

# Addressing Climate Change and Migration in Asia and the Pacific

Final Report

Asian Development Bank

# **Addressing Climate Change and Migration in Asia and the Pacific**

© 2012 Asian Development Bank

All rights reserved. Published 2012.  
Printed in the Philippines.

ISBN 978-92-9092-611-5  
Publication Stock No. RPT124478

Cataloging-In-Publication Data

Asian Development Bank  
Addressing Climate Change and Migration in Asia and the Pacific.  
Mandaluyong City, Philippines: Asian Development Bank, 2012.

1. Climate change. 2. Migration. 3. Asia and the Pacific. I. Asian Development Bank.

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

By making any designation of or reference to a particular territory or geographic area, or by using the term "country" in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

ADB encourages printing or copying information exclusively for personal and noncommercial use with proper acknowledgment of ADB. Users are restricted from reselling, redistributing, or creating derivative works for commercial purposes without the express, written consent of ADB.

Note:

In this report, "\$" refers to US dollars.

Asian Development Bank  
6 ADB Avenue, Mandaluyong City  
1550 Metro Manila, Philippines  
Tel +63 2 632 4444  
Fax +63 2 636 2444  
[www.adb.org](http://www.adb.org)

For orders, please contact:  
Department of External Relations  
Fax +63 2 636 2648  
[adbpub@adb.org](mailto:adbpub@adb.org)



# Contents

List of Tables, Figures and Boxes	v
Acknowledgments	vi
Foreword	vii
Executive Summary	viii
Introduction	1
What Climate Change Means for Migration	1
A. Human Mobility in the World's Most Populous Region	2
B. The Need for Policy Action	4
C. Structure of the Report	5
Part I Assessing the Evidence	7
1. Methodological Issues and Caveats	9
A. Definitional Issues	9
B. Limitations and Caveats of a Quantitative Analysis	10
C. Limitations of Assessing Vulnerability	11
D. Uncertainty in Local Impacts of Climate Change	12
2. Migration Patterns	13
A. Key Migration Trends and Patterns	13
B. East Asia	16
C. Southeast Asia	16
D. South Asia	16
E. Central and West Asia	17
F. The Pacific	18
3. Climate Change Impacts	19
A. East Asia	21
B. Southeast Asia	22
C. South Asia	23
D. Central and West Asia	23
E. The Pacific	23
F. Populations at Risk	24
4. How Climate Change Will Affect Migration	27
A. East Asia	27
B. Southeast Asia	29
C. South Asia	32
D. Central and West Asia	34
E. The Pacific	35
F. Resettlement as a last resort?	36
G. Migration as an Adaptation Strategy	37

Part II Addressing the Issue	39
5. Framing Climate-Induced Migration in a Development Agenda	41
A. Social Protection	41
B. Disaster Risk Management	42
C. Urban and Peri-Urban Planning	43
D. Development and Poverty Reduction Strategies	44
6. Strengthening Adaptation Through Migration	46
A. Expanding Migration Opportunities for the Poor	46
B. Housing, land, and property	48
C. Gender issues	49
D. Remittances for adaptation	50
E. Resettlement	51
7. Improving the Knowledge Base	53
A. Data Collection	53
B. Empirical research	53
C. Research Capacities	54
8. International Cooperation	55
A. Regional and International Frameworks	55
B. Bilateral Arrangements	56
C. National Responses	58
9. Funding Climate-Induced Migration	60
A. Overview of Cost and Funding Issues	60
B. Costs of Climate-Induced Migration	61
C. Funding Mechanisms and Organizations for Climate-Induced Migration	67
D. Prospects for Climate-Induced Migration Funding	70
10. Recommendations	72
A. Overarching Issues	72
B. Recommended Government Actions	72
11. Conclusion	74
Bibliography	76

# Tables, Figures and Boxes

## Tables

1	Displacement in Asia by Sudden-Onset Climate-Related and Extreme Weather Events, 2009–2011	3
2	Estimated Displacement by Climate-Related and Extreme Weather Events, 2011	3
3	Growth and Projected Growth of Asian Mega Cities, 1950–2025 (millions)	14
4	Forecasted Population at Risk from the Sea Level Rise in 2050, Top 10 Countries Globally (in million)	25

## Figure

1	Number of Natural Disasters Reported Worldwide, 1975–2010	20
2	Number of People Affected by Natural Disasters Worldwide, 1975–2010	21
3	Environmental Hot Spots in Southeast Asia	22
4	Environmental Hot Spots in South Asia	24
5	Environmental Hot Spots in Central and West Asia	25
6	Map of the Pacific	26
7	A Conceptual Framework for Climate-Induced Migration	27
8	Percentage of Population of East Asian Countries Affected by a Sea-Level Rise of 1–5 Meters	29
9	Socio-economic Vulnerability in Southeast Asia	30
10	Magnitude of Migration According to Wealth Level	47
11	How Insurance Transforms Uncertainty About a Possible Future Loss into a Fixed Up-Front Cost	63
12	How Selling Shares in a Company Transforms Uncertainty About Possible Future Losses or Gains into a Fixed Up-Front Share Price	63
13	Lost Productivity due to Forced Migration	66

## Box

1	Why ADB is interested in climate-induced migration	1
2	Disentangling climate change, environmental disruption, and other migration drivers	3
3	Examples of displacement caused by environmental events in developing Asia and the Pacific	5
4	Lowering Remittance Costs	52
5	Safeguards for Resettlement in Development Projects	52
6	The Nansen Principles	57
7	The Colombo Process	58
8	Asylum for those Displaced by Disasters	59

# Acknowledgments

This report marks the conclusion of an Asian Development Bank (ADB)-financed technical assistance project launched to generate policy responses to climate-induced migration. The report was prepared by Bart W. Édes, ADB Regional and Sustainable Development Department; François Gemenne, IDDRI – Sciences Po Paris; Jonathan Hill, Fount LLC; and Diana Reckien, formerly of the Potsdam Institute for Climate Impact Research and now with Columbia University’s Center for Research on Environmental Decisions. Robert J. Dobias, ADB’s former senior advisor on climate change, provided valuable advice. Yukiko Ito, Honey May Manzano-Guerzon, Chet Japson, and Princess Lubag helped to ensure smooth project implementation and coordination, assisted with the publication process, and organized consultative and knowledge-sharing events that generated inputs for the report. Hugh Finlay edited the document.

The report builds upon important work previously undertaken on the subject for ADB. In particular, it incorporates substantial inputs from Graeme Hugo, University of Adelaide; Douglas Bardsley, University of Adelaide; Vigya Sharma, University of Adelaide; Yan Tan, Flinders University; Martin Williams, University of Adelaide; and Richard Bedford, University of Waikato. Namrata Chindarkar, research assistant at the University of Maryland School of Public Policy, also made contributions.

During the preparation of this report, ADB worked with subject specialists and practitioners in the areas of climate change adaptation, disaster risk management, gender and development, migration, and involuntary resettlement. Their analysis and comments have helped to shape the report’s findings. Special acknowledgment goes to the International Organization for Migration, which has been a steady partner in organizing dialogues and workshops, and in sharing its extensive knowledge on the interaction between environmental factors and migration. We note in particular the contributions made to this partnership by Shahidul Haque, Dina Ionesco, Frank Laczko, and Ovais Sarmad.

Finally, John Connell and Olivia Dun of the University of Sydney complemented this report by preparing several country-specific policy briefs which take the analysis of climate-induced migration down to the national level.

# Foreword

Asia and the Pacific is burdened with a high level of exposure to risks from environmental disasters, including the risk of forced migration. Each year, large numbers of people are dislocated by extreme weather events. Such events are predicted to become more common with climate change. While many of those displaced returned to their homes as conditions improved, others were less fortunate, struggling to build new lives elsewhere after incurring substantial personal losses.

Yet forced migration due to extreme environmental events is not a foregone conclusion, at least not in all instances. The countries of Asia and the Pacific can choose to turn the threat of climate-induced migration into an opportunity to improve lives, advance the development process, and adapt to long-term environmental change by altering development patterns, strengthening disaster risk management, investing in social protection, and facilitating the movement of labor. While some actions will require regional or global action, many steps can be taken within individual countries, since migration spurred by environmental events is—and is expected to remain—primarily a domestic phenomenon.

As a part of its extensive program of work on climate change issues, the Asian Development Bank (ADB) has initiated a project to better understand how environmental events affect migration, and to elaborate responses. It is one of the first—if not the first—effort to develop policy recommendations to address the phenomenon at the regional level. This report presents the findings of the work, which has drawn upon insights and inputs from local and international researchers, specialized intergovernment agencies, and ADB member country governments. A key finding is that climate-induced migration should be seen in the context of the broader, complex dynamics of migration, and that responses should be considered as part of wider development efforts aimed at sustainably raising living standards.

In short, climate-induced migration should not be treated in isolation. This is because many of the drivers of migration are intertwined. Properly managed and supported, migration—both internal and cross-border—can often improve livelihoods, reduce poverty, meet labor force needs, bolster economies, and strengthen links between communities and countries.

The onus is on decision makers in central and subnational governments to take action, and do so urgently since environmental change is already upon us. The constructive involvement of the private sector, civil society organizations, finance institutions, and specialized international agencies is also necessary. Climate-induced migration has only recently moved up the policy agenda, but there are already many good practices and promising initiatives to draw upon. Several are highlighted in this report, such as social protection schemes that provide income to those in rural areas, international principles for managing migration caused by environmental factors, and bilateral agreements on cross-border movement of workers.

As the regional development bank for Asia and the Pacific, ADB will continue to facilitate the exchange of comparative experience, provide technical advice, and use financing mechanisms to assist its developing member countries in managing disaster risks and adapting to the challenges of climate change.

Bindu Lohani  
Vice-President for Knowledge Management and Sustainable Development  
Asian Development Bank



# Executive Summary

**T**his report marks the conclusion of an ADB-financed technical assistance project launched to generate policy responses to migration stimulated by climate-related factors. It represents the first significant effort to identify policy and other responses to impacts of environment events on human mobility within the Asia and Pacific region.

