami reached 6.9 to 9 metres. The general belief that a three-storey building would serve as evacuation centre also did not hold as tsunami waves reached as high as the fourth floor at several locations.

The earthquake and tsunami also damaged 190 of the 300 kilometres of coastal structures. In some areas they did delay the arrival of the waves, giving extra minutes for people to evacuate. A structural assessment concluded that construction standards and stability performance under worst-case scenarios should be further investigated. As a result of strict and rigorously enforced building codes, reinforced infrastructure and buildings were not seriously damaged.

Following the structural damage of elevated expressways by the 1995 Hanshin earthquake, Japan reviewed and increased the standards for bridge construction. Most of the bridges constructed applying these new standards were not damaged in 2011.

Source: ADRC and IRP, 2011.

BOX V-10

The Philippines – disaster resilience across sectors and scales in Makati City

Makati City has a sophisticated and efficient disaster risk management system, in which disaster risk reduction, preparedness and emergency management are fully institutionalized, with dedicated organizations and direct funding for disaster risk management at the local government level. Disaster risk reduction is integrated into a number of sectors: urban planning, health, disaster response and risk governance, at different governance levels.

Urban planning – The Urban Development Department implements the Comprehensive Land Use Plan and Zoning Ordinance to ensure that new and existing facilities are compliant. The zoning ordinance requires, for example, engineering, geological and geophysical assessment reports for high-risk areas, although enforcement can be a challenge. Compliance with safe building codes is overseen by the Office of the Building Official, in cooperation with the private sector and professional 'watchdog' organizations that conduct annual inspections, provide training and support in risk-sensitive planning and construction, and manage a certification mechanism.

Health – The Makati Emergency Medical Services System coordinates mass casualty operations. The Emergency Department of Ospital ng Makati serves as the pilot agency for mobilizing the flow of medical services, supported by Barangay health centres, which provide extension services. These have been assessed as 'relatively safe', meaning they will continue to function in case of disaster, and have contingency plans and trained personnel.

Coordination of disaster response across sectors – The Makati Command, Control and Communications Centre (C3) is responsible for central coordination of early warnings and emergency response. C3 acts as the city liaison among national government agencies, NGOs, private entities and communities in times of disaster, it also issues warnings to communities, and coordinates medical, public safety, and technical rescue responses.

Risk governance at all scales – A key factor in Makati's resilience is the involvement of all sectors of society, particularly the Barangay Disaster Risk Reduction and Management Committees which include young people and environmental and women's groups. Information, Education and Communication (IEC) campaigns have been combined with regular drills and simulation exercises. In collaboration with the Makati Branch of the Philippines Red Cross, the C3 delivers community preparedness and emergency management training courses. In addition, the city publishes monthly publications, brochures, and posters with risk management messages in local languages and conducts regular Barangay Ugnayan (community dialogues) to discuss disaster risk management issues.

Source: Adapted from ISDR, 2012.

As this chapter has demonstrated, governments aiming to promote greater resilience to shocks will need to direct their attention to critical sectors whose failure can reverberate across the whole country and cause other systems to collapse. But there are also many cost-effective measures they can take ensure that each sector instead serves as a source of strength – helping to sustain the others at times of disaster.

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29 Ibid.

30 UNCTAD and Abeiterkammer Wien, 2011.

31 IMF and World Bank, 2012.

32 ESCAP and others, 2010.

33 ESCAP and ISDR, 2012

34 GFDRR, 2010.

35 Green, 2007

36 Islamic Republic of Iran, 2007.

37 Climate Investment Fund, 2013.

38 UN-HABITAT, 2013.

39 United Nations and World Bank, 2011

40 World Bank, 2009.

41 Gijzen, 2012.

42 Available from http://news.cctv.com/China/20090507/108604.shtml

43 UNISDR, 2011.

44 Further information is available from http://www.safe-schools-hospitals.net/en/Home.aspx

45 Further information is available from http://www.channelnewsasia.com/stories/singaporebusinessnews/view/1226463/1/.html

46 Nepal Electricity Authority, 2011-12.

47 Queensland Government, 2011.

48 Regmi and Hanaoka, 2011.

49 Wooller, 2003.

[50] NRCNA, 2008.

[51] Meyer, 2008.

[52] Andrey and Mills, 2003.

[53] Tanner and others, 2007

[54] Howell, 1999.

[55] Bipartisan Policy Center, 2009.

[56] ICIMOD, 2012.

[57] Climate Investment Funds, 2010.

[58] UKDFID, 2011.

[59] ADB, 2011a.

[60] IPCC, 2012.

[61] WHO, 2009.

[62] World Bank and United Nations, 2010.

[63] Shaw and others, 2009.

[64] UNISDR, 2012.

[65] Further information is available from http://www.proventionconsortium.org/

[66] World Bank, 2008.

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[68] Royal Academy of Engineers, 2011.

[69] Poland, C. D., 2009.

[70] United Nations and World Bank, 2011

[71] Multihazard Mitigation Council, 2005.

[72] ERN-AL., 2011.

[73] Tanner and others., 2007

[74] UNDP, 2011.

[75] UK DFID, 2011

[76] Further information is available from http://www.adb.org/print/sectors/transport/key-priorities/climate-change

[77] Climate Investment Fund is supporting to improve resilience of coastal communities in Bangladesh, and JICA has supported development of cyclone shelters. GFDRR supported in adaptation and implementation of ASEAN Agreement on Disaster management and Emergency response, South Asia Disaster Knowledge Network, establishment of Prevention Web- a knowledge platform and launch of Safe School, safe Hospital and making Cities Resilient campaigns. Further details are available from Strengthening regional and global partnerships for disaster risk reduction: A five year retrospective: 2007-20011, GFDRR

[78] Institute for Resilient Infrastructure of the University of Leeds, Sustainable and Resilient Infrastructure Programme at the Clemson University, and Sustain able and Resilient System Programme of the Univer sity of Illinois.

[79] Wooller, S., 2003.

[80] ADB, 2012.

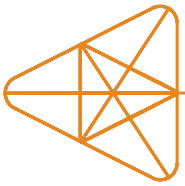
[81] NRCNA, 2008.

[82] Rogers, 2012.

PHOTO KIBAE PARK

6

STRENGTHENING SUPPLY CHAINS



STRENGTHENING SUPPLY CHAINS

Supply of many goods now takes place through complex global supply chains connecting production and distribution centres in multiple countries. While these systems can be very efficient, they are also vulnerable to external shocks, particularly natural disasters. If just one node is damaged, the whole chain can be broken. In future, enterprises and governments will need to find ways of making supply chains more resilient to shocks.

Asia and the Pacific has seen a rapid expansion of global supply chains – using offshore activities and outsourcing to supply, manufacture and distribute goods across national boundaries. These enable firms to allocate scarce resources more efficiently and gain better access to foreign markets.[1] Such arrangements are now widespread in various industries such as automobiles, electronics, office equipment and apparel.[2] Toyota, for example, conducts its business in 26 countries with 50 overseas manufacturing operations, which supply vehicles to more than 170 countries and regions (Figure VI-1).[3] Agriculture too, is increasingly reliant on imports of inputs and multi-tiered supply chain management.

These supply chains have made it possible for many Asia-Pacific businesses, including small and medium enterprises, to establish strong manufacturing bases – and also enable developing countries to benefit from foreign direct investment and increase their exports. But these chains also embody risks. If a natural disaster, such as an earthquake, flood or fire, damage a production or distribution node in the chain, the effects can soon ripple across the whole network, both within and across national borders (Box VI-1).

It is important, therefore, that global supply chains become more disaster resilient – with greater 'buffer capacity' that enables them to absorb such perturbations.[4] This Chapter explores the potential for this, drawing lessons from the response to Japan's earthquake and tsunami in 2011, Thailand's floods in 2011-2012, and Australia's floods in 2010-2011.

ASIA-PACIFIC SUPPLY CHAINS

Since the 1990s, global supply chains have created a new division of labour among Asia-Pacific economies, especially in North-East and South-East Asia.

Manufacturing

In the 1970s, Japanese Transnational Corporations (TNCs) in particular responded to high tariff protection in South-East Asia by investing in

the automotive sector. And since the late 1990s, TNCs have progressively adopted a strategy of international production fragmentation. To achieve higher economies of scale and facilitate a subregional division of labour, Japanese automobile assemblers are now taking advantage of regional trade liberalization to consolidate duplicated production facilities in ASEAN countries.[5]

By the 2000s, global supply chains were becoming more extensive in North-East and South-East Asia – in the Republic of Korea, Singapore, Taiwan Province of China and Hong Kong, China. Between 2001 and 2005, the first-tier newly industrialized economies accounted for 24.5 per cent of global vertical intra-industry trade.[6] The most impressive increase took place in China; between the periods 1986-1990 and 2001-2005, China increased its average share of global vertical intra-industry trade from 2 to 15 per cent. The current extent of Asia-Pacific integration in global supply chains is indicated in Figure VI-2.

An increasing proportion of this trade is South-South. In the late 1980s, only 15 per cent of developing Asia-Pacific trade in intermediate goods was South-South, but since the 1990s, the proportion has been above 30 per cent. At the same time the developing countries have been increasing their intermediate-goods trade with the rest of the world. China in particular has now emerged as a 'global assembly centre' and since China relies significantly on parts and components imported from North-East and South-East Asia, this has further strengthened trade linkages within the region (Figure VI-3).

Figure VI-1

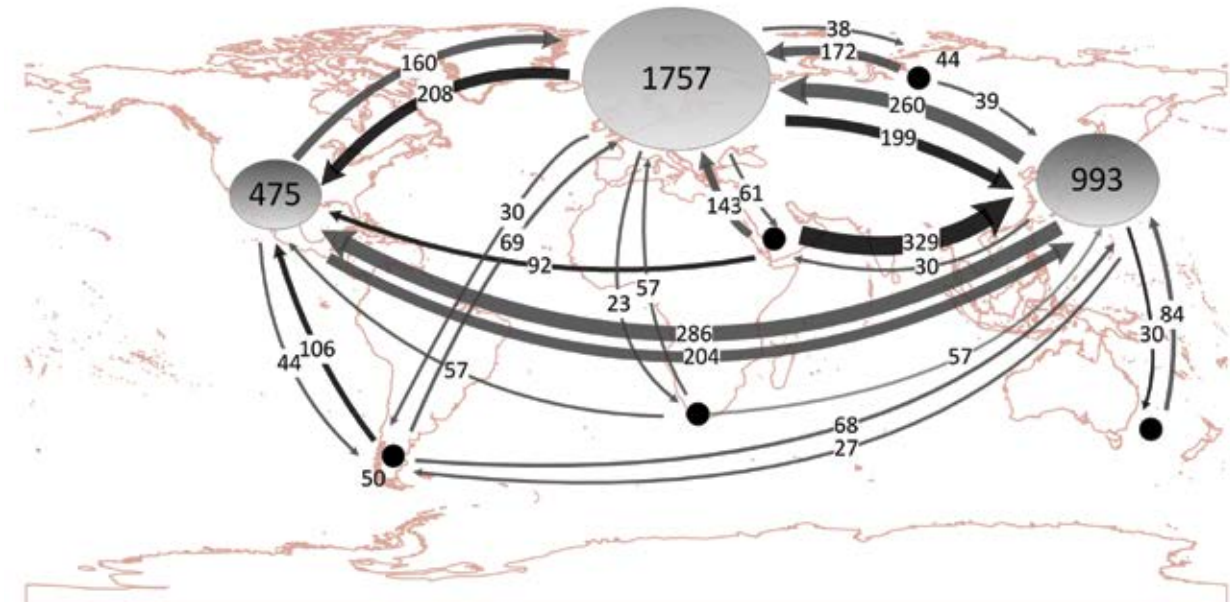
Toyota's production network

Source: Toyota, 2012.

This trend is confirmed by another measure, the Grubel-Lloyd index, which measures intra-industry trade of a particular product.[7] The index shows that intra-regional trade of Asia-Pacific industrial products has been increasingly characterized by intra-industry trade (Figure VI-4).

Figure VI-2

World trade flows of intermediate goods, 2008



Source: Miroudot and others, 2009.
Note: The map represents imports of intermediate goods above $20 billion. Circles stand for intraregional imports and arrows for interregional imports. Arrows and circles are proportional to the value of the flows.

Box VI-1

The impact of natural disasters on supply chains

The impact of natural disasters on a supply chain is illustrated by the figure below. When a disaster hits, supplier A suffers from direct losses in terms of destruction of physical assets, recovery expenditure and lost income. If the disaster severely hits public infrastructure, supplier A is likely to have indirect losses due to either damaged distribution facilities or disrupted power supplies.

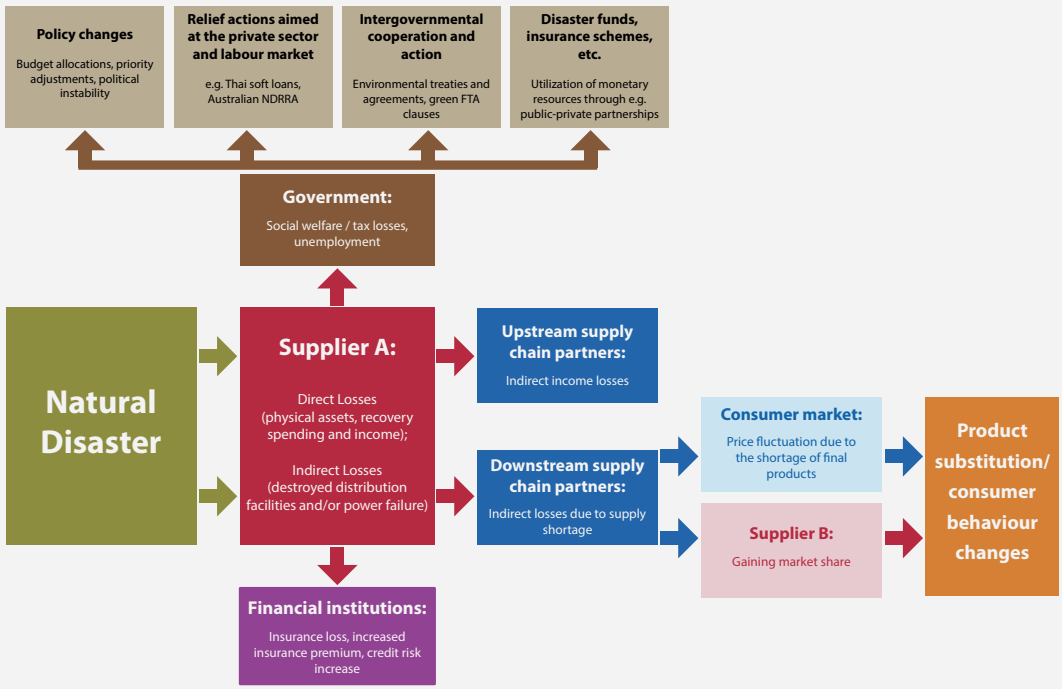
For supplier A, either direct or indirect losses can result in production and distribution suspension and subsequent weak financial conditions and possible layoffs. Therefore, the losses of supplier A may cause an additional burden on the government due to lost tax revenue. Damage to financial institutions and insurance companies will be in the form of rising non-performing loans and a surge of compensation to private entities for their losses caused by the disaster.