Extreme environmental events are increasingly recognized as a key driver of migration across the world. According to the Internal Displacement Monitoring Centre, more than 42 million people were displaced in Asia and the Pacific during 2010 and 2011, more than twice the population of Sri Lanka. This figure includes those displaced by storms, floods, and heat and cold waves. Still others were displaced drought and sea-level rise. Most of those compelled to leave their homes eventually returned when conditions improved, but an undetermined number became migrants, usually within their country, but also across national borders.

Asia and the Pacific is the global area **most prone to natural disasters**, both in terms of the absolute number of disasters and of populations affected. It is highly exposed to climate impacts, and is home to highly vulnerable population groups, who are disproportionately poor and marginalized. The report highlights “environmental hot spots” that are particular risk of flooding, cyclones, typhoons, and water stress.

Climate-induced migration is a highly complex issue which needs to be understood as **part of global migration dynamics**. Migration typically has multiple causes, and **environmental factors are intertwined with other social and economic factors**, which themselves can be influenced by environmental changes. Environmental migration should not be treated solely as a discrete category, set apart from other migration flows.

Countries and populations of Asia and the Pacific will be affected in different ways, leading to **various migration patterns and scenarios**. While most environmental migration will occur within countries, an increase in cross-border migration can also be expected. These migration flows are tied up with the broader trend of rapid **urbanization** in Asia and the Pacific; mega cities will struggle to accommodate additional arrivals driven primarily or in part by environmental factors.

Many deliberations around the impact of the environment on migration have focused on humanitarian assistance and legal protection, without addressing the need to **set the policy debate within a development context**. Yet climate-induced migration needs to be addressed as part of the development agenda given the major implications of migration for the sustainable economic and social development of Asia and the Pacific. The report recommends interventions both to address the situation of those who have migrated, as well as those who remain in areas subject to environmental risk.

To reduce migration compelled by worsening environmental conditions, and to strengthen resilience of at-risk communities, governments should adopt policies and commit financing to social protection, livelihoods development, basic urban infrastructure development, and disaster risk management.

Though every effort should be made to ensure that people can stay where they live, it is also important to recognize that **migration can also be a way for people to cope** with environmental changes. If properly managed, and efforts made to protect the rights of migrants, migration can provide substantial benefits to both origin and destination areas, as well as to the migrants themselves. However, migrants – particularly low-skilled ones – are among the most vulnerable people in society and are often denied basic protections and access to services.

**More targeted, policy-relevant research is needed on the interaction between the environment and migration**, both on the qualitative and on the quantitative side, and on a sex-disaggregated basis. In many countries, the capacity to undertake and analyze research must itself be strengthened. To promote these aims, ADB proposes the creation of an Asia–Pacific Migration and Environment Network.

There is **inadequate international cooperation** on migration management, despite the obvious benefits that can emerge from such cooperation. International protection frameworks need to be strengthened and enforced, with specific arrangements developed for resettlement or relocation. Promising examples from different countries highlight the gains to be achieved through improved migration management.

Finally, these and other areas for policy action will require financing. On the international level, **there already exist several funding vehicles** that can, in principle, finance activities addressing environmental migration. But for them to be effective, greater

commitment and contributions of governments around the world will be required. On the domestic level, governments need to factor in migration-related spending needs into development plans, poverty reduction strategies, and National Adaptation Programs of Action.

Private insurance and other financing tools also have a very important role to play in addressing the costs of environmental migration, but will require appropriate regulatory frameworks and consumer trust in their potential. Migrant **remittances** should be facilitated, as they can greatly reduce the financial vulnerability of families and communities living in areas subject to environmental risk.

In sum, environmental events are already causing people to move in Asia and Pacific region. By taking actions today, governments can reduce the likelihood of future humanitarian crises and maximize the possibilities that people can remain in their communities or – should deteriorating environmental conditions make that impractical – that they have the real option to relocate to a more secure place with livelihood options.



# Introduction

## What Climate Change Means for Migration

1. This report concludes an Asian Development Bank (ADB) project<sup>1</sup> initiated in 2010 to develop policy responses to climate-induced migration in Asia and the Pacific (Box 1). It is one of a series of ADB publications shedding light on the forecasted impacts of climate change on the countries and people of Asia and the Pacific. The report examines how climate change will affect migration patterns in Asia and the Pacific, and identifies various policy interventions and funding vehicles that can help manage the emerging phenomenon of climate-induced migration.

2. The displacement of people due to environmental events has received increased attention in recent years, yet much uncertainty remains about the way populations will actually react to long-term environmental change. The relationship between climate change and migration flows is often thought to be of a deterministic nature, where all populations living in regions affected by climate change would be forced to relocate. Many empirical studies show, however, that this relationship is far more complex, and is compounded by a wide range of social, economic, and political factors (Foresight 2011; Jäger et al. 2009).

3. More than two decades ago, the Intergovernmental Panel on Climate Change (IPCC) warned that “one of the gravest effects of climate change may be those on human migration” (McTegart, Sheldon, and Griffiths 1990). Today, as the effects of climate change intensify, action is needed in two different directions. Mitigation of greenhouse gases needs to remain a priority, as it is the only way the challenge of climate change can be tackled at source. At the same time, it is important to recognize that some impacts of climate change are already happening, and will become more pronounced in the future.

4. Environmental changes in general, and those associated with climate change in particular, are increasingly recognized as growing drivers of migration across the world. Because of the unavoidability of these impacts, mitigation alone will not suffice to fight climate change; it needs to be complemented by adaptation measures. Adaptation seeks to alleviate the impacts of climate change by increasing the resilience of people and communities to these impacts. Though mitigation and adaptation measures once used to be seen as two possible alternatives, it is now recognized that both will need to be implemented in order to fight climate change.

### Box 1 Why ADB is interested in climate-induced migration

The Asian Development Bank (ADB) is the regional development bank for Asia and the Pacific. Recognizing the impact that climate change will have on development efforts, ADB has undertaken considerable work on this issue. This report marks the conclusion of a project that engaged with local researchers, government officials, international experts, and policy makers on the impact of long-term environmental events on migration. It builds on knowledge gathered and generated by the project, as well as on content appearing in previous ADB reports, which are gathered on the climate change section of ADB's website for public access: <http://beta.adb.org/themes/climate-change/main>.

Climate-induced migration is emerging as a major unresolved challenge for Asia and the Pacific, and will have an impact on many development areas in which ADB is active, including disaster risk management, infrastructure investment, regional integration and cooperation, and urban development. As the region's development bank and a knowledge institution, ADB can promote understanding of this issue and contribute to solutions through financing, partnerships, and policy dialogue.

<sup>1</sup> ADB. 2009. *Technical Assistance for Policy Options to Support Climate-Induced Migration*. Manila (TA 7408–REG).

5. In Asia and the Pacific, large numbers of people are displaced every year due to floods, droughts, soil degradation, typhoons, and cyclones. Poor people suffer a disproportionate share of deaths, displacement, and damage associated with such events. Forced by poverty to inhabit the low-lying coastal deltas, river banks, flood plains, steep slopes, and degraded urban environments where the impact is most severe, they are least able to rebuild when their homes and communities are battered by extreme weather. Though the region is expected to be profoundly impacted by climate change in the coming decades, it is also expected to undergo other significant social, political, and economic transformations. Thus, migration behaviors are likely to be influenced by this wide range of transformations, ranging from climate change to cheaper travel. Public policies, including adaptation strategies and migration management, will also play a determining role in the nature and extent of the movement of people.

6. This report considers long-term environmental change as a growing driver of migration. Climate change will accentuate the impact of the environment on human displacement. Migration flows associated with the environment will be intertwined with broader migration dynamics, and therefore should not be considered in isolation. Understanding environmental migration as part of a global transformation process constitutes a major ambition of this work, as well as a necessary condition for sound migration and adaptation policies.

## A. Human Mobility in the World's Most Populous Region

7. Over the past three decades, Asia and the Pacific has undergone massive socioeconomic transformations. It is home to 4 billion people, representing about 60% of the world's population. Many countries—such as Brunei Darussalam; Hong Kong, China; the Republic of Korea; and Singapore—have enjoyed rapid economic development and are ranked amongst the countries with very high human development (Klugman 2010). However, poverty remains widespread in Asia and the Pacific, with about 1.8 billion people living on less than \$2 per day.

8. About 80 million of the estimated 200 million international migrants worldwide live in Asia and the Pacific. The Chinese diaspora globally is estimated

at 40 million–50 million, while 20 million Indians live outside of India (Wihtol de Wenden 2009). The region is characterized at the same time by important migration flows with the rest of the world, but also by an increasing mobility between Asian countries. With regard to migration within Asia, Indonesia, Philippines, and Sri Lanka are the main countries of origin, while Brunei Darussalam; Japan; Republic of Korea; Singapore; Taipei, China; and Thailand are key destinations. Although no official figures exist, it seems that internal migration has also been increasing, with a marked trend of movement from rural to urban areas.

9. Migration in Asia and the Pacific occurs for a wide variety of reasons, including labor mobility and the diversification of incomes, family (re-)unification, expectations and representations about the destination region, but also environmental changes. Climate change is expected to significantly increase the importance of environmental change. Mobility has been facilitated by the rapid expansion of mobile telephony and the internet, diaspora networks, improved transport links, and cheaper travel options.

10. Whilst United Nations (UN) estimates of international migrant numbers are around 214 million people, or 3.1% of the world's population, the 2009 Human Development Report identifies 740 million people, or almost 11.0% of the world's population, as having migrated within their own country (Klugman 2009). Some of these migrants were displaced because of environmental changes, either sudden or slow onset. In 2010–2011, more than 42 million people were displaced by sudden-onset climate-related and environmental disasters (Tables 1 and 2), far more than in any other global region (IDMC 2011). These figures are likely to grow over time as Asian coastal mega cities will endure recurrent flooding due to climate change (ADB, Japan International Cooperation Agency, and World Bank 2010).

11. At the same time, an increasing number of people are on the move because of slow-onset environmental factors, such as soil degradation or sea-level rise (Suzuki 2003, Displacement Solutions 2008). The number of these people, however, is difficult to estimate as migration decisions often depend on a wide array of migration drivers; soil degradation, for example, is usually coupled with poverty as a migration driver (Box 2). Given that climate change acts as an aggravating factor for environmental



**Table 1 Displacement in Asia by Sudden-Onset Climate-Related and Extreme Weather Events, 2009–2011**

Year	People Displaced
2009	13.2 million
2010	31.8 million
2011	10.7 million <sup>a</sup>

<sup>a</sup> Preliminary figure.

Source: Internal Displacement Monitoring Centre Preliminary Data: Disaster Induced Displacement 2011: Asia Summary.

**Table 2 Estimated Displacement by Climate-Related and Extreme Weather Events, 2011**

Region	People Displaced
East Asia	3,800,000
Southeast Asia	3,400,000
South Asia	3,500,000
Central and West Asia	9,000
<b>Total</b>	<b>10,700,000</b>

Source: Internal Displacement Monitoring Centre Preliminary Data: Disaster Induced Displacement 2011: Asia Summary.

### Box 2 Disentangling climate change, environmental disruption, and other migration drivers

Though climate-induced migration is often presented as a new, separate category of migration, this report argues that climate-induced migration needs to be seen as part of global migration dynamics. Migration is usually induced by a wide variety of drivers, amongst which climate change and environmental disruptions play an increasingly important role. Yet these factors cannot be disentangled from their socioeconomic context, and thus this report makes the case that climate-induced migration cannot be addressed separately from global migration flows.

In the case of slow-onset events, deteriorating environmental conditions will often add to other migration drivers and can be the triggering element for migration, i.e., the element that makes a household's livelihood no longer sustainable. Isolating environmental factors from other socioeconomic factors in migration decisions is often very difficult, since it is the accumulation of these factors that often prompts the migration decision. Environmental migration drivers are easier to isolate in the case of migration prompted by sudden-onset environmental changes such as natural disasters, but even in this case migration patterns are heavily determined by other factors such as poverty or education.

Finally, it is also difficult to disentangle disruptions related to climate change from other environmental changes. In the current state of science, it is extremely difficult to attribute any specific event to climate change, which is often best understood as an aggravating factor to other environmental changes.

degradation, it is expected to boost the number of people migrating because of environmental changes, both sudden and slow onset. Though the amplitude of these movements remains difficult to forecast, climate change is likely to become a major driver of migration in the 21st century.

12. According to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, the severest climate impacts in terms of numbers

of people and volume of economic assets affected will be felt in Asia and the Pacific. These include significant temperature increases, changing rainfall patterns, greater monsoon variability, sea-level rise, floods, and more intense tropical cyclones (Cruz et al. 2007). Asia and the Pacific is particularly vulnerable because of its already high degree of exposure to environmental risks, high population density (particularly along the coasts), and the high vulnerability of particular social or economic groups.

13. Within Asia and the Pacific, climate change is expected to take the heaviest toll on the Pacific, South Asia, and Southeast Asia. Globally, 8 of the 10 countries with the greatest number of people living in low-elevation coastal zones are located here. The 2011 Vulnerability Index, assembled by the risk advisory firm Maplecroft, shows that Asian and Pacific countries represent 6 out of the 10 most vulnerable countries worldwide, all ranked as countries at extreme risk. Bangladesh tops the list, followed by India (2nd), Nepal (4th), Philippines (6th), Afghanistan (8th), and Myanmar (10th).

14. One of the most striking demographic trends in Asia and the Pacific in recent decades has been an increase in the level and complexity of population mobility, against a context of increased urbanization. Existing migration corridors and channels are expected to be further used by future migrants, including those displaced by environmental disruptions. Most migration flows associated with climate change are likely to be internal migration, and the migration channels likely to be used are those that have already been used by family or community members, or those leading to places where jobs are available. As for international migration, cross-border channels associated with the existence of labor programs or family reunification schemes are likely to be the most used.

15. There are different possible responses to climate change, of which migration is one. People might choose to migrate or be forced to migrate, as they can choose to stay or find themselves unable to move. As climate change will impact on a wide range of migration drivers, research shows that it is equally likely to cause migration as it is to prevent migration (Foresight 2011). The decision to migrate or to stay will be compounded both by personal characteristics (such as age, income, and education) and obstacles and facilitators (public policies and networks). The choice of the response will greatly depend on the information that is available, in regard to both climate impacts and migration possibilities.

16. Three primary factors explain why Asia and the Pacific finds itself at the center of the discussion of climate-induced migration:

- (i) It is the region **most affected by disasters**, which is a result of the high frequency of extreme climatic events, the large populations

living in high-risk zones, and their limited ability to reduce their vulnerability. This leads to the displacement of millions of people every year, a trend that will be further reinforced by both climate change and population growth.

- (ii) The region is the **most populous** in the world, with mass movements of people spurred by growing inequalities and regional integration.
- (iii) **Climate change** is expected to take the heaviest toll in the region, exacerbating current environmental problems and stimulating a variety of economic, social, and political challenges.

## B. The Need for Policy Action

17. For these three reasons, it is expected that Asia and the Pacific will be the region where climate-induced migration will be the most significant, and needs to be addressed urgently. The policy responses and normative frameworks that address climate-induced migration remain scattered and highly inadequate. Part of this is due to the lack of reliable data about the nature and extent of population movements in general, and those related to environmental changes in particular. The very nature of migration is generally not well understood, and climate-induced migration had until recently received much less attention than economic- or conflict-induced migration. Yet these policy responses will be the key determining factor of the nature and magnitude of climate-induced migration in Asia and the Pacific.

18. Though millions of people are already displaced because of environmental disruptions (Box 3), it is likely that this trend will increase substantially in the coming decades, as a result of both climate change and population growth. Addressing this phenomenon today will minimize forced displacement and make the most of migration for development. Yet current policy responses remain inadequate, and are inadequately sustained by international cooperation. Furthermore, climate change will also impact upon existing migration patterns, affecting a wide variety of mobility processes in Asia and the Pacific. Thus, addressing climate-induced migration requires attention to the broader dynamics of mobility.

19. General mobility patterns are conditioned by rural–urban disparities in quality of life, employment

### Box 3 Examples of displacement caused by environmental events in developing Asia and the Pacific

In Papua New Guinea, sea-level rise is putting the livelihoods of many island communities at risk. In 2007, the Government of Papua New Guinea, along with the autonomous government of Bougainville, decided to resettle inhabitants from the Carteret atoll and neighboring atolls to the island of Bougainville. This case of preventive resettlement is assisted by a nongovernment organization that has been specifically formed to coordinate with local people regarding their resettlement.

In July 2010, Pakistan was affected by heavy monsoon rains, which led to massive flooding in the Indus River basin. The flood led to the displacement of more than 10 million people, with about 20% of the country under water. About 2,000 people perished in the disaster. The provision of international aid relief was widely considered as insufficient, and the floods took a very heavy toll on the country and its population, with millions of farmers housed in refugee camps, and crops and cattle destroyed.

In December 2011, Typhoon Washi ravaged the Philippines island of Mindanao and displaced more than 300,000 people, mostly in the cities of Cagayan de Oro and Iligan. Public health issues emerged as a result of the lack of adequate relocation facilities, which were urgently needed.

opportunities, and educational institutions, as well as the pace of change in social and family traditions, gender roles, and age distribution. Furthermore, increasingly globalized production and consumption cycles fuel education, earnings, and international employment aspirations. Environmental problems will act on top of these more general societal drivers of migration trends and affect migration dynamics.

## C. Structure of the Report

20. The report is divided into two parts. The first part assesses the evidence of the links between climate change and migration in Asia and the Pacific. It draws upon major studies of climate-induced migration to yield the most up to date and comprehensive assessment of the phenomenon in the world's most populous and disaster-prone region. It is the first report to provide this comprehensive regional assessment. It places climate-induced migration within the broader context of migration dynamics and provides the foundation for the second part of the report, which outlines several policy options addressing climate-induced migration in Asia and the Pacific.

21. Part I has four chapters. Chapter 1 examines the methodological issues associated with the study

of climate-induced migration in Asia and the Pacific. Chapter 2 examines the migration patterns of Asia and the Pacific, including internal migration, migration between countries of the region, and migration from and to the rest of the world. Chapter 3 reviews the different impacts of climate change that will affect Asia and the Pacific, and how these impacts interplay with other environmental disruptions. This chapter also assesses the vulnerability of the areas most at risk of climate-related hazards—the “hot spots”. Chapter 4 assesses the links that exist between climate impacts and migration in Asia and the Pacific, exploring the extent to which climate impacts induce migration, and which populations are likely to move and in what ways.

22. Part II elaborates on different kinds of policy interventions that can address the issue. First, chapter 5 makes the case for climate-induced migration to be considered within the framework of a development agenda. Chapter 6 recognizes that migration is not always a failure to adapt and outlines ways for migration to be facilitated as an adaptation strategy. Chapter 7 addresses the need for further research, in particular empirical, local, and participatory research. Chapter 8 provides some direction in order to achieve these goals. Finally, Chapter 9 outlines possible ways to fund these different policies and identifies different mechanisms that could be used to mobilize these resources.



# **Part I**

## **Assessing the Evidence**





# 1. Methodological Issues and Caveats

23. Any assessment of the impacts of climate change is compounded by a set of methodological difficulties. An initial problem lies in identifying the flows of environmental migration; so far, no agreed-upon definition has emerged to characterize these migration flows. A second problem relates to the quantitative assessment of the number of people who are on the move, or could be in the future. This problem of numbers is deeply connected with the definition: the broader the definition, the larger the numbers. To estimate future flows of migration, a vulnerability assessment is often resorted to. This assessment, however, introduces additional methodological problems, and no consensus exists on the relative weight of the different components of vulnerability. Finally, much uncertainty remains about the local impacts of climate change, and about the way these impacts will interplay with other environmental changes and socioeconomic transformations.