The production suspension of supplier A or the damage to the distribution facilities can cause indirect losses to both upstream and downstream supply chain partners. The negative impact can be transmitted to the whole supply chain and affect the firms involved, regardless of their geographical locations. At the same

time, consumer markets may experience price fluctuations with the shortage of final products due to the production suspension caused by supply chain disruption. After natural disasters, supply chains often experience severe delays, missed deliveries and even supplier defaults. In addition, disasters can make controlling the supply chain operation difficult, or temporarily impossible, due to disruptions in communications systems, destroyed equipment and lost information.

The product shortage of the downstream partners of supplier A and of the end market may create an opportunity for supplier B who produces the substitute of supplier A's product. This is more likely when the recovery pace of supplier A is slow and supplier B is flexible and able to compensate for the supply shortage quickly. In the long run, if supplier B is considered to be more disaster resilient, the partners of supplier A may permanently turn to supplier B and result in a business loss for supplier A. However, if supplier A is the single source in the market and halts the provision of products due to a disaster, its downstream partners may have no choice but to wait for its recovery. In such situations the effects can be international, as was the case with the Kobe earthquake in 1995 which left companies in San Francisco without access to parts and components.

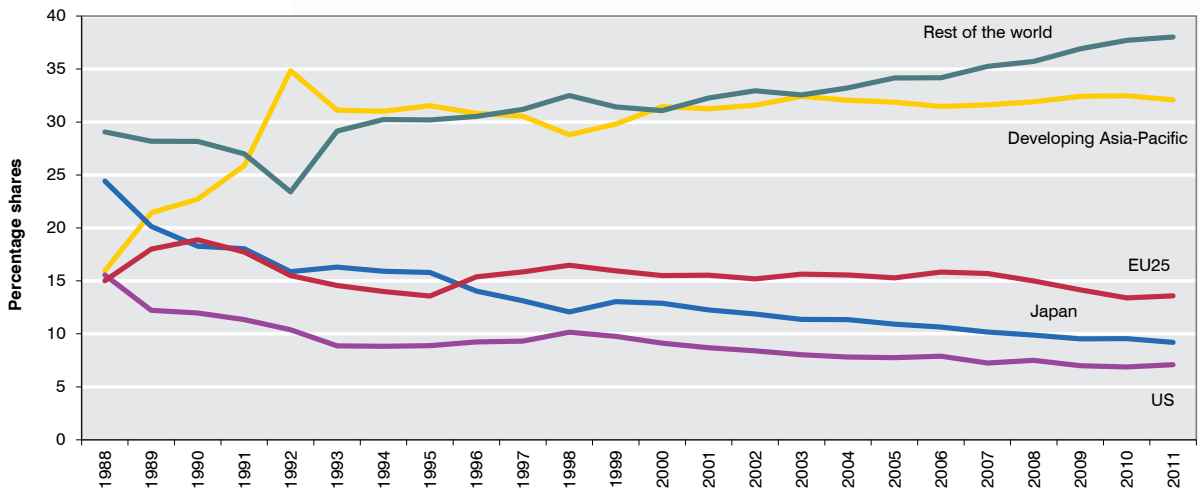
The effects of delays and disruptions can be felt in the long term, should other competitors who were able to avoid the disaster's negative effects be able to gain market share due to the problems faced by supplier A. These problems are often manifested in failures to deliver to the markets or in higher consumer prices, potentially causing a fall in demand for the products. The risk of lost market share is particularly high in close-to perfectly competitive markets in which substitution of products is effortless and price elasticity high. In some cases, short-term product substitution can lead to consumer behaviour changes as they move from one competing product to another due to lower price or better availability. Recovering from changes in demand and retaking market share can prove to be difficult.



Source: Chopra and Sodhi, 2004.

Figure VI-3

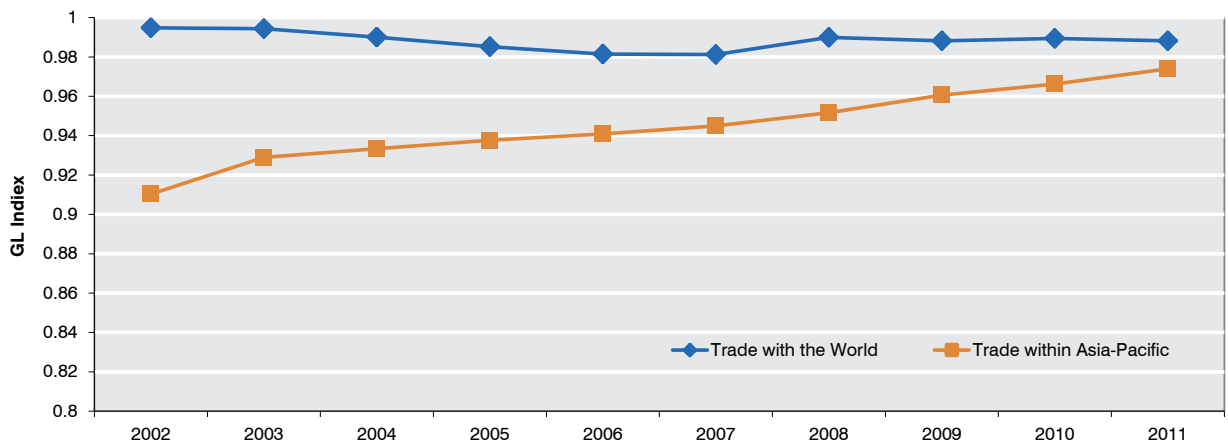
Shares of selected partners in intermediate-goods trade, 1988-2011



Source: ESCAP calculation based on United Nations Comtrade from WITS. Available from http://unstats.un.org/unsd/tradekb/Knowledgebase/Use-UN-Comtrade-via-World-Integrated-Trade-Solution-WITS (accessed September 2012).

Figure VI-4

Intra-industry trade intensity of the Asia-Pacific industrial sector, 2002- 2011



Source: ESCAP calculation based on United Nations Comtrade from WITS. Available from http://unstats.un.org/unsd/tradekb/Knowledgebase/Use-UN-Comtrade-via-World-Integrated-Trade-Solution-WITS (accessed September 2012).
Notes: 1. Intra-industry trade intensity is measured by the Grubel-Lloyd index at aggregated-sectoral level.
2. The list of industrial products follows WTO's standard classifications based on HS-2002.

PHOTO: ESCAP

Agriculture

Modern agricultural supply chains are also increasingly reliant on imports and multi-tiered systems of supply management. Such chains encompass inputs, production, post-harvest, storage, processing, marketing and distribution, as well as retailing and final consumption.[8] These functions typically span over several sectors and can extend beyond national boundaries (Figure VI-5). In addition, they often involve a wide range of public and private sector institutions and organizations.

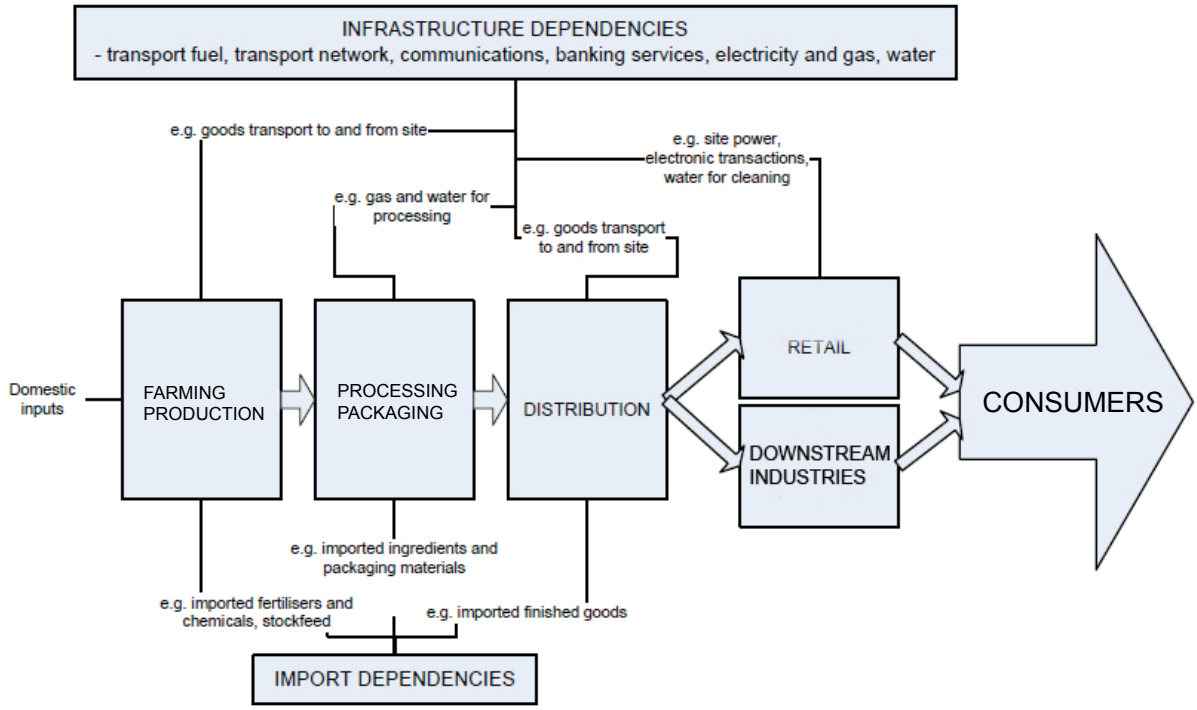
Although agricultural supply chains often rely intensively on domestic inputs, they include many import inputs, such as fertilizers, chemicals and feedstock. As a result, participants can be located within or outside national boundaries and even within national borders their activities can be spatially dispersed.

The expansion of agricultural supply chains has been accompanied by a rise in intraregional trade. Between 2001 and 2011, the proportion of Asia-Pacific agricultural exports that was intraregional rose from 55 to 59 per cent (Figure VI-6). Over the same period, the proportion of imports that was intraregional, however, increased more modestly, from 46 to 49 per cent. Figure VI-7 shows the extent to which networks of intra-industry trade in agricultural products have become integrated, at both global and regional levels.

One effect of incorporating agricultural businesses into global supply chains is a reduction in levels of inventory. For example, the overall food inventory of Australian frozen and chilled food producers was reduced to only five days in 2006 from the 2002 levels, which were 13 days for chilled food and 70 days for frozen food.[9]

Figure VI-5

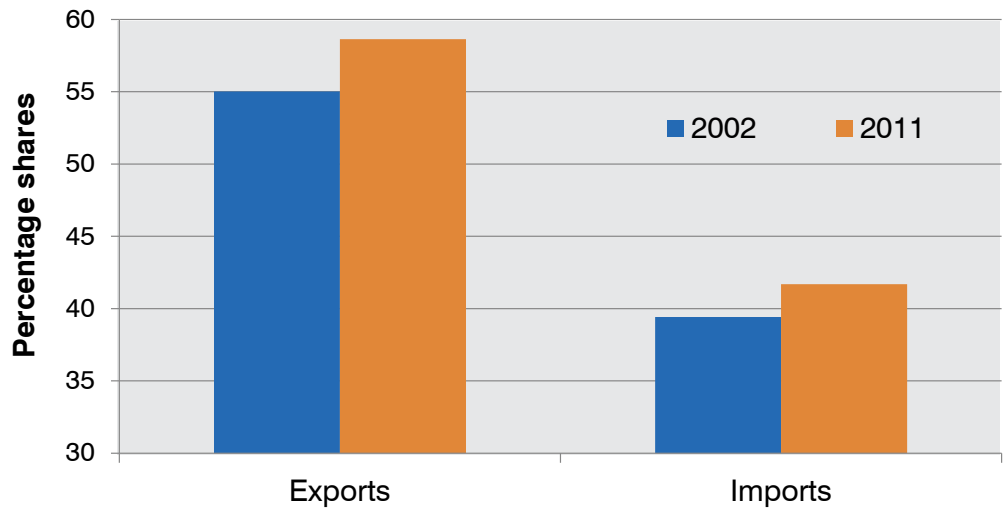
An illustration of agricultural supply chains



Source: Adapted by ESCAP from Australia, Department of Agriculture, Fisheries and Forestry, 2012.

Figure VI-6

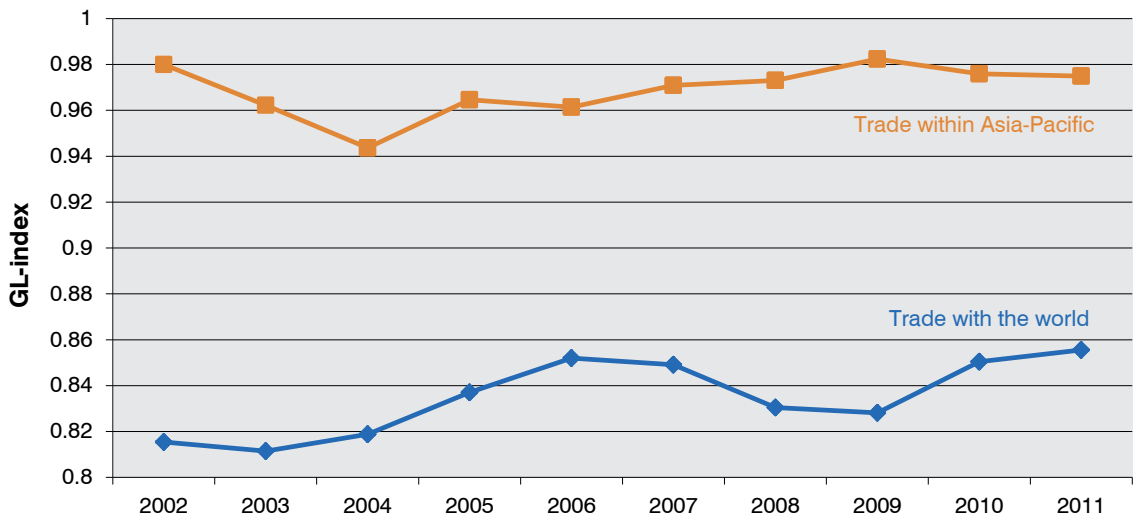
Intraregional trade intensity of Asia-Pacific agricultural trade, 2002 and 2011



Source: ESCAP calculation based on United Nations Comtrade from WITS. Available from http://unstats.un.org/unsd/tradekb/Knowledgebase/Use-UN-Comtrade-via-World-Integrated-Trade-Solution-WITS (accessed September 2012).

Figure VI-7

Intra-industry trade intensity of Asia-Pacific agriculture, 2002-2011



Source: ESCAP calculation based on United Nations Comtrade from WITS. Available from http://unstats.un.org/unsd/tradekb/Knowledgebase/Use-UN-Comtrade-via-World-Integrated-Trade-Solution-WITS (accessed September 2012).
Notes: 1. Intra-industry trade intensity is measured by the Grubel-Lloyd index at aggregated-sectoral level; 2) the list of agricultural products follows WTO's standard classifications based on HS-2002.

VULNERABILITIES OF GLOBAL SUPPLY CHAINS

Firms that use complex supply chains should be able to boost efficiency. But they are also running some risks. Particularly exposed are enterprises that rely for inputs or intermediate goods on a single source – one which might be located on a tectonic fault line or in an area subject to frequent storms and hurricanes.

Chains are also vulnerable to sudden changes in demand. Faced with an economic downturn or recession in a major market, a highly complex supply chain might find it difficult and costly to react, particularly if it services numerous markets with different consumer preferences and circumstances.

If companies are to make their supply chains resilient, they need control mechanisms that take into account the circumstances of each component – a task that becomes increasingly arduous as the chain becomes more complex. This will require careful planning and sufficient finance and resources – which the company concerned might not have. The focal firm may be able to recognize some production nodes or distribution links that might be at risk. But as the network becomes more fragmented, the focal firm will be less able to control and monitor all the possibilities.[10]

Problems can occur, for example, for firms that use 'just-in-time' inventory management systems. Another common concern is that partners in the supply chain may be unable to settle their payables in time – leading to cash flow problems

among participating firms. This may raise concerns among financial institutions and make it more difficult for firms to obtain external financial resources during the recovery phase.

Most vulnerable are the small and medium-sized enterprises (SMEs). Generally, they work as subcontractors, supplying basic services or labour-intensive parts and components. Few SMEs are prepared for natural disasters.[11] Typically, they lack insurance and do not carry out risk assessments nor have business continuity plans.[12] This makes it difficult to recover from disasters and heightens supply chain disruption.[13]

Agriculture

In the case of agricultural production, most of the risks are weather-related. Producers will always have to cope with varying and often extreme conditions. The natural disasters that most commonly disrupt agricultural supply chains are droughts, floods, storms, frosts and high winds.[14] These can become more intense or frequent if human activity or economic development has diminished the region's resilience.

Natural disasters that hit agricultural supply chains will usually reduce short-term yields, and lead to price increases and destroy assets – disrupting the flow of goods, services and information. But they can also affect productivity and market relations in the longer term.

The risks will vary depending on underlying climatic conditions, geography or topography, demographics and agrarian and industry structures. They will also differ from one commodity to another. For some producers, a major risk is the volatility of international market prices – as with grain and oilseed commodities, as well as traditional beverage and industrial crops. For other crops, such as perishable, higher-value products a greater concern will be logistics, and compliance with food safety or plant or animal health requirements.[15]

JAPAN EARTHQUAKE, 2011

This and subsequent sections consider the impact on supply chains of three major disasters - the earthquake and tsunami in Japan in 2011, the floods in Thailand in 2011, and Australia's floods in 2010-2011.

In March 2011, an earthquake struck Japan and triggered a devastating tsunami, which led to the meltdown of nuclear reactors in Fukushima. The disaster caused a record $210 billion in economic damage, representing 3.8 per cent of Japan's GDP.[16] Manufacturing was hard hit. Following the earthquake, Japanese automobile production fell by 48 per cent and electrical component production by 8 per cent. And since production was highly integrated into the world economy, there was widespread disruption in supplies elsewhere, particularly among Japan's ASEAN trading partners. As indicated in Figure VI-8 automobile production fell in a number of countries: in Thailand by 19.7 per cent; in the Philippines by 24.0 per cent and in Indonesia by 6.1 per cent. There was also serious disruption in the production of electrical components. The impacts lasted about two months for electronic supply chains and three months for automotive supply chains.[17]

The global impact of the disruption differed according to industries, the locations of production, the nature of backward-forward linkages and the potential for substitution between suppliers in different countries. The impacts by sector are described below.

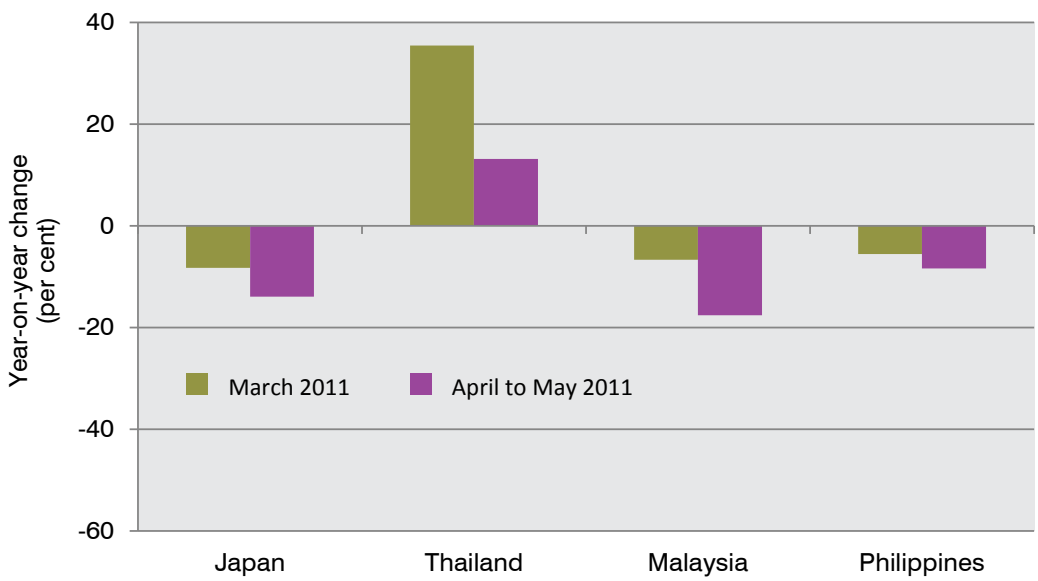
Figure VI-8

Automobile production in ASEAN countries after the Japanese earthquake, 2011

Source: Ye and Abe, 2012.

Figure VI-9

Electrical components production after the Japanese earthquake, 2011



Source: Ye and Abe, 2012.

Automobiles

Many automobile producers around the world experienced shortages in electronics and car components normally produced in Japan. Automakers in the United States, for example, had to cut their second-quarter production in 2011 by 350,000 to 400,000 units.[18] General Motors and the French automaker Peugeot Citroën had to temporarily halt production of certain vehicles.[19] There was also disruption in the production of Xirallic pigments which are used in a number of automobile paints. Merck Chemical International's only production plant is situated near the Fukushima nuclear reactor, and automakers, including Ford Motor, Chrysler Group, Volkswagen, BMW, Toyota Motor and General Motors, had to reduce the production of automobiles that used this pigment.

Overall, however, the impact lasted only around three months. By June 2011, Toyota's production bases had returned to around 70 per cent of their normal production levels and by July were back on their original schedules – demonstrating that these chains were highly resilient.

Electronics

Japan produces about 60 per cent of the world's silicon wafers for semiconductors. The earthquake shut down two factories that accounted for about 25 per cent of wafer shipments. The disaster also affected several factories that make computer chips. Renesas Electronic Corporation, for example, the world's largest maker of microcontrollers for cars and many other products, had to close eight of its semiconductor factories. The shutdown in the Naka factory in Hitachinaka City, Ibaraki Prefecture reduced the world supply of microcontrollers by about 10 per cent (Box VI-2). Even car producers like Toyota were hit, demonstrating how difficult it is to monitor and control procurement in multi-layer supply chains. Automotive microcontrollers have a high degree of product differentiation so it is difficult to transfer production to other factories.

Steel

In 2010, Japan produced 109,599 million metric tons of steel[20] – and was the world's second largest producer, and the largest exporter.[21] Following the disaster, in 2011 crude steel production decreased by 1.8 per cent.[22] But this did not greatly affect the world market because, as a result of the global recession, major mills in 64 countries were operating at about 82 per cent capacity and could easily make up for the decline in Japan's exports.[23] Asia-Pacific shipbuilders, for example, shifted their orders to mills in the Republic of Korea, China, and Taiwan Province of China.

Relief and recovery measures

Japan's industrial value chains were hard hit by the 2011 earthquake, but recovered quickly. Much of this was thanks to government support to businesses, including SMEs, which were affected directly or indirectly. Rather than addressing specific supply chains, however, the Government targeted its assistance on restoring normal business functions in general. Measures included:

- *Assistance in financing* – The government requested that financial institutions give special consideration for the disposal of dishonoured bills and cheques and for longer repayment periods for SMEs. It also implemented measures to mitigate the rapid deterioration of cash flow, such as special grants, soft loans and repayment grace.

- *Employment support* – Measures included an 'employment adjustment subsidy' along with 'employment benefits' to enterprises that suspended their businesses after the disaster.

- *Assistance in taxation* – This involved special tax deductions for post-disaster reconstruction, including the refund of corporation tax, exemption from registration and license tax, vehicle weight tax and stamp tax. In addition, to encourage business preparation for future disasters, it offered tax incentives for investment in earthquake mitigation and provided special tax deductions for post-disaster reconstruction.

- *Rehabilitation support* – To help SMEs resume their businesses, the Government supported the establishment of temporary plants and stores and helped with radioactivity inspections to minimize reputational damage.

- *Local government support* – The disaster caused devastation in Tohoku region of Honshu Island. Here, the local and regional governments of non-affected regions and municipalities were particularly active in providing support.[24]

In addition, many companies received support from the manufacturers they were supplying – the 'global value chain' anchors. Executives and engineers from Toyota, for example, tried to help their suppliers solve problems at the plant level. Suppliers whose plants were still functioning were given temporary contracts to produce parts that a competitor could not build. [25]

There were also relief efforts from other private entities. The Entrepreneurial Training for Innovative Communities (ETIC) is a former Waseda University student organization. Only one day after the disaster had struck, ETIC initiated a 'Disaster Recovery Leader Development Project' which aimed to support the afflicted communities by facilitating the emergence of entrepreneur-led innovations for disaster recovery. Over the next three years ETIC intends to train more than 200 entrepreneurs with the necessary skills to revitalize the region and support long-term recovery.[26]

THAILAND FLOODS, 2011

During the fourth quarter of 2011, Thailand experienced one of its worst flooding crises

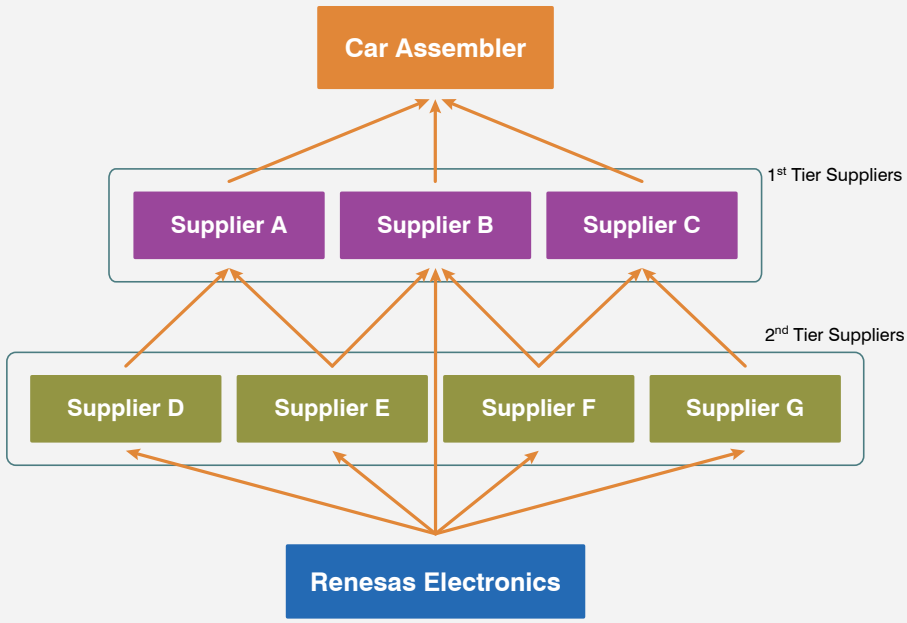
Box VI-2

Supply chain disruption at the Renesas Electronics Corporation

The Japanese company Renesas Electronics Corporation (RENESAS) is the world's largest manufacturer of microcontrollers – which manage various interlinked electronic functions of cars. In 2010, it had 29 per cent of the global market. Almost every car maker in the world relies on Renesas microcontrollers for their automotive electronics systems. Renesas supplies over 60 per cent of microcontrollers for cars produced by Toyota, Nissan and Honda, while it has a 20 per cent share for non-Japanese counterparts such as General Motors.

Automotive microcontrollers are generally designed in close collaboration with other automotive parts suppliers for specific, and each requires a special production line. The following figure shows a simplified supply chain:

Supply chains for Renesas automotive microcontrollers



Eight Renesas factories were affected by the earthquake on 11 March 2011, particularly the Naka factory in Ibaraki Prefecture. Renesas not only lost half of its wafer-start capacity but also faced unreliable electric power supplies as a result of the closures of nuclear power plants.

Renesas production lines make specific microcontrollers for individual car models. So neither other Renesas factories nor competitors could immediately take over their production. As a result, the automobile industry started to exhaust all the remaining stocks and many major motor vehicle companies had to stop operations. For instance, General Motors halted production at a pick-up truck factory in the United States, while Toyota, Honda, Nissan and Mazda shut down 22 plants.

Renesas immediately established a damage assessment team, and by 22 March 2011 had restarted limited production in five out of eight affected factories. The company also prepared three other facilities for resumption but was hampered by power blackouts following the crisis at the Fukushima nuclear power plant.

The Naka factory resumed mass production on 1 June 2011, and by the end of September 2011 Renesas was finally able to restore production to all its affected facilities.In the course of the recovery, Renesas had involved 80,000 people, including those from parent companies, suppliers, downstream producers, government and even from competitors – around twice the number of the company's regular employees. Despite the rapid restoration of its main factories, Renesas experienced severe losses. Losses from earthquake damage totalled $615 million. Only one-third of the loss was covered by insurance.

This case provides some useful insights on supply chain disruption. One is that even large companies like Toyota can find it difficult to identify weak links in their supply chain. Another is that in the absence of industry standardization in just one of two custom-made components can cause a chain to break, even if they account for a very small amount of the final product value. This example also highlights the need to review practices, such as just-in-time production, and develop business continuity plans.

Sources: Rec, 2011; Tokahashi, 2011; Dishman, 2011; Wilson, 2011; REE, 2011; Inove, 2012; and Ye and Abe, 2012.

in 70 years. The immediate impact was a contraction of output in the last quarter of 2011, reducing forecast GDP growth from 2.6 to 1 per cent.[27] The impact was particularly severe because the floods hit industries that had been concentrated in key central provinces including Ayutthaya, Pathum Thani, Nonthaburi, Samut Sakhon and parts of Bangkok. Damage was estimated at $40 billion.[28] The floods also had a heavy impact on SMEs – hitting 550,000 small businesses, causing the loss of 2.32 million jobs, at least temporarily.[29]

Thailand's severe flooding resulted from a combination of factors: massive rainfall, poor planning of water management and drainage, and a lack of infrastructure for flood mitigation. But the damage was exacerbated by poor urban planning and by the inappropriate location of industrial estates. Seven severely affected estates in Ayutthaya and Pathum Thani were built on a major flood basin of the Chao Phraya delta.

The production facilities and associated logistics systems were built there for two reasons. One was proximity to Bangkok, which allowed firms to tap into well-established infrastructure and gain easy access to suppliers and customers. The second reason was that Thailand's Board of Investment had offered incentives for investing both in the central region and there and in the eastern seaboard – including 100 per cent foreign ownership and tax exemption.[30] As a result, 97 per cent of all automotive factories were located in only three locations – Bangkok and the eastern and central provinces.[31] Similarly, electronics manufacturers from Japan and the United States established their production facilities mainly in Bangkok and the central and eastern provinces.[32]

The factories in the affected industrial estates amounted to 29.3 per cent of all production plants in industrial estates, and less than 0.5 per cent of all production plants in Thailand.[33] Nevertheless, this had a major impact on global supply chains since these industrial estates were major sources of intermediate inputs in various manufacturing sectors including cars, computers, electronics, electrical appliances and optical instruments. Honda, for example, due to the shutdown of its plants and suppliers in Ayutthaya, had to cut production in plants around the world, from the Philippines to the United Kingdom.[34]

The flooding caused a sharp decline in Thailand's industrial exports (Figure VI-10). Japan's earthquakes had already hit exports of electronics, automotive and electrical appliances in April-May 2011, but the floods then caused a further dip. The most affected export sector was the automotive industry which in November 2011 suffered a year-on-year export contraction of more than 50 per cent. Electronics exports fell similarly, by 47 per cent, and electrical appliances by 22 per cent.