## A. Definitional Issues

24. Among the core issues is the definition of “environmental migration.” Despite numerous attempts and proposals, no single internationally agreed definition has emerged, and this void has led to great confusion over the terms used to describe the people displaced by environmental events. “Environmental refugees,” “ecological migrants,” “climate refugees,” or “environmentally displaced people” are all terms frequently used by scholars and the media to describe what they assume is a common reality. The definitional issue is directly linked to the conceptualization and typologies of environmental migration, its estimates and forecasts, and the policy responses aimed at addressing it. Furthermore, the debate is marked by a number of confusions over different concepts, and the term “environmental migration” has become a catch-all for different migration dynamics that often have little in common.

25. A number of reasons account for this lack of definition: the difficulty of isolating environmental factors from other drivers of migration, the absence of a legal definition, and also the confusion between forced and voluntary migration. A common assumption is that environmental disruptions trigger only forced—and often brutal—displacements, an assumption emphasized in the term “environmental refugees.” Many authors stress, however, that environmental factors also induce voluntary migration (Hugo 1996; Renaud et al. 2007; Suhrke 1994). Though the distinction between forced and voluntary migrants is to an extent blurred, it remains fundamental in migration studies and policies. For this reason, many authors have distinguished between migration, which is assumed to be voluntary, and displacement, which is forced migration (Foresight 2011).

26. Definitions and typologies do matter, and not only for the scholarly debate. Environmental migration as a social phenomenon is generally apprehended through its definition, which bears high responsibility for the development of normative framework and policy responses. Without a clear definition, it’s not possible to identify which populations are of concern and require assistance, nor can accurate estimates be made of the number of people displaced or prompted to migrate because of environmental factors. Words and typologies also matter for the populations themselves because of the images and meaning they carry: empirical studies show that many people described as environmental refugees object angrily to the use of this terminology. Thus, getting the wording right is important; in this report, “climate-induced migration” or “climate migrants” will refer to the persons or groups of persons who, for compelling reasons of climate-induced changes in the environment that adversely affect their lives or living conditions, are obliged to move from their habitual homes, or choose to do so, within their country of residence or abroad. This definition is derived from the International Organization

for Migration (IOM) working definition of environmental migration.<sup>1</sup> “Displacement” in this report refers to a situation where a person is compelled to move from their habitual home, for example due to extreme weather conditions.

## B. Limitations and Caveats of a Quantitative Analysis

27. The media has reported excitedly on reports of mass migration due to climate change. Figures ranging from tens of millions of people to 1 billion were to be found not only in headlines of the mainstream press but also in official communications and research reports. Current interest in the topic is due not only to the specific nature of these migration flows but also to their potential magnitude and impact on migrant-receiving countries.

28. Yet no consensual estimate exists, let alone a commonly agreed methodology. As a result, predictions and estimates have become one of the most contentious issues in the debates on climate-induced migration. Numerous authors have criticized the existing estimates as artificially inflated, excessively alarmist, or “guesstimates” (Kolmannskog 2008). Crisp notes that “while all of the standard works on refugees are replete with numbers, few even begin to question the source or accuracy of those statistics” (Crisp 1999). The remark applies to many works on environmental migration, as most of them reproduce previous statistics without critically assessing them (Gemenne 2011b).

29. For now, the only robust estimates of people displaced by environmental changes are those related to natural disasters. In the current state of research, it is impossible to reliably forecast—the number of people who will migrate as a result of slow-onset environmental degradation. This is due to a quadruple difficulty.

30. First, the multicausality of displacement, as well as the confusion between forced and voluntary migration, makes it difficult to identify an exact number of environmental migrants. Second, the quest for numbers is hampered by the debates about the concept and very definition of environmental migration; without a clear definition, providing accurate data

seems a daunting task. Third, as most environmental migration is internal migration, the absence of border crossing poses a further statistical problem, since counting cross-border movements is easier than counting intranational movements: “the machinery to collect data on these movements simply does not yet exist” (Brown 2008,). Fourth, as will be discussed in this report, much uncertainty remains about the actual local impacts of climate change, and about how populations will react to these changes.

31. It is possible to mitigate the impacts of climate change through adaptation strategies, and to mitigate climate change itself by reducing greenhouse gas emissions. Thus, future impacts of climate change on societies will greatly depend on future levels of greenhouse gas emissions and on the amount of funding that is allocated for the development of adaptation strategies in vulnerable regions. Put simply, future displacements depend to a large extent on what we do today.

32. The importance of time frames is also of crucial importance: do the predicted numbers describe an accumulation of migration flows over a certain period of time, or do they account for a stock of environmental migrants at a certain period of time? Are those who have been able to return home included in the predictions or not? Though these questions are of crucial importance, they are rarely addressed and fuel the suspicion that the numbers are artificially inflated.

33. Despite these difficulties, getting the numbers right is an important step towards developing adequate policies. The programming of assistance and mobilization of resources, including funding, depend on accurate numbers (Crisp 1999). In the absence of reliable statistics, numbers can be easily inflated and manipulated in order to attract attention to some populations, sometimes at the expense of other needy populations. Given these uncertainties and caveats, in the current state of science it is simply not possible to provide robust estimates and projections of the number of people displaced by climate change.

34. For this reason, vulnerability assessment is often relied upon when making an assessment of the actual and potential numbers of people migrating because of environmental changes.

<sup>1</sup> See [www.iom.int/jahia/Jahia/definitional-issues](http://www.iom.int/jahia/Jahia/definitional-issues)

Such an assessment, however, brings further methodological caveats.

## C. Limitations of Assessing Vulnerability

35. Several recent studies have attempted to conceptualize vulnerability to environmental hazards and climate change. It is found that an individual or group's vulnerability to climate change and climate-related disasters is influenced by the complex array of social, economic, political, and environmental factors operating at a variety of levels that in combination affect vulnerability (O'Brien et al. 2008). Another key learning from these studies is that vulnerability is not evenly distributed across and within countries, and some individuals, households, or groups are likely to be disproportionately affected by climate change or disasters (O'Brien et al. 2008). Even though there is no one definition of vulnerability, we can identify three main elements that constitute the conceptual framework of vulnerability—exposure, sensitivity, and adaptive capacity.<sup>2</sup> Again however, there are differences in the way these elements have been defined.

36. Adger specifically examines social vulnerability to climate change and defines it as

the exposure of groups or individuals to stress as a result of the impacts of climate change and related climate extremes... Stress encompasses disruption to groups or individuals' livelihoods and forced adaptation to the changing physical environment. Vulnerability can therefore be explained by a combination of social factors and environmental risk, where risks are those physical aspects of climate related hazards exogenous to the social system. (Adger 1999)

37. The IPCC Third Assessment Report defines vulnerability as

the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. (IPCC 2001)

38. Adger (2006) reviews the evolution of different traditions of vulnerability to environmental change and conceptualizes it as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt." Generally, vulnerability is now conceived as a combination of exposure, sensitivity, and adaptive capacity, even though the relative weight of each of these three components remains a subject of considerable debate.

### 1. Exposure

39. Adger (2006) defines exposure as "the nature and degree to which a system experiences environmental or socio-political stress. The characteristics of these stresses include their magnitude, frequency, duration, and areal extent of the hazard." Some studies merge exposure and sensitivity.

### 2. Sensitivity

40. The IPCC (2001) defines sensitivity as "the degree to which a system is affected by or responsive to climate stimuli." Adger (2006) defines it as "the degree to which a system is modified or affected by perturbations." However, some researchers choose not to distinguish between exposure and sensitivity. For example, Smit and Wandel (2006) argue that "exposure and sensitivity are almost inseparable properties of a system (or community) and are dependent on the interaction between the characteristics of the system and on the attributes of the climate stimulus."

<sup>2</sup> Hazard is similar to exposure and measures the severity, frequency, duration, and return period of the natural disaster. Vulnerability refers to the weakness or resistance of the elements at risk. With reference to impact on population, vulnerability can be measured in terms of population density; poverty profile; and number of children, women, and old people in the affected population. Capacity representation is similar to adaptive capacity and refers to the response capability in terms of institutional measures such as urban planning, expertise, and capacity of local government units; and social measures, such as education, awareness, public information, and participation

### 3. Adaptive Capacity

41. A system or community's coping capacity or capacity to respond to climate change is referred to as adaptive capacity. Adger (2006) defines adaptive capacity as "the ability of a system to evolve in order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope." The IPCC (2001) defines adaptive capacity as "the ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities or to cope with the consequences." A crucial point made by Smit and Wandel (2006), and which is particularly important when looking at climate-induced migration, is that "adaptive capacity is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time."

42. Adaptive capacity is often perceived as depending primarily upon the level of development. This view neglects other important determinants, such as social cohesion and governance (Tubiana, Gemenne, and Magnan 2010). In some situations, the ability to migrate will be part of the adaptive capacity, and migration itself will be an adaptation strategy. In other cases, arguably more frequent, migration will be the result of an adaptive capacity unable to cope with climate impacts in situ.

### D. Uncertainty in Local Impacts of Climate Change

43. Climate change will affect societies through an extensive range of impacts. The magnitude of these impacts depends, to a large extent, on the efforts currently undertaken to curb greenhouse gas emissions and to mitigate global warming. Hence, predicting these impacts, particularly on a regional level, is a daunting task, since many uncertainties remain (Barnett 2001; Webster et al. 2003). To account for these uncertainties, the IPCC has classified projections of climate change impacts into different families of scenarios, according to the various policies that could be implemented and different hypotheses about climate sensitivity.

44. Amongst these impacts, three seem most likely to have effects on migration patterns, although these effects are not certain and are highly discussed (Black, Kniveton et al. 2008; Piguet 2008):

extreme weather events, water stress and land degradation, and sea-level rise.

45. It is important to appreciate that the relationship between environmental change and migration is much more complex than an "environmental deterioration equals population displacement" nexus, which is often assumed. It is of fundamental importance to recognize that environmental change is usually not the only, or even most important, concern for migration in Asian and Pacific nations. It usually interacts with a range of other economic, social, and demographic factors. This will also be the case where the environment is affected by climate change.

46. Too often it is assumed that all environmental impacts will result in displacement or migration. In particular, for some Pacific atoll countries, the discourse on potential sea-level rise associated with climate change has focused exclusively on resettlement migration as a response, to the extent that other forms of mitigation and adaptation have been neglected (Connell 2003). This is especially the case in projecting the impacts of climate change (Black 2001). Population mobility as a response to environmental change can and does take many forms. Moreover, population mobility is often one of several mitigation and adaptation strategies adopted by communities to cope with that change. It is essential, then, that environmentally induced population mobility be seen as (i) a wide array of mobility types and not just displacement, and (ii) only one of the responses among an array of potential mitigation and adaptation strategies.

47. Furthermore, the impacts of climate change remain difficult to forecast at the local level. Current climate models can only project impacts on the global level, and downscaling remains a tricky task in the current state of science. Furthermore, climate data monitoring is often incomplete at the local level, making it difficult to assess how climate change will affect local livelihoods.

48. Taken together, these difficulties make it hard to predict with any degree of certainty the number of people who will be displaced by climate change. However, it is possible to identify the processes by which these migrations will occur, as well as the places where they are most likely to happen. This is what this report aims to do, focusing on extreme weather events, water stress and land degradation, and sea-level rise.



## 2. Migration Patterns

49. International migration to and from Asia and the Pacific has increased steadily over the past few decades as a result of globalization and widening gaps in living standards among countries and the supply and demand for labor. Relocating on a permanent or temporary basis has become an option for a majority of people living in the region. As a result, levels of mobility within and between nations have increased exponentially. Movement (both internal and international) has increasingly been directed towards urban areas, especially the largest cities.

50. One of the most striking demographic trends in recent decades in Asia and the Pacific, and one which has major implications for economic and social changes, has been an increase in the level and complexity of population mobility. Asia is currently the primary source of migration for to most of the world's immigrant-receiving countries, and represents about 30% of the world's total migrant population (Klugman 2009). There are about 80 million migrants in Asia. The People's Republic of China (PRC), India, and the Philippines are the top three migrant-sending countries, with the PRC diaspora estimated at 35 million, that of India at 20 million, and that of the Philippines at 7 million (IOM 2010).

51. Migration from the Pacific islands to Australia and New Zealand has been a repeated pattern in recent decades. Whereas earlier labor migration from Asia and the Pacific was primarily toward the Middle East, most labor migration now occurs within the region as low-skilled workers seek job opportunities in more developed or booming economies.

### A. Key Migration Trends and Patterns

52. As previously stated, climate change needs to be conceptualized in Asia and the Pacific as an additional factor in an array of existing migration drivers. It is not possible in the space available to provide a comprehensive account of contemporary migration

in the region, but it is important to establish its existing patterns before projecting the impact of climate change. The decisions of those impacted by climate change as to whether or not to move, whether to move permanently or temporarily, and to which destination will all be influenced by the existing patterns. Climate change will add an additional set of migration drivers to these existing forces shaping movement.

53. "In the coming decades climate change is most likely to exacerbate existing migration patterns more than it will create entirely new flows. This means a crude guide to the geography of future movements is present movements" (Barnett and Webber 2010).

54. While the focus of attention in the global discussion on climate change and migration has been on international migration, the fact is that most past environmentally induced migration has involved internal movement (Hugo 1996), and the majority of mobility related to climate change will also be within countries.

55. Before considering migration patterns in the different regions of Asia and the Pacific, it is worth highlighting a number of trends that are universal:

- (i) As development has increased, mobility has come within reach of most of the region's people as a strategy to adjust to changed circumstances (such as environmental) or to improve their socioeconomic position.
- (ii) Mobility of women has increased such that in many migration flows they are more numerous than men (because traditional marriage movements are increasingly supplemented by other forms of migration, such as labor migration).
- (iii) Movement (both internal and international) has increasingly been directed toward urban areas, especially the large cities.
- (iv) There has been an increase of both permanent and temporary mobility.

56. In 1950, for example, only 17% (230 million) of the population in Asia and the Pacific was urban, reaching 39% (1.5 billion) by 2005, and it is expected to reach 50% by 2025. Over the same period (1950 to 2005), the rural population more than doubled from 1.1 billion to 2.3 billion. But while the rural population is expected to peak at 2.3 billion in 2015 and thereafter begin to decline, the urban population will grow to 1.8 billion in 2015, to 2.5 billion in 2030, and to 3.2 billion in 2050.

57. Permanent resettlement from rural to urban areas has obviously been of fundamental significance, and international migration is an increasingly significant element. Less evident, however, is the large volume of circular migration and commuting from rural to urban areas. This largely involves individuals leaving their villages to work temporarily in the city, creating strong rural–urban network links.

58. A particular feature of Asian urbanization has been the emergence of mega cities—large, complex urban areas of 10 million people or more (Table 3), sometimes also called “mega urban regions” because they cover such large areas and envelop many smaller cities.

59. The UN estimates that, by 2020, 13 of the world’s 25 mega cities, most of them situated in low-lying coastal areas, will be in Asia and the Pacific. In many mega cities, more than half the population is crowded into densely populated slums that are at risk from flooding and lack basic protective infrastructure. Climate change will likely exacerbate existing pressures on key resources associated with growth, urbanization, and industrialization. Without a substantial investment in basic amenities and infrastructure in these large cities, climate change will worsen existing vulnerabilities, exposing many more people to flooding and the threat of displacement (ADB, Japan International Cooperation Agency, and World Bank 2010).

60. Yet, despite the increase in the scale of intra-national and international migration, measurement has not kept up and statistical data remain scarce. The censuses in Asian and Pacific countries generally do not detect short-distance movement, nonpermanent movement, and even much rural-urban relocation. Very few countries have the means to estimate current—let alone future—intranational migration patterns. Information on international migration is also problematic (Huguet 2008); no censuses in

**Table 3 Growth and Projected Growth of Asian Mega Cities, 1950–2025 (millions)**

1950		2000		2005		2025	
City	Population	City	Population	City	Population	City	Population
Tokyo	11.27	Tokyo	34.45	Tokyo	35.3	Tokyo	37.09
Shanghai	4.3	Mumbai	16.09	Mumbai	18.2	Delhi	28.57
		Shanghai	13.22	Delhi	15.1	Mumbai	25.81
		Kolkata	13.06	Shanghai	14.5	Dhaka	20.94
				Kolkata	14.3	Kolkata	20.11
				Dhaka	12.6	Shanghai	20.02
				Karachi	11.6	Karachi	18.73
				Osaka-Kobe	11.3	Beijing	15.02
						Manila	14.92
						Osaka-Kobe	11.37
						Shenzhen	11.15
						Guangzhou	10.96
						Jakarta	10.85
						Lahore	10.31

Source: United Nations. *World Population Prospects: The 2009 Revision*. United Nations, Department of Economic and Social Affairs, Population Division. <http://esa.un.org/unpd/wup/index.htm> (accessed 23 February 2012).

the region contain a direct question on emigration. Similarly, border control statistics are not terribly reliable (Hugo 2006). The current information does not provide the basis for realistic projections of future international mobility levels. Again, a major problem is the failure to detect nonpermanent flows.

61. Despite this lack of statistical data, several key points need to be noted:

- (i) As stated earlier, the massive growth in mega cities in coastal areas significantly increases the population exposed to the risks posed by climate change. This is of particular importance where high-risk areas have experienced high levels of damage. Because damage exerts post-disaster employment opportunities, there is the great risk of higher migration rates in cities that are often damaged than in cities that are less affected. People are likely to move to places of high vulnerability, not only away from them (Foresight 2011).
- (ii) Temporary, cyclical, and permanent rural–urban flows are creating strong rural–urban links. Across Asia and the Pacific, such migration is generated by real and perceived inequality of opportunity, and increasing impoverishment in rural areas. In contrast to East and Southeast Asia, urbanization in Central and South Asia is still relatively low, meaning there is still considerable scope for it.
- (iii) Similarly, for many populations, large international diasporas establish networks and contacts for future mobility.
- (iv) Most rural frontiers that might have settled large numbers of new migrants have already been settled in Asia and the Pacific. People instead are increasingly settling in areas exposed to significant environmental risks such as storm surges, floods, and droughts.
- (v) Conflict has periodically been an important cause of population movement, but movements have been primarily contained within Asia and the Pacific. Where refugee migration has been established, people primarily move along corridors established by original refugee flows.
- (vi) Many countries in Asia and the Pacific are highly dependent on remittances.

62. As mentioned, migration is driven by a wide array of factors, including labor market

segmentation, which induces labor migration. Most labor migration within Asia and the Pacific is intended as temporary by both the sending and host countries, but a large number of temporary migrants have stayed for much longer in many receiving countries in the region. The proportion of female labor migrants in Asia and the Pacific has been increasing and women constitute a majority of the migrants officially deployed from some countries. Migration may empower both female migrants and those women who stay home when male family members migrate. The demand for workers in the oil-rich countries in the Middle East in the 1970s started large-scale labor migration from and within Asia and the Pacific. During this decade, migration mostly involved men. Receiving countries adopted the strictly temporary and limited contract migration policy. Initially, migrant workers were mainly from India and Pakistan.