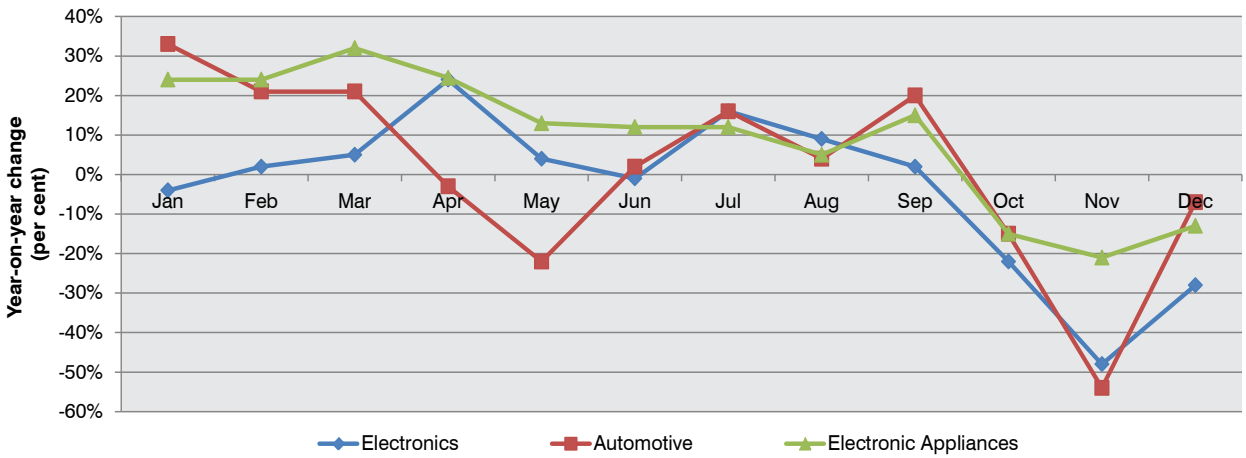
The effects were soon felt far beyond Thailand. In the automotive industry this was particularly evident for 'knocked-down units' – vehicle parts and components that are produced in one country to be exported for final assembly in another. The consequence for assembly in Japan is shown in Figure VI-11. While Japan's total exports remained stable, those of knocked-down vehicles declined by 24 per cent in December 2011, a trend that persisted during January-February 2012.

Automobiles

Thailand is world's 12th largest vehicle producer and is highly integrated into global supply chains. It includes the regional bases of Toyota, Nissan,

Figure VI-10

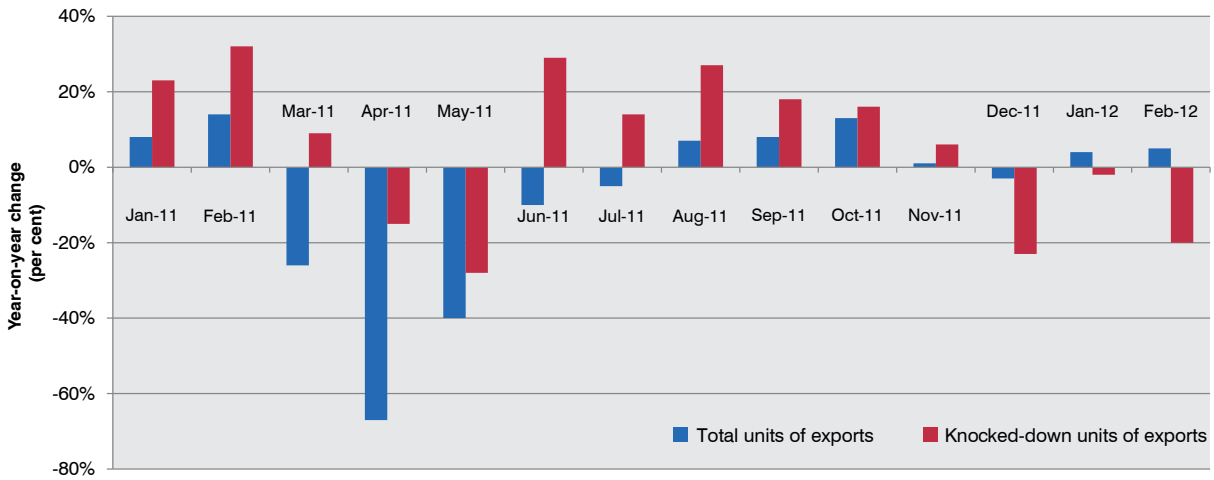
Key industrial exports from Thailand, 2011



Source: Thailand, Office of Industrial Economics, Ministry of Industry, 2012.
Note: Based on value of exports in local currency

Figure VI-11

Japan, monthly growth rates of automobile exports



Source: Japan Automobile Manufacturers Association, 2012.
Note: A knocked-down unit refers to a semi-finished vehicle with a unit value less than 60 per cent of the unit value of a finished vehicle.

General Motors, Isuzu and Ford. Over 90 per cent of automobile companies reported damage to production.[35] As the floods ravaged Ayutthaya, Honda had to suspend operations at its assembly plant there on 4 October 2011. Nissan and Toyota plants in Thailand also had to suspend production; although they were not physically damaged they could not get parts from suppliers that had been directly impacted.[36] To make up for output losses in Thailand, Toyota had to step up production in Canada, Malaysia, Pakistan, the Philippines, the United States and Viet Nam.[37]

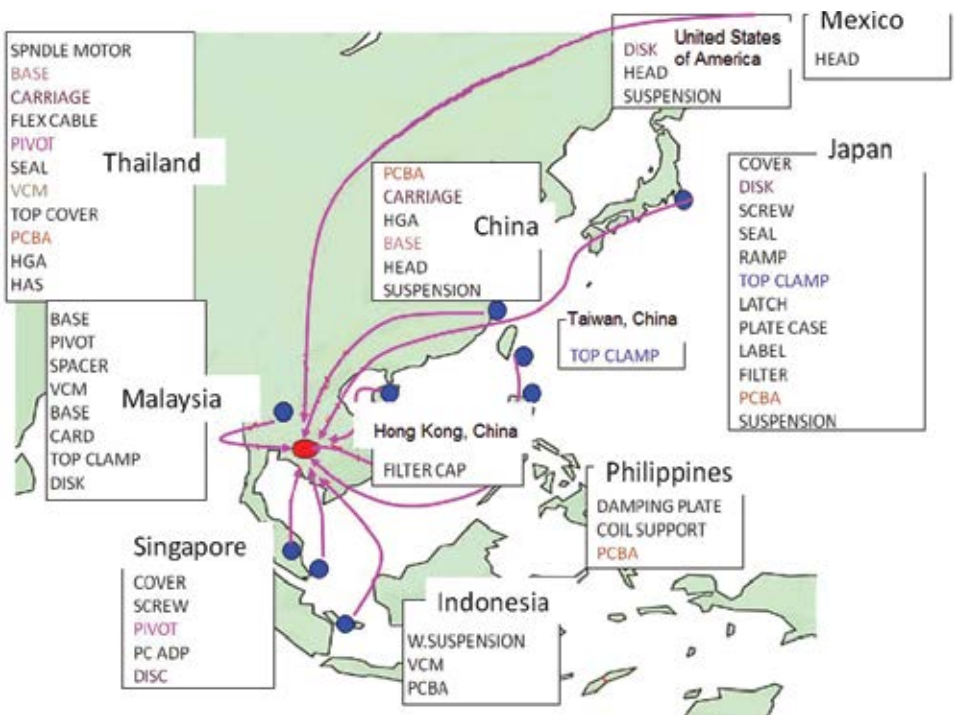
Electronics

The affected areas also had clusters of major hard disk and semiconductor producers such as Seagate Technology, Toshiba, Western Digital and Hutchinson Technology. Thailand, after China, is the world's second largest producer of hard disk drives (HDD) and is a major supplier of HDD parts. HDD production requires multiple parts and components imported from many countries around the world (Figure VI-12).

Many HDD producers were affected by the floods and the world price of HDDs rose 20 to 50 per cent.[38] During the flood period the retail prices of HDDs made by Seagate and Western Digital tripled.[39] Some of these increases were, however, also a consequence of defensive purchases by consumers or inventory hoarding by resellers and wholesalers.

Figure VI-12

Global supply chains of a hard disk drive made in Thailand



Source: Baldwin, 2010.

Relief and recovery measures

The Government, along with financial institutions and Global Value Chain (GVC) anchors, played important parts in the process of recovery. Support included:

- *Financial assistance* – SMEs and individuals affected by the floods were able to use a soft loan programme of 300 billion Thai Baht. The Small Business Credit Guarantee Corporation also provided loan guarantees of up to THB 120 billion for seven years for businesses seeking reconstruction loans from commercial banks.

- *Employment support* – The floods affected around 990,000 workers of whom 500,000 were re-employed or returned to their previous workplaces. To assist flood-hit workers and maintain employment, the Ministry of Labour provided a subsidy of THB 2,000 for each employee for a certain period, providing participating workplaces maintained at least 75 per cent of each employee's normal salary. As of January 2012, 347 manufacturers, covering 210,150 workers, had participated in the programme.[40] The Government also provided a skill development scheme: participating workers received a food allowance of THB 120 per day for a period of 10 days. In case of lay-offs, the affected workers received compensation in line with the labour protection law.

- *Public-private partnerships* – The Government worked with companies to enable temporary relaxation of the regulations related to credits and insurance. Commercial banks and non-banks were allowed to maintain flooded customers' loan classifications and consider credits to such borrowers as new loan approvals, with special interest rates and extended repayment periods. In addition, the Government facilitated insurance claims payments by temporarily allowing foreign surveyors to work in Thailand in order to relieve the shortage of surveyors.

- *Support from global value chain anchors* – Some TNCs launched assistance to their employees. Flood-hit Japanese companies sent a number of their Thai workers to work in their Japan-based parent companies. This helped maintain employment while facilitating flows in supply chains (Box VI-3).

AUSTRALIA FLOODS, 2010-2011

From December 2010 until February 2011, Queensland experienced one of Australia's worst-ever floods, compounded intermittently by major storms and cyclones (Table VI-1).

The damage was extensive. Public infrastructure was severely affected, including more than 9,100 kilometres of the state road network and approximately 4,700 kilometres of the rail network. Power to 480,000 homes and businesses was disrupted. In addition, 11 ports, 139 national parks and 411 schools were affected. Private assets were also damaged: there were 97,000 insurance claims, of which more than half were for residential properties. Businesses too suffered extensively, including damage or disruptions to 54 coal mines.

But some of the greatest impacts were in agriculture with the loss of $1.6 billion-worth of crops. Australia is a major agricultural exporter, so this had a significant influence on world markets. Waterlogged fields reduced the quality of wheat, and cut Australia's exports by around 1.5 million tons. This produced spikes in the world prices of wheat, cotton and sugar during late 2010 until the first quarter of 2011 (Figure VI-13). This exacerbated rising world commodity prices.

Box VI-3

Toyota's assistance to suppliers

Immediately after the earthquake in Japan, all Toyota companies, from suppliers to dealers and overseas operations, came together to provide support and to restore operations. The core measures for post-quake production restoration were:

1) *On-site assessment and verification* – Toyota conducted an investigation of all primary suppliers, including the impact at secondary and tertiary suppliers. Onsite investigation teams were despatched to confirm production items and inventory. The purchasing units confirmed the availability of overseas primary suppliers.

2) *Support for suppliers* – Toyota provided onsite support to 200 suppliers.

3) *Finding substitutes* – When restoring onsite production was not possible, the company would try to find substitute products.

As a result, production was restored more rapidly than had been anticipated. Domestic production had reached almost normal levels by July 2011 and was fully restored by September 2011.

There were similar measures following Thailand's floods. By adjusting the operational levels of each production line according to the parts situation, Toyota was able to return to normal operation in North America by the first half of December 2011, and in Thailand by the beginning of 2012. Initially, it had been estimated that the two disasters in 2011 would cut Toyota's output globally by 1 million vehicles, but the actual drop was 390,000 vehicles.

The lessons learned following the two events led the company to revise its business continuity plan. The company has also launched measures such as decentralizing sources for at-risk parts and converting to generalized designs.

Source: Toyota, 2012

Cotton – Australia is a leading cotton exporter with around half of the production coming from Queensland. Global cotton supplies had already fallen in 2010 due to adverse weather across China and the United States, and flooding in Pakistan. But the floods in Queensland exacerbated the situation and in March 2011 drove the world price to a record high.

Sugar – Australia is also a leading sugar exporter – with around 95 per cent of the crop coming from Queensland. The flooding caused a 27 per cent decline in revenue for the sugar industry in 2010.[41] The revenue also declined further in 2011 because water logging hampered the harvest. As a result, the world sugar price reached a 30-year high – to the benefit of other countries such as Brazil and Thailand which made up for some of the fall in Australian output.

Grains – Queensland accounts for about 10 per cent of Australia's grain production. Grain losses were about 500,000 tonnes, including wheat, barley and sorghum with losses for the grain industry of about $400 million.[42] A major problem for grain exporters was shipment delays due to port closure.

Table VI-1

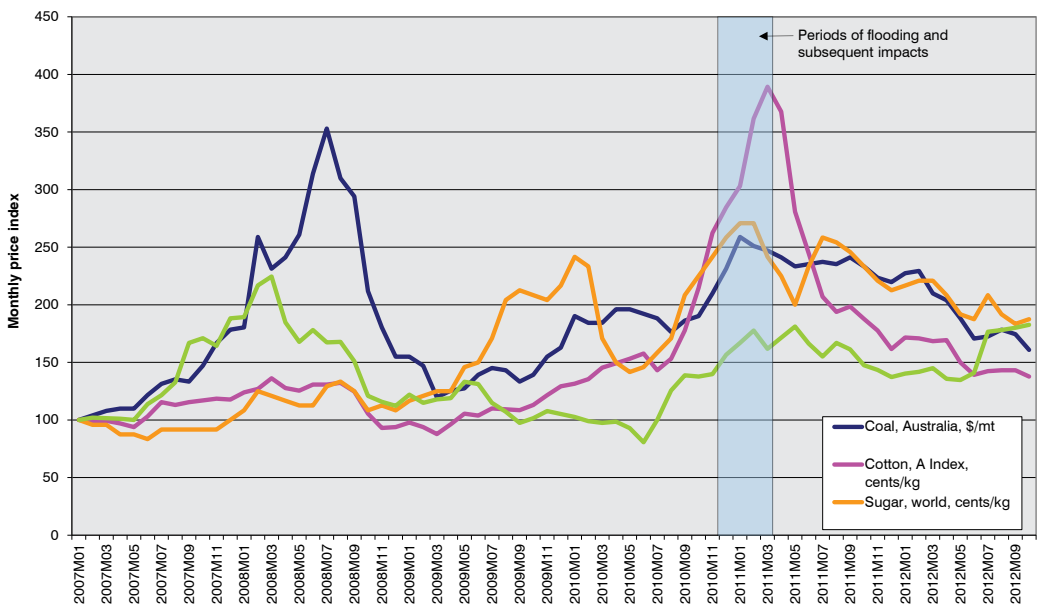
Australia's 2010-2011 floods timeline

September-November, 2010	Large parts of eastern Australia, including Queensland, experience the wettest spring season, soaking crops and filling water catchments.
December 3	First series of heavy rain hits central Queensland, causing much damage in the town of Emerald.
December 10-13	Central Queensland hit again with torrential rains, causing localized flooding, and strengthening floodwaters.
December 19-20	Strong rains for the third time recorded in Queensland, causing flooding.
December 24	Many river catchments are soaked.
December 25	Tropical Cyclone Tasha makes landfall near Gordonvale south of Cairns, bringing rainfall of 150-250 mm.
December 28	After six more days of contact rain, disaster is declared for the towns of Chinchilla, Theodore and Dalby in southern Queensland, prompting mass evacuation.
December 30	Bundaberg north of Brisbane experiences heavy flooding.
January 1, 2011	Airport at Rockhampton is cut off by a deluge from soaked inland areas.
January 3-4	Rockhampton is cut off by rising floodwaters. Other cities brace for record flooding, and it is expected that floods will last for weeks.
January 5	Violent storms overnight cause flash flooding in Brisbane.
January 12	Brisbane flood levels reach peak, causing widespread flooding with dozens of suburbs and thousands of properties are inundated.
January 17-18	Floods menace Victoria State. Residents of Kerang evacuate.
February 2	**Category 5 Cyclone Yasi hits south of Cairns.**

Source: World Bank and Queensland Reconstruction Authority, 2011.