63. In the 1980s, workers from Indonesia, Philippines, Republic of Korea, Sri Lanka, and Thailand were also migrating to other lands to seek employment. In the same decade, as the construction sector was winding down, other workers—especially domestic household helpers—contributed to the feminization of migration in Asia and the Pacific; most domestic workers came from Indonesia and Sri Lanka. In the 1980s, the newly industrialized countries and areas in East and Southeast Asia became the new destinations of migration; Malaysia and Thailand are both origin and receiving countries of migration workers. The demand for domestic workers in East and Southeast Asian countries further increased the feminization of migration. Migration workers are mainly from Indonesia, the PRC, Philippines, and South Asia. While labor migration in Asia and the Pacific involves primarily low-skilled workers, a small proportion of labor flows includes highly skilled and professional people, including intracompany transfers, information technology workers, nurses and health care workers, teachers, architects, and managers.

64. Other driving forces for migration include a highly developed migration industry that generates important remittances. The World Bank forecasts that remittance flows to East Asia and the Pacific will reach \$109 billion in 2012 (up from \$85 billion in 2008), while South Asia is forecasted to receive \$97 billion (up from \$72 billion in 2008). In 2011, six of the top eight remittance-receiving nations of the world were in Asia: India (\$58 billion),

PRC (\$57 billion), Philippines (\$23 billion), Pakistan (\$12 billion), Bangladesh (\$12 billion), and Viet Nam (\$9 billion) (World Bank 2011b).

65. Environmental factors are already an increasingly important migration driver in many countries of Asia and the Pacific, including Bangladesh, the PRC, Pakistan, Papua New Guinea, Philippines, and Viet Nam. Floods, cyclones, and desertification have led in recent years to significant population movements, mostly from rural to urban areas.

66. Finally, large infrastructure development projects are also a major factor in forced migration in Asia and the Pacific. Though not yet related to climate change, these projects induce radical environmental disruptions and are sometimes assimilated to environmental factors of migration. Major development projects involve the permanent displacement of large numbers of predominantly rural people, a factor anticipated to be one of the major impacts of climate change on migration. Such “mega projects”, especially dam construction, have become common, especially in less-developed countries where there are escalating demands for electricity and water associated with rapid urbanization (Cernea 1990).

67. The following section address migration in different regions of Asia and the Pacific.

## B. East Asia

68. In East Asia, rapid economic growth, especially in the PRC, over the last two decades has resulted in a massive increase in individual mobility. The annual increase in the number of PRC nationals traveling to foreign countries indicates a new era of personal mobility.

69. That said, most population mobility in the PRC, as elsewhere, is intranational. The All China Federation of Trade Unions reported in October 2008 that 210 million of 900 million rural registered people in the PRC were rural–urban migrants.

70. Neighboring Mongolia has been experiencing a rapid increase in mobility as it moves from a centrally planned economy to a market-driven one. There is an increasing flow of migrant workers from Mongolia to the Republic of Korea and Kazakhstan, and rapid urbanization is occurring within the

country. The other economies of East Asia are high-income migrant destinations, although the Republic of Korea and Taipei, China are also important sources of skilled migrants to OECD member countries.

## C. Southeast Asia

71. In Southeast Asia migration is also diverse, with several net immigration countries (Brunei Darussalam, Malaysia, Singapore, and Thailand) but also some of the world’s major emigration nations (Indonesia, Philippines, and Viet Nam). The dominant mode of movement is temporary and largely involves low-skilled workers; the Philippines is one of the world’s major origins of temporary and permanent migrants. Filipinos are present in significant numbers in many countries around the world and represent a substantial network of links. There is also increasingly significant permanent migration of skilled workers to OECD member countries.

72. Looking at intranational migration, the increasing ease of mobility has also become a factor in Southeast Asia, although there are no comprehensive and accurate data to quantify the changes. Indonesia provides a useful case study where even the most casual observer will have noticed a great increase in individual mobility over recent decades. At each census, the proportion of Indonesians who have lived in a different province increases. But mobility is predominantly intraprovincial and non-permanent and, hence, is undetected by the census.

73. At any rate, the key intranational population movement in Southeast Asia is the permanent and circular migration directed from rural to urban areas. As in East and South Asia, these data underestimate the urbanization process since there is substantial circular migration and commuting from rural to urban areas.

## D. South Asia

74. With its vast population, South Asia has become an important source region of migrants to other parts of Asia and the Pacific and the world. The Indian and Pakistani diasporas are among the largest and most extensive in the world, and Bangladesh, India, Nepal, Pakistan, and Sri Lanka are some of the major origins of temporary unskilled labor for the Middle East and elsewhere. Similarly, skilled migration

from these countries, especially India, to OECD member countries has accelerated in recent years. There are also substantial flows between the countries of the region, in particular from Bangladesh to India and especially to the far eastern Indian states of West Bengal and Assam. Indeed, it has been suggested that this is the largest single international migration flow, with more people involved than estimated for top-ranked Mexico–United States migration flows.

75. Intranational migration is dominant in South Asia, amid rapid urbanization, although urbanization remains relatively low and the majority of people in most countries still live in rural areas. There is, however, increasing temporary, circular migration between rural and urban areas. Dyson, Cassen, and Visaria (2005), for example, have shown in India that the low level of urbanization is in fact misleading, since many rural populations are dependent on sending family members to work in urban areas. Nevertheless, there is a clear difference compared to East and Southeast Asia, leaving considerable scope for further rural–urban migration. The movement of forced migrants and refugees, meanwhile, remains a strong form of migration. It is apparent that refugee migration and other forms of movement have continued to move along the corridors set up by original refugee flows.

76. Migration in Nepal's Himalaya is a highly gendered process. For the most part, men leave their villages and families and women stay behind. In some areas, up to 40% of men are absent. This leads to feminization of mountain economies, with women responsible for most economic activities, as well as for their households (ICIMOD 2011).

## E. Central and West Asia

77. Central and West Asia as a whole is prone to important migration movements, both international and intranational. Its current demographic composition has been heavily impacted by international migration; after the collapse of the Union of Soviet Socialist Republics (USSR), many Central Asians returned home, while ethnic Russians fled to Russian Federation. The civil unrest and conflicts that followed the collapse in some regions also induced flows of refugees. Migration today plays an important role in the development of the region, notably through remittances. The Kyrgyz Republic and Tajikistan have both adopted the 1990 International

Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families, while Kazakhstan is considering ratification. Labor migration is widely acknowledged as a positive factor for development for the whole region.

78. Data on internal movements are scarce but the role of these migration flows should not be underestimated; a study commissioned by the IOM in 2005 found that internal displacements were very important in Central Asia (IOM 2005). It is estimated that about half of the total migrant population has moved internally.

79. Among internal migrants, different empirical studies, including those from the EACH-FOR project, show that a significant share of migrants move due to environmental reasons (Jäger et al. 2009). Those reasons included mudslides and landslides, floods, hazardous waste, and desertification (particularly around the Aral Sea). The UN High Commissioner for Refugees (UNHCR) estimates that about 250,000 people have been forced to leave their homes in the region because of environmental disasters. Sulaimanova mentions the following examples:

over 100,000 persons were displaced during the 1980s and 1990s because of the environmental disaster in the Aral Sea region. In addition, over 161,000 persons were forced to leave the Semipalatinsk area, a nuclear testing site. In Kyrgyz Republic, at least 17,000 people had to migrate between 1992 and 1997 because of landslides, mudflows, floods and earthquakes. (Sulaimanova 2004)

80. If one looks at the historical development of international migration patterns, three different phases can be distinguished: a phase where political motivations were predominant, after the collapse of the USSR and the civil unrest that followed; then a phase where economic motives were predominant, with many looking for better job opportunities in Russian Federation, Germany, and increasingly in the United States; and finally a phase where the motivations were increasingly of an environmental nature, this phase being associated with intranational migration.

81. Finally, it should also be mentioned that Central Asia is also increasingly a region of



transit migration, with migrants from Asia en route to Europe or the United States.

## F. The Pacific

82. The Pacific differs massively from the previous regions. Apart from Papua New Guinea, the region comprises a number of island or atoll countries of comparatively small populations. More than 15 years ago, Connell and Brown (1995) recognized several elements characterizing migration in the Pacific region, including movement away from small remote islands, movement down mountains to more accessible coastal locations, urbanization, and international migration, especially to the cities of Australia and New Zealand. This last pattern still partly holds, but international migration has become more substantial and more diversified, while Australia has assumed much greater importance as a destination.

83. Connell and Brown also noted considerable variation among the parts of Pacific, not only in the levels and types of labor mobility but also in the drivers of movement. Hence, there are intraregional differences in the level of access to outside work and residence opportunities between countries and groups in the Pacific. Bedford and Hugo (2008) show that the three subregions of the Pacific—Melanesia, Micronesia, and Polynesia—have become associated with different stories of migration:

- (i) **Melanesia:** Fiji, New Caledonia, Papua New Guinea, Solomon Islands, and Vanuatu, and have 85% of the region's approximately 10 million people. The first three countries have very limited outlets for migration but Fiji has a substantial diaspora.
- (ii) **Micronesia:** Kiribati and Nauru have strong links to Australia and New Zealand, and the

remainder of Micronesia has strong links to the United States.

- (iii) **Polynesia:** This part of the Pacific has strong links to New Zealand and also, in some cases, to North America.

84. Bedford (2005) has shown that the populations of each of the three Pacific subregions will increase significantly over the coming decades, but in Melanesia there will be an explosion of growth. Several commentators have also pointed to the importance of youth in those population increases. In the three subregions, the 15–24 age group made up around 19% of the population, compared with 14% in Australia and New Zealand. The potential for economic development within Pacific countries varies but migration has become a significant contributor with the so-called MIRAB (migration, remittances, aid, and bureaucracies) countries (Bertram and Watters 1985). While all economies in the region do not fall into this category, it is the case for at least half of them. Therefore, the extent to which Pacific island countries have access to migration outlets for their growing populations varies considerably. The Pacific region, it should be noted, is very dependent on remittances.

85. The bulk of emigration from the Pacific region has involved permanent resettlement abroad. From the perspective of development, and the climate change and migration concerns of this study, the size of the diaspora of Pacific island communities is important. People of the diaspora send remittances home and assist development in other ways. The diaspora can also serve to anchor future generations of migrants, with information and assistance. While there is a focus on international migration in the Pacific region, considerable movement within countries is also taking place. Rural–urban migration is particularly strong among young adults.

### 3. Climate Change Impacts

86. Asia and the Pacific is one of the global regions projected to be most impacted by climate change. Bangladesh, the Maldives, and Tuvalu have come to epitomize the threat of climate change to local populations. These populations are sometimes portrayed as “canaries in the coal mine”—the first witnesses of climate change, alerting the rest of the world of the humanitarian catastrophe to come. Such portrayal, however, confuses exposure and vulnerability.

87. The fact remains that Asia and the Pacific will be greatly impacted by climate change, partly because of its high exposure to climate impacts and partly because of the great vulnerability of some areas. As for the impacts, the IPCC projects a significant acceleration of warming over that observed in the 20th century.

This warming will be least rapid in Southeast Asia, but stronger in South and East Asia, and stronger in the inner parts of Asia, especially in North Asia.

It is projected that most of the region will experience an annual increase in precipitation, especially in North and East Asia. An exception is Central and West Asia, where precipitation is expected to decrease, particularly in winter, and where the frequency of very dry springs, summers and autumns might increase.

South Asia, East Asia and Southeast Asia will also very likely experience an increase in the occurrence of extreme weather events, such as heat waves and flash floods, as well as a 10–20% increase in tropical cyclone intensities. Sea-level rise should also be greater than average in the region, at about 3 mm/year. (Cruz et al. 2007)

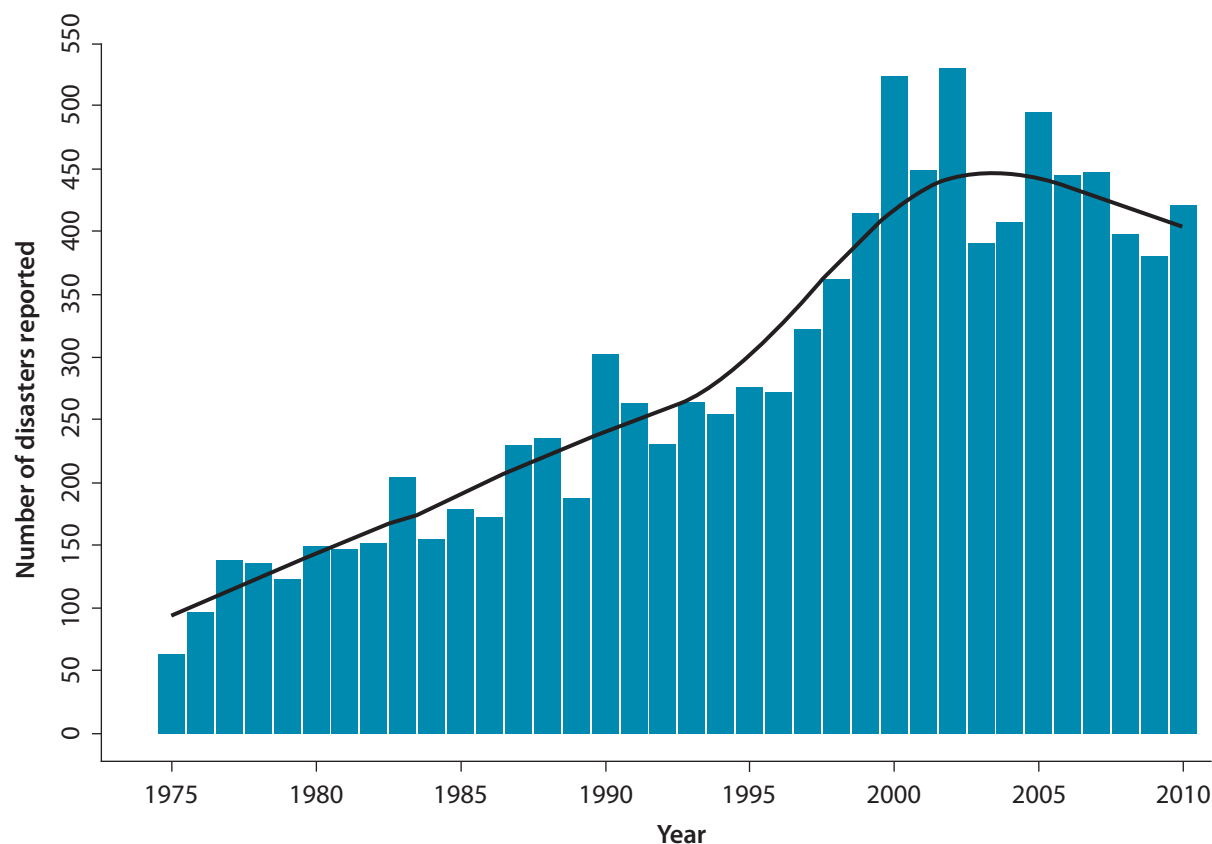
88. Among the impacts of these changes is a possibly significant decrease in cereal production,

though there will be regional differences in maize, wheat, and rice yields. A northwards shift of the arable lands is also likely; currently a large share of the region’s arable lands are put to use. Livestock, fisheries, water resources, and food supply could also be significantly reduced.

89. The different socioeconomic impacts of climate change could influence migration patterns in different ways. The IPCC notes that migration accounts for 64% of urban growth in Asia, even though the figures that it provides for international migration in the region are widely underestimated (Cruz et al. 2007). In its Fourth Assessment Report, the IPCC states the following:

Climate-related disruptions of human populations and consequent migrations can be expected over the coming decades. Such climate-induced movements can have effects in source areas, along migration routes and in the receiving areas, often well beyond national borders. Periods when precipitation shortfalls coincide with adverse economic conditions for farmers (such as low crop prices) would be those most likely to lead to sudden spikes in rural-to-urban migration levels in [the] PRC and India. Climatic changes in Pakistan and Bangladesh would likely exacerbate present environmental conditions that give rise to land degradation, shortfalls in food production, rural poverty and urban unrest. Circular migration patterns, such as those punctuated by shocks of migrants following extreme weather events, could be expected. Such changes would likely affect not only internal migration patterns, but also migration movements to other western countries. (Cruz et al. 2007)

90. Asia and the Pacific is also the global region most prone to disasters. Since the start of systematic monitoring of disasters in the 1950s, the number

**Figure 1** Number of Natural Disasters Reported Worldwide, 1975–2010

Source: Emergency Events Database (EM-DAT), Office of U.S. Foreign Disaster Assistance (OFDA)/ WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED). International Disaster Database. [www.emdat.be/natural-disasters-trends](http://www.emdat.be/natural-disasters-trends) (accessed 21 February 2012).

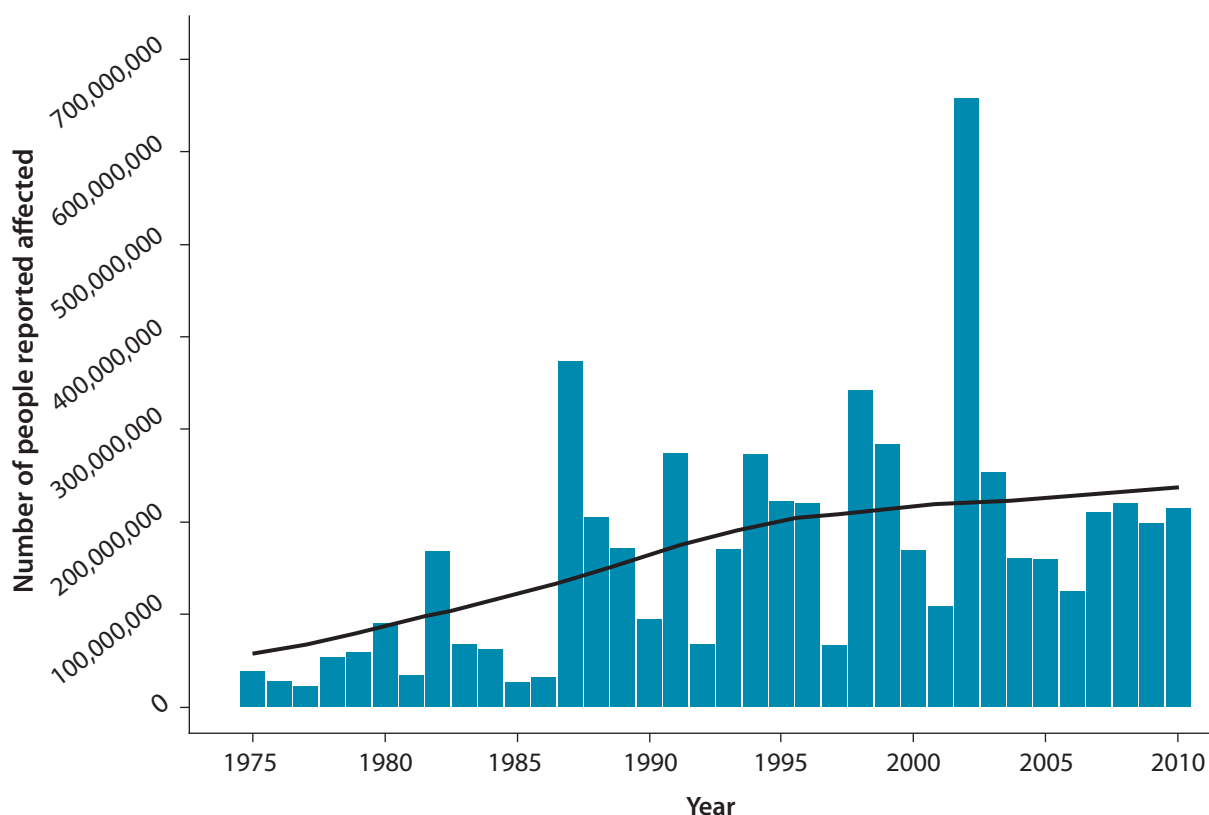
of disasters reported worldwide has been steadily growing (Figure 1), which could also be the result of better reporting. The number of people killed in disasters has been steadily decreasing since the mid-1970s, while the number of affected people has been on the rise (Figure 2).<sup>3</sup> Climate change is expected to increase both the number and intensity of natural disasters, especially floods, storms, and heat waves.