Figure VI-13

Movements of selected agro-product prices, 2007-2011



Source: ESCAP calculation based on World Bank data.

Fruit and vegetables – Queensland supplies around one-quarter of Australia's fresh fruit and vegetables. The flooding and consistent rainfall resulted in widespread damage and disrupted harvests for many crops. Overall the floods affected areas that account for 14 per cent of Australia's supply of fresh fruit and vegetables. Revenue for Australia's fruit and vegetable growers declined by 10 per cent for 2010-2011, representing a combined loss of $561 million.[43]

Relief and recovery measures

All levels of government pledged support for the recovery. Initially, this involved emergency assistance grants of up to 1,000 Australian dollars ($A) per person. The Queensland Government pledged about $A2.1 billion funding for financing recovery and reconstruction. The national Government also has well-established relief and recovery measures which can quickly be activated when disasters hit – the Natural Disaster Relief and Recovery Arrangements (NDRRA). The Government indicated that it would invest $A5.6 billion for rebuilding flood-affected regions, including around $A3.9 billion as the Government's share of NDRRA.[44]

The NDRRA has a number of financial assistance packages. These include:

- *Special grants* – Businesses with fewer than 20 employees could receive $A25,000 for cleaning, repairs and stock replacement, and concessional loans of up to $A250,000, as well as deferred repayment of existing loans with the Queensland Rural Adjustment Authority.

- *Low-interest loans* – Businesses with more than 20 employees could get low-interest loans of up to $A650,000 for cleaning, repairs and stock replacement – with a grant component of up to $A50,000.

Commonwealth and state governments gave priority to small businesses and individuals who could not survive on their own. In addition to loans, the Queensland Government provided support and advice and a range of services. For example, it published a series of simple guidelines: how to sort out business operations after the disaster; steps to business recovery; plans for longer-term recovery; managing and paying staff; advice on dealing with insurance, banks and tax offices; and establishing mobile offices equipped with wireless technology. The Australian Government Disaster Recovery Payment conducted recovery workshops involving small businesses in the affected areas.[45]

The private sector also helped individuals and small businesses. Individual banks had assistance packages including: deferring home loan repayments for up to three months; rescheduling or restructuring business loans without incurring fees; giving credit card holders an emergency credit limit increase; refinancing personal loans at a discounted fixed rate; waiving interest rate penalties if term deposits were drawn early; and deferring monthly repayments on equipment finance facilities for three months.

Australia's recovery measures offer good practices for other countries. First, because the Government had pre-agreed recovery measures it could offer assistance quickly. Second, the Government ensured efficiency by limiting assistance to small firms who could not survive on their own. Third, it had public-private partnerships that enabled efficient recovery measures. Fourth, it offered incentives for mitigation by requiring businesses applying for concessional loans to take steps to minimize future losses. Finally, it offered technical advice and information, making good use of information technology.

LESSONS FOR BUILDING RESILIENT SUPPLY CHAINS

Just-in-time production and a high degree of product differentiation through global supply chains add to efficiency but can also be a source of fragility when there is a disruption. This highlights the importance of risk management strategies based on careful cost-benefit analysis and trade-offs.

Enterprises that want to build in greater resilience to natural disasters can take a number of measures, for example: (a) invest more in each location to enhance resilience to natural disasters; (b) spatially diversify the locations of both production and supply; (c) hold larger inventories or stocks.

All of these options incur extra costs. In addition to facing direct costs, enterprises that want to build greater redundancy into their systems may have to forego some economies of scale or opportunities for lower factor costs. Similarly, there will be extra costs from diversifying sources of supply, by increasing stocks of food for example.

In making investment decisions, businesses now have to consider risks even if they are not located in a disaster-prone area. Devising the optimal strategy is not easy, particularly when dealing with rare but catastrophic events. Nevertheless, firms will need to assess risks and find ways to control them – for example, through business continuity plans (Box VI-4). In addition, governments can help minimize disaster risks and offset market failures such as the absence of adequate insurance. Developing countries generally have inadequate insurance markets.[46] Even Japanese companies, who may be able to get coverage for production in Japan, will find it difficult to extend this to the whole of their supply chain in other countries. Insurance companies may also be reluctant to provide specific services such as microinsurance for small enterprises. And even where there is insurance it can be very expensive. After the Thailand floods, for instance, firms directly affected found on average that their insurance premiums more than tripled. A number of them, particularly the smaller ones, decided not to renew their insurance or to exclude disaster risk coverage.[47] Developing efficient competitive insurance would require improving the overall regulatory framework, providing better risk information and modelling systems, and exploring innovative new schemes such as disaster microinsurance.

While private agents bear the most of the costs of disasters in developing countries, governments also carry a substantial contingent liability. They thus have a strong motivation for ensuring that private incentives are appropriately aligned.[48] For this purpose, developed countries use a combination of regulation and tax incentives. Japan, for example, provides tax incentives for investments in earthquake mitigation and has special tax deductions for post-disaster reconstruction. In developing countries, where compliance issues are problematic and enforcement costs are higher, there is greater need to combine regulatory measures with more active interventions aimed at appropriately incentivizing private agents.

There is also considerable scope for international cooperation. At present, most such efforts are ad hoc and there is little formalized cooperation. Further initiatives are needed to create standing funds and reserves – not only to bolster disaster resilience through improved infrastructure but also to provide relief and recovery assistance.

Box VI-4

Business continuity plans

A business continuity plan assesses risks posed by natural disasters and codifies the practical responses. Such plans are relevant for the supply chain as a whole as well as for individual components. While drafting and upholding business continuity plans incurs some expense, they bring long-term benefits in the event of a disaster. Business continuity plans surged in popularity after the events of 11 September 2001. But even in developed markets like the United Kingdom, around half of SMEs have no formalized plans for managing disaster risks. In developing countries, the penetration of business continuity plans can be expected to be markedly lower.

The generic process of drafting a business continuity plan is illustrated in the figure below:

The first step is to identify potential risks and conduct a specific threat and risk analysis. This should consider, for example, the state of existing infrastructure, the susceptibility to natural disasters, the potential effects of disruptions and the extent of financial reserves. The next step is to develop a continuity strategy. For supply chains with high-risk components, this should involve buffer stocks and redundant supply sources from less risk-exposed areas. For supply chains relying on just-in-time delivery, it might be necessary to relocate production of key components to less risk-exposed areas. In all cases, insurance should be considered and taken as appropriate. The final step is to periodically rehearse the procedures and update the plan to reflect recent events and changes in the supply chain, external markets and the environment.

In the light of the growing complexity of supply chains in Asia and the Pacific, the local firm should require its suppliers to establish business continuity plans alongside its own. For this purpose, it can offer technical and financial assistance.

Governments can also play a part. Governments of developed countries have used both regulatory and incentive approaches. For example, in the United Kingdom, the Civil Contingencies Act requires businesses to draft sufficiently comprehensive plans for dealing with disasters and emergencies. In this regard, the community authorities have the responsibility to advise and assist firms with regard to formulating business continuity plans. The state of Ohio in the United States, on the other hand, has taken an incentive approach – allowing the costs of such plans to be tax deductible.

Sources: British Standards Institution, 2010; Denning, 2012.

PHOTO: MARIA MISCICOVA

Existing funds such as the Natural Disaster Fund of New Zealand are typically nationally administered and their usage is too limited to address the needs of a disaster-struck supply chain.

It would be better to have greater cooperation between international organizations, development banks, governments of developed countries and vulnerable countries. Examples include the recent joint Pacific Catastrophe Risk Assessment and Financing Initiative, piloted by the Secretariat of the Pacific Community, 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. The first of a series of applications under the initiative is a Pacific Risk Information System which will include a regional geospatial database and country-specific catastrophe risk models.

Greater supply chain resilience will also rely critically on support from TNCs and especially the GVC anchors who can help their business partners in reconstruction and in improving resiliency. Intergovernmental cooperation can also facilitate such private initiatives.

POLICY RECOMMENDATIONS

Some of the following recommendations apply specifically to supply chain resilience; others are valid in a broader framework because

of the tight linkage between the supply chain resilience and the resilience of business and economy in general.

1. Public interventions to enhance resilience and recovery

The most important areas for government interventions are in facilitating investments to improve general resilience to natural disasters and, when a disaster occurs , in facilitating rapid reconstruction. The public sector, including public-private partnerships, should be involved in reconstruction of physical infrastructure. There is also a case for temporary assistance to affected downstream industries and employees.

Governments should consider subsidies for measures to improve long-term resilience and accelerate recovery processes such as:

- Measures to make property and other physical assets more disaster resistant – for example, earthquake-, fire- and flood-resistant construction, 'green' buildings and the conservation of forests and mangrove swamps;
- The development and use of new applications and information platforms for assessing and managing disaster risks in businesses;
- Advocacy for business continuity plans; and offering special tax deductions to individuals and corporations who invest in post-disaster reconstruction and recovery efforts.

2. Public interventions to improve private-sector disaster risk management

Governments can use taxes and subsidies as part of risk management strategies but need to tailor these to individual communities and take into account potential problems of moral hazard. Governments could subsidise wider take-up of private insurance by:

- Assisting the development of affordable and sustainable insurance markets, and improving access to such markets by promoting cost-efficient marketing channels;
- Cooperating with insurance providers to make insurance premiums reflect firms' efforts on risk management, such as discounting premiums for firms with business continuity plans;
- Increasing cooperation between governments, insurance providers, GVC anchors and GVC partners to establish:
  - group insurance schemes for businesses involved in global production;
  - joint risk assessments, risk information sharing and early warning systems; and
- Encouraging insurance for vulnerable groups in the supply chains such as small-medium producers, including innovative microinsurance services and products.

Governments can also foster the development of business continuity plans by, for example:

- Imposing compulsory legal requirements for such plans;
- Offering tax incentives for the establishment of such plans, for example, by allowing firms to count the costs of these plans in their tax deductible accounts; and
- Providing technical support for drafting plans, through centralized agencies or local community offices.

3. Intergovernmental cooperation to support private sector recovery efforts

Governments can encourage mutual arrangements between GVC anchors and business partners. For instance:

- The government of the GVC home country can arrange with the government of the affected countries to temporarily relax labour movement restrictions so as to facilitate assistance to overseas subsidiaries, including for workers of their business partners; and
- Facilitate financial capital movements from GVC anchors and insurance companies during the period of reconstruction.

4. International cooperation for disaster risk management

International organizations can:

- Provide forums and facilitate the emergence of formalized systems of international cooperation on disaster risk management or building resilience;
- Consider global initiatives which would limit man-made environmental risks such as cap-and-trade carbon credit schemes; and
- Help develop standardized safety codes and infrastructure standards for building more resilient supply chains.

There will also be opportunities through emerging comprehensive free trade agreements involving major GVC participating countries. These include the Regional Comprehensive Economic Partnership, Trans-Pacific Partnership and the ASEAN agreements. These can:

- Create standing funds and reserves; and
- Open up broader cooperation for example, on reinsurance schemes jointly established by regional organizations, governments and funds.

ENDNOTES

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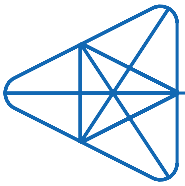
ESCAP PHOTO

7

MUTUAL SUPPORT THROUGH REGIONAL COOPERATION



CHAPTER 7

MUTUAL SUPPORT THROUGH REGIONAL COOPERATION

In an era of globalization, and ever closer links between countries in Asia and the Pacific, disastrous shocks in one country can soon reverberate across many others. These transboundary crises demand transnational solutions, so Asia-Pacific countries will need to intensify regional cooperation, for which a regional framework for building resilience is proposed.

The preceding chapters have shown how multiple shocks and their convergence have put economic, social and environmental systems simultaneously under stress. In 2008, ESCAP was already warning of these multiple threats at a High-level Regional Policy Dialogue in Bali, Indonesia – 'The food-fuel crisis and climate change'.[1] [2] Here, Asia-Pacific countries recognized that the convergence of these interrelated and mutually exacerbating crises, together with climate change, threatened to undermine the region's development gains and affect its future prospects – potentially slowing progress towards the Millennium Development Goals (MDGs).

The root causes and repercussions of these crises are often transboundary, which necessitates greater regional cooperation. By working together, governments can produce solutions that are greater than the sum of individual country responses. Regional cooperation also further intensifies and deepens interdependencies, so future cooperation through forums such as ESCAP becomes even more significant.

It should also be emphasized that these crises are often global, so policy reforms are essential at the global level. Nevertheless, multilateral policies for economic governance are also evolving within multipolar frameworks so regional actions will in turn influence global reforms.

Cooperation will be particularly important for the least developed countries. They already have many immediate pressures and priorities that might seem to take precedence over long-term resilience building. Yet these are also the countries most vulnerable to multiple shocks. They should, however, also be able to rely on regional solidarity. This will not only assist individual countries, but in a closely interconnected world will also help avoid negative feedback loops that can quickly ensnare other countries. Cooperation can ensure that one country's actions are not detrimental to another's.

COORDINATED MANAGEMENT DURING ECONOMIC CRISES

The Asia-Pacific region is a global powerhouse driving economic growth, and in the current global economic crisis has been an anchor of stability. Even so, it remains vulnerable to

economic shocks originating both within and beyond the region – all of which will benefit from a regional response.

Financial sector

The days are long gone when economic shocks could be dealt with solely by national authorities; no longer can individual governments rely on their own monetary and fiscal tools. Nor can international organizations such as the IMF and the World Bank respond solely by targeting their rescue or debt relief packages at individual countries.

Instead, there needs to be much greater coordination at international and regional levels. This was demonstrated after the 1997 Asian financial crisis which provided the impetus for a new model of regional self-help (Box VII-1). Regional bodies such as ASEAN+3, the Executives Meeting of East Asia Pacific Central Banks, ASEAN, APEC, the Asia-Europe Meeting and the South-East Asian Central Bank Research and Training Centre have initiated a number of forums and cooperation mechanisms. These have focused primarily on three objectives: i) providing regional emergency liquidity; ii) developing a regional bond market; and iii) cooperating on macroeconomic management and exchange rate policies.

As the region recovered after the 1997 crisis, however, some of the political impetus for such mechanisms started to ebb. One test came in 2009 when, rather than utilizing the Chiang Mai Initiative (CMI) (Box VII-2), countries seeking liquidity support – Indonesia, the Republic of Korea and Singapore – instead approached treasuries in the United States of America and Japan for bilateral swaps.[3] This was partly because CMI was linked to IMF conditionality.

On a more positive note, this also stimulated another spurt in progress. Members expanded the CMI as the Chiang Mai Initiative Multilateralization (CMIM) to include a foreign exchange reserve pool of $120 billion.

BOX VII-1

The 1997 financial crisis: lessons in economic policy management

The 1997 Asian financial crisis had a profound effect on the region, forcing policymakers to rethink economic strategies that were focused on maximizing economic growth driven by external borrowing. They resolved to deepen their regional cooperation, to better coordinate the management of speculative capital flows, and to build foreign exchange reserves that would protect against a similar type of crisis in the future.

Policymakers from affected countries also stood resolutely in favour of expanding trade and investment, despite protectionist pressures from crisis-hit sectors. This helped restore growth through buoyant global demand for the region's exports. Interestingly, at the height of the crisis, the region's WTO members entered into further liberalization commitments under the WTO's financial services agreement, which helped recapitalize banks, and showed that calibration, through sequencing and selection of the modes of liberalization, were important factors in liberalization policies. As a result, when the global financial crisis hit in 2008 the countries in Asia and the Pacific were more resilient – though they remained aware of how susceptible they still were to the financial contagion.

Source: ESCAP, 2012a.

In addition, they raised the ceiling of currency swaps not subject to IMF conditionality from 10 to 20 per cent. In a further encouraging sign of continued reform of the CMIM, leaders of ASEAN+3 have announced that in 2014 member countries will be allowed to tap up to 40 per cent of their own quota without an IMF aid package.[4]

One continuing limitation of the CMIM is that when a member requests support, the participating countries need to agree to contribute on each occasion. This provision may ensure that countries only contribute when they are in a position to do so, but it also makes the system very slow.[5]

Countries in the region have also been aiming to reduce their dependence on extra-regional funds by expanding Asian bond markets – through the Asian Bond Fund (Box VII-3) and the Asian Bond Market Initiative. Since 1997, the region has seen a nearly 30-fold increase in the size of the bond market.[6] However, there are still concerns about the quality of the bonds, since issuers' credit rating levels still do not meet investor expectations.[7] To address this, APEC has launched several initiatives such as the APEC Financial Development Programme and the Initiative on Strengthening Capital Markets in the APEC region. The bond markets would also be stronger if they had common substructures of credit guarantees and ratings.

With regard to the third objective, on regional exchange rate policy coordination, most activities have remained at the stage of information exchange and dialogue. Countries recognize the deleterious effects of exchange rate volatility, particularly for the trade in parts and components in regional supply chains. They also appreciate the dangers of competitive devaluations. But as yet, no consensus has emerged on a collectively managed float or any other arrangement for currency stabilization. On this issue, there is no clear evidence, either theoretical or empirical; the crisis-hit euro being a case in point.

Nevertheless, the region has created a strong foundation of regional cooperation in trade, investment and capital flows. As a result, many countries are in a better position to absorb external shocks than they were a decade and a half ago. This was demonstrated by their

BOX VII-2

The Chiang Mai Initiative

The Chiang Mai initiative (CMI), established in 2000 as a direct response the Asian financial crisis, is a set of bilateral agreements that established a pool of $200 million in foreign exchange reserves that was raised to $1 billion in 2005. In 2009, the CMI was transformed from a bilateral network into a multilateral foreign exchange reserve pool of $120 billion. Of this pool, 80 per cent is contributed by China, Japan and the Republic of Korea, while the ASEAN countries provide the remaining 20 per cent. An independent regional surveillance office, the ASEAN+3 Macroeconomic Research Office (AMRO) was established in 2010 and is responsible for conducting surveillance of Chiang Mai Initiative Multilateralization (CMIM) operations.

Source: ESCAP, 2012a.

resilience during the 2008 global financial crisis. Although this differed in many ways from the 1997 crisis, the fundamental issue remained the same: a sudden stop in capital flows, leading to a general run for liquidity. This time, however, the damage was contained and the overall recovery was quick and strong (Box VII-4).

BOX VII-3

The Asian Bond Fund

The Asian Bond Fund was established by the Executives Meeting of East Asia Pacific Central Banks, an association of central banks of 11 economies in the region (Australia, China, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand and Hong Kong, China). The first stage of the fund was launched in 2003 with voluntary contributions of members to a dedicated fund, with an initial size of $1 billion, to purchase regional bonds denominated in US dollars.

Source: ESCAP, 2012a.

Box VII-4

The 2008 financial crisis: visible resilience and hidden vulnerabilities

The 2008 global crisis caused a visible contraction. However, thanks to financial sector reforms after 1997 and the willingness of policymakers to respond with aggressive fiscal stimuli and expansionary monetary policies, the overall damage was limited and the recovery was quick and strong. By 2010, most of the region's economies appeared to be back on long-term growth trends.

But apparent overall economic resilience masks underlying vulnerabilities. In particular it hides the impact on the poor. Vulnerable communities can see their life savings devastated by a spike in food prices, or the loss of a job that has disappeared forever. Moreover, any reduction of health and education expenditures will affect the quality of human development in both short and long terms.

Those most resilient to crises are those with access to capital, knowledge, employment opportunities and the capacity to accumulate wealth. Widespread economic recovery at the macro level has not translated into increased security of jobs and livelihoods for the most vulnerable.

The experiences of both the 2008 and 1997 financial crises have underlined the need for a much broader response. Rather than dealing solely with macroeconomic factors, such as public debt and fiscal balances, this has to address issues such as skyrocketing youth unemployment and the decline of government services. Even in Europe these seem to have been shifted to a later phase of the recovery process.

Asia and the Pacific, with its strong macroeconomic fundamentals, has an opportunity to avoid the mistakes of other regions. It can take regional action that bridges the gap between visible resilience and hidden forms of vulnerability.

Source: ESCAP, 2012a.

Trade and investment integration

Most Asia-Pacific economies have come to rely heavily on exports, often over 50 per cent of GDP – the bulk of which are destined for developed country markets. Indeed, in South-East and East Asia, in particular, exports are often a greater share of GDP than household consumption, investment and government consumption – and sometimes all three combined. Given that future global crises could also weaken export demand from the developed countries, Asia and the Pacific will thus rely more on regional export markets and will need to generate more demand for consumer goods from within the region.

This will mean tackling remaining tariffs and the often complex measures on rules of origin. Countries also need to simplify customs and inspection procedures, improve transport links and reduce transaction costs. Indeed, given the current stalemate in the Doha Round of negotiations, economic integration reforms are likely to happen through the faster track that regional trade agreements provide.

At the same time, it will be important to improve the climate for investment. Further flows of FDI would boost domestic demand, increase access to credit and insurance, reduce inequality, and ultimately build greater resilience to external shocks. If investors are to risk their capital they will need predictable and secure mechanisms. Investment would also benefit from tighter regional coordination of such policies – creating common markets of production and consumption that produce economies of scale while ensuring a level playing field for competition.

LAND, WATER AND ENERGY LINKAGES

Demand for water, food and energy is expected to rise by 30 to 50 per cent over the next two decades. This could put unsustainable pressures on natural resources with particularly harmful impacts for the poor. Policymakers increasingly recognize that land, water, and energy supplies and food security are interdependent – and the risks are correlated.[8] Countries need to cooperate accordingly.

Food security

Countries across the region have cooperated for some years on food security. In 1975, in the aftermath of global market turmoil, the United Nations established an International Emergency Food Reserve. Then in 1979 at a subregional level, ASEAN agreed on the ASEAN Food Security Reserve. This arrangement proved ineffective because the reserves were too small and each disbursement required bilateral negotiations.[9] In 2004, the ASEAN ministers therefore relaunched the scheme as the East Asia Emergency Rice Reserve which had clearer stock release guidelines. In March 2010, this reserve facilitated the transfer of 10,000 metric tons of rice from Viet Nam to the Philippines. It also developed programmes to help disaster victims in Cambodia, Indonesia, and Myanmar. In 2011, ASEAN+3 agreed to establish a permanent mechanism which, with three more participating countries, is able to earmark substantially greater reserves.

There have also been food security arrangements among the SAARC countries. SAARC established the first reserve in 1998,

but this was not activated. It was relaunched in 2008 as the SAARC Food Bank. Nevertheless, the scheme still has structural and procedural weaknesses.

Food reserve systems need to operate with clear guidelines and on a sufficient scale. They should also establish ways of transferring stocks speedily across borders without excessively relaxing safeguards for plants, animals and humans. The ASEAN system, by clarifying questions related to prices, terms and conditions of commercial transactions, has addressed these issues effectively. It is also important that governments protect critical food reserves and stocks from both natural and man-made hazards.

Water resources

Countries across the region have a long history of cooperation on water resources. For over five decades, ESCAP has been at the forefront of promoting such collaboration. Indeed, during its founding days, the main environmental preoccupation for ESCAP (then known as ECAFE) was not land, but water.[10] In May 1949, the Bureau of Flood Control was established, and it quickly prioritized the Mekong. This represented the United Nations' first direct involvement in international river basin planning.[11] Progress was subsequently slowed by conflict but revived again in 1995 with the formation of the independent Mekong River Commission between the governments of Cambodia, Lao PDR, Thailand and Viet Nam. Since then the Commission has formulated the Basin Development Plan which integrates economic, social, and environmental issues in the management of water and related resources, energy generation and food production, as well as a regional flood management programme, and an agreement on data and information sharing. It also has an agreement with China on hydrological data exchange.

Table VII-1 lists some other frameworks of cooperation among the region's major transboundary river basins. Such integration could be strengthened or expanded to include other critical natural resources.

COOPERATION ON DISASTER RISK MANAGEMENT

The Hyogo Framework of Action (HFA) encourages cooperation on disaster risk management. It calls on regional organizations to undertake the following five specific tasks: (a) promote regional programmes; (b) undertake and publish regional and subregional baseline assessments; (c) coordinate and publish periodic reviews on progress; (d) establish or strengthen specialized regional collaborative centres; and (e) support the development of regional mechanisms and capacities for early warning.[12] More recently, the Rio+20 outcome document reaffirmed the international community's commitment to the HFA and called on subregional and regional organizations to urgently accelerate implementation of the HFA goals in the context of sustainable development and poverty eradication.

Many initiatives for regional cooperation have been initiated or supported through ESCAP. One of the most significant, as mentioned earlier, is the Mekong River Commission. Another is the intergovernmental ESCAP/WMO Typhoon Committee which was established in 1968 to coordinate measures for minimizing the loss of life and material damage caused by typhoons.[13]

Table VII-1

Major transboundary river basins in Asia

River basin	Riparian countries	Total population in river basin (million)	Intergovernmental framework of cooperation	Member countries	Principal cooperation areas
Amu Darya	Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan	43.3	Interstate Commission for Water Coordination (ICWC); International Fund for saving the Aral Sea (IFAS)	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan	Water quantity, water quality, joint management
Amur	China, Mongolia, Russian Federation	63.9	Amur River Coordination Committee	China, Mongolia, Russian Federation	Joint management
Ganges-Brahmaputra-Meghna	Bangladesh, Bhutan, China, India, Myanmar, Nepal	581	Mahakali River Commission;	India, Nepal	Water quantity
			Indo-Bangladesh Joint Rivers Commission	Bangladesh, India	Joint management
Indus	Afghanistan, China, India, Pakistan	219	Indus Waters Commission	India, Pakistan	Water quantity, joint management
Mekong	Cambodia, China, Lao PDR, Myanmar, Thailand, Viet Nam	57.2	Mekong River Commission	Cambodia, Lao PDR, Thailand, Viet Nam	Hydropower, irrigation, navigation, fishing, flood control and relief

Source: ESCAP, 2011d.

The Japan Meteorological Agency provides support and advice to members through the Regional Specialized Meteorological Centre in Tokyo. A third example, established in 1972, is the intergovernmental WMO/ESCAP Panel on Tropical Cyclones which provides a cyclone warning service for the Bay of Bengal.[14] In this case, the Regional Specialized Meteorological Centre is the Indian Meteorological Department.

All three cases have demonstrated the value of regional cooperation, but the intensity of cooperation varies. Cooperation is most advanced in the Mekong River Commission – where there is clear political commitment and members, development partners and donors provide the Commission with substantial resources. In the two other arrangements, cooperation tends to be looser: governments commit fewer resources and activity is typically confined to typhoon-related early warning and information exchanges.

There are also international and regional cooperation mechanisms for emergency responses that are supported by ESCAP. The International Charter on Space and Major Disasters, for example, which became operational in 2000, provides countries affected by disasters with a unified system of satellite data acquisition and delivery. Currently, 14 of the world's space agencies are members, offering more than 21 earth observation satellites; China, India and Japan together have more than six. At the regional level, another

ESCAP Executive Secretary, Dr Noeleen Heyzer at the site of the Sichuan earthquake, with affected populations.

mechanism is Sentinel Asia which provides disaster-related information and products from satellites operated by India, Japan, the Republic of Korea and Thailand.

ESCAP has also been working to enhance regional cooperation in space applications. In 1994, it established the Regional Space Applications Programme for Sustainable Development (RESAP) which provides capacity building programmes on space applications for disaster risk management. In addition, UNITAR's Operational Satellite Applications Programme will use RESAP's framework to provide access to near-real-time satellite-based information during disasters and emergencies. This collaboration should help provide data in a more timely and efficient manner.

Recently, the ESCAP secretariat facilitated the formulation of the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017 (Plan of Action). This was adopted by member States at the intergovernmental meeting held in December 2012. ESCAP is tasked to take the lead in implementing the Plan of Action at the regional level.

Cooperation in disaster risk management has also evolved at the subregional level. In 1976, ASEAN leaders identified disaster management as one of their eight principles and objectives for cooperation. Since then progress has been steady, albeit slow.

Of note is the ASEAN Agreement on Disaster Management and Emergency Response, which came into force in December 2009. This is the world's first, and only, HFA-related binding instrument. In South Asia, SAARC at its 14th Summit adopted the 'SAARC Comprehensive Disaster Management: A Framework for Action 2006-2015'.

Integrated early warning systems

In recent years, early warning systems have become more people-centred. These rely on four inter-related elements: knowledge of risks; monitoring and warning services; dissemination and communication; and response capability. All are equally important: failure in one will result in a collapse of the entire system. All four elements are now benefiting from advances in technology and communications which are allowing people-driven forms of cooperation to transcend geographical boundaries. The ESCAP Trust Fund for Tsunami, Disaster and Climate Change Preparedness contributed to the development of an integrated regional early warning system comprising a network of collaborative centres connected to subregional and regional centres (Box VII-5).

Sharing also lowers costs – particularly for systems that address infrequent but catastrophic events, such as tsunamis. One study has concluded that if individual countries each developed their own early warning systems for tsunami warnings in the Indian Ocean this would cost around $50 million – in addition to $5 million to $10 million per year for operating multiple systems. A collective system, on the other hand, would require no more than $1.5 million operating expenditure. Moreover for a further $1 million a year this could also incorporate warnings on hydro-meteorological hazards.[15] Such a collective system, the Regional Integrated Early Warning System (RIMES) was established with the support of the Trust Fund (Box VII-6). It is now providing a range of cost-effective early warning and climate application services to members.

A more recent initiative is the Regional Cooperative Mechanism for Disaster Monitoring and Early Warning, Particularly Drought. Established under ESCAP's RESAP programme, this mechanism receives technical support from member countries in the region. While still at an early stage this should provide an information portal for national strategies and mitigation experiences. It will also serve as a technical support platform for no- or low-cost space-based products for drought analysis – and as a platform to encourage technology transfer and capacity building.

Disaster preparedness

Countries can also work together to agree on what to do when disaster strikes. ASEAN, for example, has established standard operating procedures for coordinating disaster relief and emergency responses between member countries. These systems were put to the test in May 2008 when cyclone Nargis hit Myanmar, and ASEAN was able to act as a bridge between Myanmar and the international community. In 2011, ASEAN, in order to link national disaster management agencies and provide early warnings and response, launched the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management. This came into action, for example, in July 2012 when it monitored the effects of an earthquake in Aceh, Indonesia. Search and rescue teams stood by in Jakarta and in Malaysia. Fortunately, after a few hours of monitoring, it was clear they would not be

Box VII-5

ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness

The ESCAP Multi-Donor Trust Fund for Tsunamis in the Indian Ocean and South East Asian Countries was established in 2005 through a $10 million contribution from the Government of Thailand. The overall objective was to build and enhance tsunami early warning capacities at various levels in the Indian Ocean.

The Fund helped establish RIMES, which now covers over 26 countries from the Asian and African continents, and feeds into the overall Indian Ocean Tsunami Warning and Mitigation System which went live in 2011. Under this system, Australia, India and Indonesia have been mandated by UNESCO/IOC to act as Regional Tsunami Service Providers, with the specific task of issuing tsunami warnings in the Indian Ocean. A study commissioned by ESCAP estimated that nearly 160,000 lives could have been saved had this warning system been in place on 26 December 2004. As for preventing future losses, a conservative estimate is that this system will help save about 1,000 lives every year for the next 100 years.

The scope of the Fund was later expanded to include coastal hazards and climate change preparedness. An evaluation in 2011 concluded that the Fund had made a significant contribution to the establishment of an Indian Ocean tsunami early warning system. It also reconfirmed the relevance of focusing on early warnings for coastal hazards and recommended actions to strengthen the Fund based on the comparative advantages of ESCAP.

Source: Aysan, 2011.

Box VII-6

RIMES: the cost effectiveness of regional cooperation

The Regional Integrated Multi-hazard Early Warning System (RIMES) has three characteristics that make it cost effective:

- *Economies of scale* – Countries pool their resources to monitor infrequent events. The annual recurring cost for maintaining the regional tsunami component of RIMES is about $1.5 million.

- *Multi-hazard scope* – RIMES also includes other, more common, hazards, such as floods, thunderstorms and tropical cyclones – which is attractive for countries where tsunamis are not a major concern. Integrating these services in RIMES has an added recurring cost of less than $0.5 million. Integrating such value-added and special services into the regional system also has the benefit of ensuring constant engagement of member countries.

- *Faster responses* – This makes the early warning information more effective and increases the benefits.

Source: ESCAP, based on Subbiah and others, 2010.

needed. Shortly after typhoon Bopha struck the Mindanao region of the Philippines in December 2012, the Centre launched an ASEAN Disaster Emergency Logistic System.

Knowledge sharing

Policymakers will be in a better position to integrate disaster resilience into national planning processes if they can broaden and deepen their exchange of knowledge. To assist these flows, ESCAP is collaborating with the Asian Disaster Preparedness Centre (ADPC) on the Asia-Pacific Gateway for Disaster Risk Management and Development. This web portal provides information and knowledge products that enable government ministries, as well as other institutions and the general public, to integrate DRR principles, concepts and practices into development processes (Box VII-7). As each country gains experience on disaster risk management, the Gateway platform should help accelerate the uptake of good practices.

In the Pacific, the most comprehensive information resource on disaster risk management is the Pacific Disaster Net. Established in 2008, this was developed by SOPAC, IFRC,UNDP-Pacific Centre and UN-OCHA. In South Asia, the SAARC Disaster Management Centre established the South Asia Disaster Knowledge Network in 2011 to provide a common platform and easy access to real-time disaster data from different providers using a map-based system. The network is linked to portals within and beyond the governments of the SAARC member countries.

Regional networking has also helped build resilience at the community level. The 'Making Cities Resilient Campaign', for example, has organized international city-to-city learning events to share disaster risk information. This has resulted in partnerships between Bonn in Germany and six cities: Bukhara in Uzbekistan, Chengdu in China, Cape Coast in Ghana, La Paz in Bolivia, Minsk in Belarus and

Box VII-7

The Asia-Pacific Gateway for Disaster Risk Management and Development

Launched by ESCAP in November 2010, the Asia-Pacific Gateway for Disaster Risk Management and Development is an interactive web platform that provides unprecedented opportunities to share information and knowledge products about disaster risk management (DRM) across the Asia-Pacific region. The Gateway acts as a knowledge broker that connects the various hubs of DRM knowledge in the region to develop an extensive database of policies, plans and assessments. These 'knowledge configurations' connect government ministries, particularly national development and disaster management authorities, and enable them to benefit from centralized access to hundreds of policies, strategies and studies across the Asia-Pacific region.

The Gateway is a regional initiative supported through key partnerships with the Asian Disaster Preparedness Center (ADPC), the UNISDR, the United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development, and the United Nations Office for Outer Space Affairs. The Gateway builds on existing initiatives in disaster risk management, such as ADPC's DRR Project Portal for Asia and the Pacific, and relies on the active participation of users to provide value-added content.

Ulaanbaatar in Mongolia. The common element is Bonn's challenge in dealing with flooding from the river Rhine. These cities are also cooperating on projects on climate adaptation, biodiversity and water quality.[16]

Regional risk insurance

Small developing countries, with limited budgets, cannot absorb the financial impact of natural disasters. As a result, they run into problems of short-term liquidity. Nor individually are they in a position to arrange contingency credit or arrange insurance. However, they could join regional risk insurance pools.

Small economies in the Caribbean, for example, can take advantage of the Caribbean Catastrophe Risk Insurance Facility (Box VII-8). Building on this experience, the Secretariat of the Pacific Community with the support of the World Bank in January 2013 launched the Pacific Catastrophe Risk Assessment and Financing Initiative.[17] The pilot programme, funded principally by the Government of Japan, has successfully placed catastrophe risk with four international reinsurance companies, Sompo Japan Insurance, Mitsui Sumitomo Insurance, Tokio Marine & Nichido Fire Insurance, and Swiss Re. The programme covers major tropical cyclones and earthquakes. Five Pacific island countries, namely the Marshall Islands, Samoa, Solomon Islands, Tonga and Vanuatu are participating, and coverage is expected to be $45 million. This regional mechanism could generate savings of up to 50 per cent compared to individual risk transfer solutions (Figure VII-1).

Resilient infrastructure

Natural disasters weaken or destroy critical infrastructure, and the cascading effects can produce wider systemic failures that could lead to an economic crisis. The reverse is also true: prolonged economic stagnation can result in a neglect of infrastructure. For the period 2010 to 2020, it has been estimated that the Asia-Pacific region needs to spend about $8 trillion on national infrastructure.[18]

Following the 1997 Asian financial crisis, countries that had invested in infrastructure recovered faster than others.[19] As a result, in response to the 2008 global financial crisis, many Asia-Pacific countries responded with large fiscal stimuli much of which they invested in infrastructure projects. This was partly to create income and employment through public works, but also to strengthen subregional infrastructure in anticipation of future threats and disasters.

There are also infrastructure investment funds at the subregional level. In 2010, SAARC established the SAARC Development Fund with paid-up capital of $300 million to finance infrastructure projects in energy, power, transportation, telecommunications, environment and tourism.[20] Also in 2010, ASEAN created the ASEAN Infrastructure Fund, which is co-financed by the Asian Development Bank (ADB) with major contributions from Malaysia and Indonesia; it funds many of the projects related to the Master Plan on ASEAN Connectivity. In addition, there is infrastructure investment from other, overlapping subregional groups. The Greater Mekong Subregion (GMS), for example, with support from the ADB and other donors, has targeted projects in transport, energy, telecommunications, trade, tourism, agriculture and environment worth approximately $10 billion.[21]

Many of these investments aim to create more resilient regional ICT infrastructure. ADB has

Box VII-8

The Caribbean Catastrophe Risk Insurance Facility

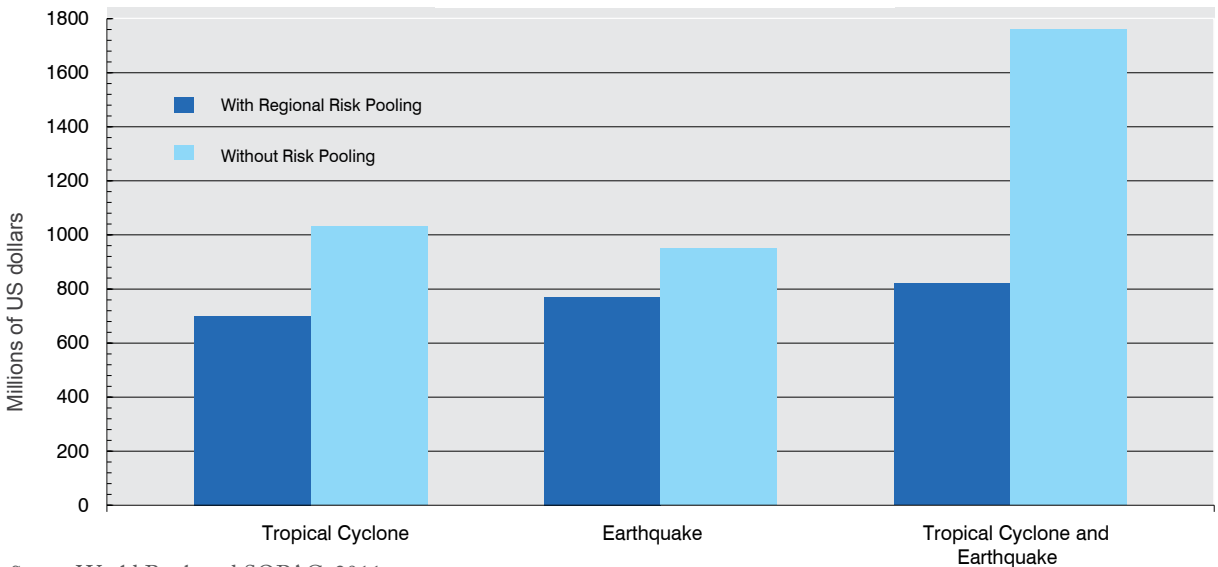
The Caribbean Catastrophe Risk Insurance Facility (CCRIF) provides participating governments of the Caribbean Community with the opportunity to purchase insurance coverage at rates 45 to 50 per cent lower than if they were to purchase insurance individually in financial markets. This is because participating countries can pool their country-specific risks into one diversified portfolio. The facility then transfers risks it cannot retain to the international financial markets through reinsurance or through other financial coverage instruments such as catastrophe bonds.

Parametric insurance products are priced for each country based on their individual risk profiles. Annual premiums typically vary from $200,000 to $4 million, for coverage ranging from $10 million to $50 million. Bermuda, Canada, France, the United Kingdom, the Caribbean Development Bank and the World Bank have pledged a total of $47 million to the CCRIF reserve fund. Participating governments contribute resources to the pool according to their respective risk exposure. With 16 governments currently members of the CCRIF, participation is regarded as high.

Source: Small Island Developing States Network, 2012.

Figure VII-1

Benefits of risk pooling in the Pacific



Source: World Bank and SOPAC, 2011.
Note: Impact on reserve requirements to sustain a 1-in-150 year disaster (earthquake, tsunami and tropical cyclone)

provided funding of $65 million for the GMS Information Superhighway Network. ADB has also approved about $16 million in grants and loans for the South Asia Subregional Economic Cooperation Information Highway initiative. This aims to improve data connectivity across Bangladesh, Bhutan, India, and Nepal and may serve as a preliminary phase for an extended SAARC information highway. Also of note, ASEAN, in its Master Plan on ASEAN Connectivity,[22] has designated the development of broadband corridors as a key component of its regional infrastructure development plan. Another regional initiative is the Trans-Eurasian Information Super Highway (TASIM) project spanning more than 20 countries between Central Asia and Europe.[23] The TASIM initiative is a collaborative project that involves a connectivity alliance led by the ITU, as well as telecom operators from the participating countries which are jointly responsible for the construction of the backbone network.

Nevertheless, many of these programmes still do not suffficiently address disaster risks and are missing opportunities to maximize resilience. Governments may therefore wish to review their policy and regulatory frameworks to ensure that disaster risk reduction is integrated into current and future infrastructure programmes.

ESCAP can also promote cooperation by building resilience into regional infrastructure initiatives. ESCAP has long taken the lead in coordinating and promoting regional infrastructure agreements, notably the Trans-Asian Railway Network and the Asian Highway Network, both of which were forged through decades of regional cooperation. A similar approach can also be taken for other critical infrastructure. To benefit from cross-sectoral and transnational synergies, however, what is needed is a regional framework that will reduce costs by sharing resources and develop infrastructure in ways that promote regional integration and long-term sustainable development. The real value of the Asian Highway Network, for example, is not so much its overall scale, but the standardization that enables traffic to move more easily across neighbouring countries.[24] Through mutuality of interests and sharing of risk, countries can now build on the Asian Highway Network and the Trans-Asian Railway Network with other forms of critical infrastructure.


ESCAP PHOTO

A REGIONAL FRAMEWORK FOR BUILDING RESILIENCE

The multiple shocks that affect the Asia-Pacific region are increasingly interconnected and converging, bringing with them complex linkages. While the region has adopted numerous multi-country mechanisms and plans of actions, for the most part they are disparate, ad hoc or event driven, and lack a region-wide coordinated approach. This calls for a new regional framework for resilience-building – one that rebalances economic, social and environmental systems. This framework, rather than addressing the consequences of recurring crises addresses the root causes. Rather than pursuing individual goals it is comprehensive – cutting across countries, sectors and institutions with coordinated regional initiatives. The framework is also inclusive – meeting the needs of the region's poorest who are often the least responsible for causing crises and disasters, but the hardest hit by them.[25]

The framework gives a central role to governments – as the planners of long-term socio-economic development. Indeed, the recurrence of shocks should be an opportunity for governments to re-enter economic, social and environmental systems and use their fiscal resources to build resilience. The key question is whether the governments of the region are willing or able to prioritize these objectives. All countries find it difficult to finance investment to protect economic activity, critical infrastructures, and their people from future shocks – whose timing, likelihood and magnitude are unknown. Furthermore, in the current climate of slow economic growth, they are likely to give priority to immediate growth-enhancing objectives, over building long-term resilience. However, coordinated policymaking at the regional level can address these very challenges. The proposed regional framework builds on the four-pronged action agenda outlined in the study entitled "Growing together: economic integration for an inclusive and sustainable Asia-Pacific Century" that was prepared for the 68th session of the Commission in 2012. The framework consists of three pillars, three enablers and one integrator, as set out below in Figure VII-2.

Pillar 1 – Coordinated investment in inclusive development

Coordinated macroeconomic policies can help move countries in Asia and the Pacific towards crisis-resilience. Macroeconomic policy coordination enhances financial sector stability by reducing the volatility of key macroeconomic variables, thereby mitigating the risk of a financial crisis. Policy coordination is also needed to minimize negative spillovers and to maximize positive spillovers, especially since shocks are multiple and business cycles are becoming increasingly coordinated. Thus, macroeconomic policy coordination can contribute to sustaining growth by reducing volatility and strengthening financial stability. Coordinated policies shore up market confidence and build overall resilience.

- *Fiscal policy* – Countries can maximise the social returns on public investment by taking advantage of regional synergies. Each country makes its own fiscal choices according to national priorities. But countries can also work together in setting regional agendas that prioritize public investments in such areas as regional infrastructure, disaster preparedness,

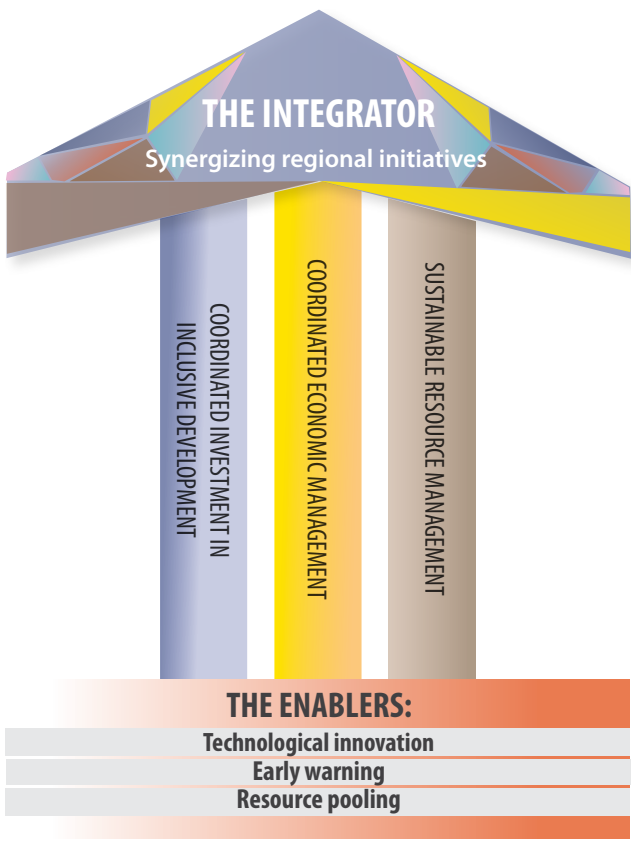
and climate change adaptation. In this way, they coordinate their long-term policy planning horizons – and strategically target their fiscal resources towards development that is based on principles of resilience-building.

- *Monetary and exchange rate policies* – Short term capital flows are often a source of financial sector fragility and financial crisis. Countries may also lose competitiveness through inflation rate differentials and serious misalignment of bilateral exchange rates. Coordination of monetary and exchange policies may thus help preventing monetary policy spillovers as well as competitive devaluations.

- *Financial policies* – Financial reform at the global level has turned out to be a long haul. Consequently, governments have been turning to multi-polar configurations, among which regional policy coordination has made significant progress. Nevertheless, the countries of the region still need to harmonize their banking and financial market regulations to prevent enterprises by-passing regulation through regulatory migration. Member States should also strengthen regional monetary and financial monitoring and surveillance, and consider establishing a regional platform that would provide a cohesive surveillance mechanism. Overall, the regional financial cooperation framework needs to be consolidated.

Figure VII-2

A regional framework for building resilience



- *Regional risk financing* – Neighbouring countries facing common hazards should consider regional cooperation in risk financing. They can thus pool resources and spread the risks across a wider group of countries. This is of particular value to small and disaster-prone countries; if they tried to obtain insurance on their own they would face exorbitant premiums. Similarly, during times of economic crisis, a coordinated regional approach could also provide emergency liquidity support and protect against sudden reversals of capital flow. National governments would then feel less pressure to build up large foreign exchange reserves.

- *Trade policy coordination* – Asia and the Pacific should also rationalize its preferential trading agreements. At present, regional trading partners belong to multiple agreements, each with their separately negotiated terms. Two initiatives that aim to be more comprehensive are the trans-Pacific Partnership led by the United States of America, and the Regional Comprehensive Economic Partnership (RCEP) led by ASEAN. RCEP should be of particular benefit to countries participating in production networks centred in China, as well as to Asian countries in that depend heavily on intraregional trade.[26]

Pillar 2 – Coordinated economic management

The second pillar of resilience-building is investment in inclusive development. Asia and the Pacific has achieved rapid growth and economic recovery but has not translated this progress into increased security of jobs and livelihoods. As a result, income inequalities are on the rise while more than 80 per cent of the region's poor are estimated to be without any basic security against the risks associated with multiple shocks. Development thus needs to be more inclusive and it should build more resilient livelihoods. Foremost, this will involve greater investment in social infrastructure – particularly in education and health services that will lead to more resilient human development.

Resilient human development also entails establishing social protection floors – not as a handout, but as investments in supporting the poor and other vulnerable groups against the risks of multiple shocks. ESCAP estimates that the costs of providing a social protection system by 2030, would range between 5 to 8 per cent of GDP per year.[27] [28] States should be able to afford this, and yet, coverage remains very low. For least developed countries and other low-income countries, the very countries that are most in need of expanding social protection programmes, this problem is not trivial. More often than not, they are also the countries with high vulnerabilities to multiple shocks with a large portion of the population vulnerable to the same risks of economic crises, natural disasters, epidemic diseases or extreme food price increases. The main disincentive in introducing a comprehensive social protection system is therefore the risk that multiple shocks will result in surges in public expenditures at the same time that revenues decline.

This wide divergence in States' "ability to pay" opens up the opportunity for a multi-country cooperative approach. A regional social protection fund based on the principles of regional solidarity in the face of multiple shocks is worth further consideration. Besides the political groundswell that builds up from regional solidarity, there are also numerous economic synergies. One need only consider how the absence of social protection and extreme vulnerabilities act as push factors for economic migration to countries that offer

better opportunities and economic security. Millions of vulnerable people often take extreme risks to flee hopeless situations and invariably fall prey to crime, trafficking and other extreme forms of exploitation. Richer countries both within the region and further afield spend millions of dollars to protect their borders. Instead they could address these problems collectively at a fraction of the costs by contributing to a regional fund for social protection that mitigates the push factors in economic migration.

Three points related to the proposed fund would need to be stressed. One is that the regional fund would complement and support current discussions underway at the global level that are spearheaded by the Special Rapporteur on the Right to Food, and supported by the United Nations Special Rapporteur for Extreme Poverty and Human Rights, among others. The global fund that has been proposed would help poorer countries to establish their social protection floors with a provision to act as a reinsurance provider if social protection systems are overwhelmed by unexpected shocks. Both global and regional solidarity are needed as they work in mutually supportive ways. Second, the existence of such a fund would not pre-empt the control of governments in the administration of their national social protection systems. Rather, it would augment a government's ability to implement national programmes in more sustainable ways. Third, numerous aspects related to the contribution scales, administration and operation of such a regional fund would need to be worked out and agreed to.

As a minimum, there should be more cooperation in the planning, coordination and tracking of such social protection systems. Drawing on global norms, the region could also develop its own norms on social protection. This would improve implementation and trigger further multiplier effects making the region as a whole more resilient. For this purpose, experiences emanating from the EU, the region that has made the most headway in coordinating social policies could be useful (Box VII-9).

More needs to be done. Asia-Pacific as the most disaster-prone as well as the most diverse region of the world could provide a leading example of regional solidarity. ESCAP stands ready to provide the platform for such a dialogue.

Pillar 3 – Sustainable resource management

Asia and the Pacific has 52 transboundary river basins covering around one third of the region's territory and population.[29] Of these basins, 14 cover between three and six countries. Governments need to strengthen existing integrated river basin management frameworks by tapping into the new dynamism of South-South cooperation. To address the water-food energy linkages, this should extend beyond existing basin-wide cooperation. Comprehensive frameworks such as those that have evolved under ASEAN and SAARC would enable regional cooperation and policy coordination. They can help countries sustainably manage shared water, energy and land resources – all of which are critical for food security.

Enabler 1 – Investing in technological innovation

Modern ICT, along with space technology applications, are providing unprecedented opportunities for building resilience. But they do not reach everyone. Governments will

therefore need to enter the scene more proactively with forward-looking visions and long-term development plans.

Governments should support the development of technological innovations that have yet to reach their peaks. This can require massive public investment in infrastructure that supports affordable, reliable and universal access to these technologies. At the same time, Governments will need to manage the overall impacts of innovation – ensuring that the benefits spread to everyone, especially vulnerable groups, while also taking measures to minimize potential risks, both for people and the environment. This will require collaboration between the public and private sectors as well as regional cooperation.

Enabler 2 – Monitoring and early warning

Governments should continue to strengthen regional monetary and financial monitoring and surveillance. The main objective would be to detect and assess the symptoms of potential crisis and make early corrective policy recommendations. The establishment of the ASEAN+3 Macroeconomic Research Office (AMRO) in Singapore in April 2011 can provide guidance on how to achieve this.
Similarly, in disaster-prone areas, governments will need to support people-centred risk knowledge, monitoring and warning services. For this they can work more effectively through regional cooperation. This would enable them to pool scientific knowledge and technical expertise and take advantage of economies of scale. Governments, development partners and donors should further strengthen and expand regional multi-hazard monitoring and early warning systems – such as the integrated regional early warning system for tsunami, coastal hazards and climate preparedness.

Enabler 3 – Pooling resources for better preparedness

Governments who are preparing their disaster responses have to acquire the necessary information and expertise. For this purpose, ESCAP could serve as a bridge – bringing together regional cooperative mechanisms that have similar expertise and mandates, such as the Typhoon Committee and the Panel on Tropical Cyclones.

Data sharing, monitoring and surveillance are not just important when disasters are underway; they are also vital beforehand. These should be continuous processes. Countries participating in cooperative mechanisms such as RESAP and Sentinel Asia, for example, can commit to providing access to near-real-time satellite data and products in support of preparedness – as well as for damage assessments and recovery planning. And collaboration in research and policy analysis needs to be strengthened by making better use of existing institutional arrangements. Governments should be prepared to undertake damage and loss assessments for resilient recovery and reconstruction planning across all sectors. Institutions need to be willing to undergo continuous reforms that make them adaptable to situations and allow for streamlined decision-making and implementation.

Supply chains could also be made more resilient by determined regional action that pulls resources for better preparedness. This could include joint supply chain risk assessments, targeted development aid and more institutionalized forms of cooperation that have more impact on the stability of global markets.

Box VII-9

Social protection coordination in the European Union

The experiences of the European Union (EU), the Nordic Council and the Nordic Centre for Welfare and Social Issues offer useful pointers and lessons in policy cooperation that economies of the Asia-Pacific region could adapt. In the EU, the open method of coordination (OMC)[30] on social protection and social inclusion provides a framework for coordinating policies between EU countries.

The OMC is a mechanism for policy areas which remain the responsibility of national governments, such as employment, health and social protection. Through the OMC, national governments establish common objectives on social protection and translate these objectives into national plans. Countries regularly report data that is used by the EU to monitor progress towards the common objectives. In this way, through commonly agreed objectives and indicators, and data that is directly comparable across the EU, the OMC aims to develop a mutual learning process that assesses the relative effectiveness of key policies or programmes at the country level.[31] Furthermore, the EC also uses the OMC framework to help countries that have applied to join the EU and would like to reform their social welfare systems.

Another example of regional cooperation in social protection is the Nordic Council, an inter-parliamentary body for welfare and social issues between Denmark, Finland, Iceland, Norway and Sweden. The Council promotes a set of common values, while recognizing that each country will have a unique social protection system, and aims to boost dialogue and cooperation within the region as well as internationally.[32]

The integrator – Synergizing regional initiatives

Having set out the three pillars and discussed the enablers of resilience-building, the final issue concerns how best to integrate the various initiatives into a comprehensive whole.

The Asia-Pacific region has a number of regional organizations and cooperative mechanisms. None of these institutions have the legal or political power to bind countries' national policies to the regional policy coordination process. For the most part, therefore, coordination consists of one, sharing the knowledge and good practices that have been developed over decades, and two, advocating for new areas of cooperation that transcend traditional areas and tackle contemporary challenges such as resilience-building.

For this purpose, ESCAP can provide a regional sharing platform for ASEAN, SAARC and other regional and subregional organizations in resilience-building. ESCAP can also provide a region-wide forum for learning in the above mentioned pillars and enablers of resilience building. This would allow member States to address the inter-linkages between the pillars. For example, through coordinated macroeconomic management, countries will be in stronger positions to enhance investments in inclusive development, in particular through the provision of social protection, as well as ensure sustainable resource management. The enablers that form the foundation strengthen the mutually reinforcing role of the pillars of resilience and in that way enable countries to reduce risks to disasters and economic crises, and address climate change concerns.

The emphasis is on softer forms of policy coordination and consensus-building. For these purposes, member States can draw upon the expertise of relevant committees in the Commission. For example, the Committee on Disaster Risk Reduction would provide the intergovernmental platform for a regional voice on global issues pertaining to disaster risk management in preparation for the post-2015 development agenda. The Committee on Macroeconomic Policy, Poverty Reduction and Inclusive Development could provide the platform for governments to build a regional voice on the ways to build on a more resilient regional macroeconomic and financial architecture. A related forum that plays a useful role is the Asia-Pacific Regional Coordination Mechanism chaired by ESCAP's Executive Secretary, in which agencies related to the United Nations could exchange views and devise coherent regional programme strategies in support of member States policymaking processes.

Notwithstanding the region's strengths, it faces considerable risks – most countries are regularly exposed to multiple shocks that could jeopardize future economic security and social progress. Countries across the region need therefore to work together to consolidate and extend their achievements – by ensuring that their economic, social and environmental systems are sufficiently robust, flexible and resilient to deal with the uncertainties of what lies ahead.

ENDNOTES

1 ESCAP, 2008.

2 ESCAP, 2009a.

3 ESCAP, 2012a.

4 Ibid.

5 Ibid.

6 Ibid.

7 Bank for International Settlements, 2008.

8 Notably, the Global Risks 2011 Report presented at the Davos Summit and the Report of the United Nations Secretary-General's High-level Panel on Global Sustainability.

9 Briones, 2011.

10 ESCAP, 2007a.

11 Jacobs, 2002.

12 UN Regional Commissions, 2011.

13 The Committee is currently composed of fourteen members: Cambodia; China; Democratic People's Republic of Korea; Hong Kong, China; Japan; Lao People's Democratic Republic; Macao, China; Malaysia; the Philippines; Republic of Korea; Singapore; Thailand; Viet Nam and the United States of America.

14 The Panel's members - Bangladesh, India, Maldives, Myanmar, Oman, Pakistan, Sri Lanka and Thailand.

15 Subbiah and others, 2008.

16 UNISDR, 2012.

17 World Bank, ADB and SOPAC, 2011.

18 ADB and ADBI, 2009.

19 Ibid.

20 ESCAP, 2012e.

21 ADB: "Greater Mekong Subregion: Overview"

[22] ASEAN, 2010.

[23] A/RES/67/195

[24] ESCAP, 2007b.

[25] ESCAP, 2013c.

[26] ESCAP, 2012b.

[27] Ten countries were analysed: Bangladesh, China, Fiji, India, Indonesia, Malaysia, the Philippines, the Russian Federation, Thailand and Turkey.

[28] ESCAP, 2013c.

[29] ESCAP, 2011d.

[30] OMC: An intergovernmental means of governance in the EU, based on the voluntary cooperation of member States to establish common objectives, guidelines and indicators in a number of policy areas.

[31] European Commission

[32] Nordic Council

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United Nations publication
Sales No.: E.13.II.F.3

ISBN 978-92-1-120656-2
e-ISBN978-92-1-056101-3
ST/ESCAP/2655

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Website: www.unescap.org

ISBN 978-92-1-120656-2

UNITED NATIONS PUBLICATION
PRINTED IN BANGKOK
APRIL 2013