91. According to the EM-DAT Emergency Events Database, an annual average of more than 200 million people were affected (90% of world total) and more than 70,000 people killed (65% of world total) by natural disasters in Asia and the Pacific between 2001 and 2010. The two areas most affected were (i) East and Northeast Asia, and (ii) South and Southwest Asia. The share of the population

affected among the total population was highest in Northeast Asia (86 out of 1,000), compared to 3 out of 1,000 in Central Asia, and in the Pacific. In Southeast Asia, many more people died as a result of natural disasters between 2001 and 2010 than during the previous decade. This was primarily due to two extreme events: the Indian Ocean earthquake and tsunami of late 2004 (which killed far more people in Indonesia than all other affected countries combined), and Cyclone Nargis in Myanmar in 2008 (United Nations Economic and Social Commission for Asia and the Pacific 2011).

92. It's likely this situation will be considerably aggravated by climate change. Four environmental disruptions induced by climate change are of particular concern in Asia and the Pacific: sea-level rise and storm surge, cyclones and typhoons, riparian

<sup>3</sup> Affected people are defined as those requiring assistance during a disaster, including people displaced and evacuated.

**Figure 2** Number of People Affected by Natural Disasters Worldwide, 1975–2010

Source: Emergency Events Database (EM-DAT), Office of U.S. Foreign Disaster Assistance (OFDA)/ WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED). International Disaster Database. [www.emdat.be/natural-disasters-trends](http://www.emdat.be/natural-disasters-trends) (accessed 21 February 2012).

flooding, and water stress. The following sections detail these impacts in each of the regions. In addition, Figures 3–6 identify the hot spots likely to be affected by these impacts in different parts of the region.

## A. East Asia

93. The PRC experiences significant impacts from environmental hazards, largely associated with flooding in densely populated plains regions. The country has many people living in its low-elevation coastal zone that is likely to be affected by sea-level rise, especially when associated with the combined risk of cyclonic activity. The northeast plains are seen as being vulnerable, as are coastal cities such as Guangzhou, Haikou, Shanghai, Shenzhen, and Tianjin. Similarly, the densely populated areas of Seoul in the Republic of Korea and southern Honshu in Japan will be at risk due to sea-level rise. Flood

risk is already a major problem along many rivers in the PRC, but especially in the highly populated areas of the Yangtze (Changjiang) River, Lower Yellow (Huanghe) River, and Pearl River basins, and this could increase with more significant rainfall events in central PRC (Hai-Lun and Kang 2001). Landslide risk will increase in association with flood risk in steep terrain, particularly in the Himalaya.

94. The sustainability of natural resource management has already been brought into question in many parts of Northeast Asia due to high population densities. Whereas the water resource availability in northern PRC is currently a significant environmental management problem, projections of increased rainfall may tend to reduce the risk (Arnell 2004; Nohara et al. 2006). Counter to this, projections of glacial melting in the headwaters of the major rivers of the PRC could create a situation of greater intra-annual variability in flow regimes (Vörösmarty et al. 2000). The melting of glaciers and permafrost in the Xizang Autonomous

Region and the northwestern part of the country could lead to increased local landslide activity.

95. In addition, coastal areas of Taipei, China; Hong Kong, China; and Republic of Korea are also expected to be affected by coastal inundation due to sea-level rise. The deltas of the Yellow, Yangtze, and Pearl rivers are also identified as being vulnerable to sea-level rise. Riparian flooding along these rivers is expected to increase due to increased precipitation in the area. Mega cities at high risk due to sea-level rise include Guangzhou in the PRC, Seoul in the Republic of Korea, and Osaka and Nagoya in Japan.

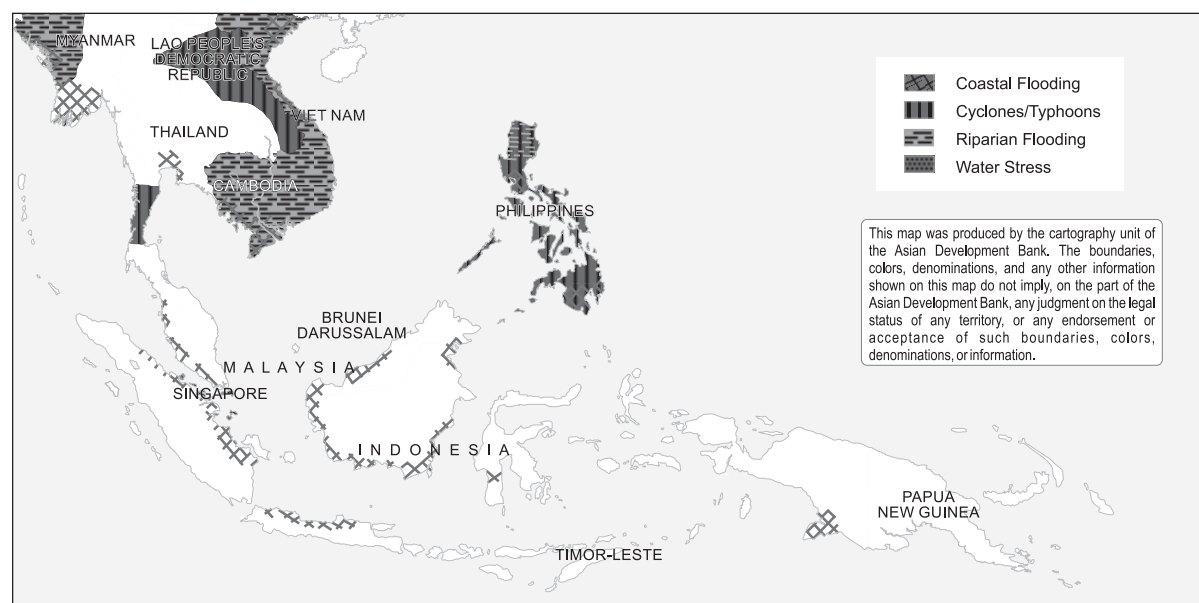
## B. Southeast Asia

96. Environmental hazards resulting from sea-level rise and associated storm surges will be a great concern for low-lying regions in Southeast Asia (Yusuf and Francisco 2009). Areas identified as being highly vulnerable include the Mekong, Red, and

Irrawaddy river deltas, which already experience regular cyclonic activity. Several major cities situated at or close to sea level in the region—including Bangkok, Ho Chi Minh City, Jakarta, and Manila—are all likely to be affected as seas rise and populations increase. As witnessed during the 2011 monsoon season in Thailand, Bangkok and environs are susceptible to coastal and riparian flooding. Flooding in coastal regions is generally most intense when storm surges are associated with high river flows.

97. Significant flooding is expected along major river systems, including the Chao Phraya Irrawaddy, Mekong, Salween, and Red rivers. Local flooding on islands such as Java, Sumatra, and the Philippines archipelago is projected to become more frequent with increasing extreme precipitation events. Cyclonic activity is already significant, particularly in the Lao People's Democratic Republic (Lao PDR), Philippines, and Viet Nam, and the intensity of this hazard may increase. The quality of water supplies in delta regions is projected to be significantly affected by the combined impacts of sea-level rise

**Figure 3 Environmental Hot Spots in Southeast Asia**



Source: National Centre for Social Applications of Geographic Information Systems, University of Adelaide, from multiple sources.

and reduced flows in some river systems during the winter months. Figure 6 highlights hot spots in Southeast Asia.

### C. South Asia

98. Environmental harm due to sea-level rise in association with storm surge impacts will be significant in both the Bay of Bengal and the Arabian Sea, where cyclonic activity is projected to intensify. The delta areas of the Ganges-Brahmaputra, Godavari, Indus, Krishna, and Mahanadi rivers also experience cyclonic activity and these rivers are likely to flood more often with increased monsoonal activity. The hazard of coastal flooding is likely to be significantly increased in Bangladesh, in India in West Bengal and along the coast south to Chennai, and along a coastal strip from Karachi to Mumbai.

99. In association with an intensification of the monsoon, river and local flooding will be increased in many areas—the Himalaya, northern Pakistan, northern India, Nepal, and Bangladesh. Landslide risk will increase in association with flood risk in steep terrain, particularly in the Himalaya. Nepal's mid hill ecological region is susceptible to landslide and erosion. Some pocket areas of the midwest to east regions of Nepal suffer from water stress.

100. In a manner similar to parts of Southeast Asia, the population densities of some parts of South Asia are so high and directly dependent on intensive cropping systems that changing precipitation regimes are likely to impact significantly on the viability of food supplies, especially in parts of northwest India. Water stress in relation to access to nonpolluted fresh water is already a significant problem across large parts of South Asia, and these risks could be increased with more variable rainfall, particularly in winter (Vörösmarty et al. 2000). The Ganges and Indus rivers have significant salt-water intrusion and, with decreases in winter flows, the problems in these systems could become more significant. Similarly, projected drying to the west of the Himalaya could increase water stress in parts of the Indus valley.

101. Several mega cities of South Asia—such as Dhaka in Bangladesh; and Kolkata, Mumbai, and Chennai in India—are at high risk of sea-level rise, prolonged cyclonic activity, and greater salt-water

intrusion, which is likely to affect a large number of people due to high population density and poor urban planning. Salinity ingress due to sea-level rise is becoming a major climate episode in some parts of Bangladesh. Figure 4 shows environmental hot spots in South Asia.

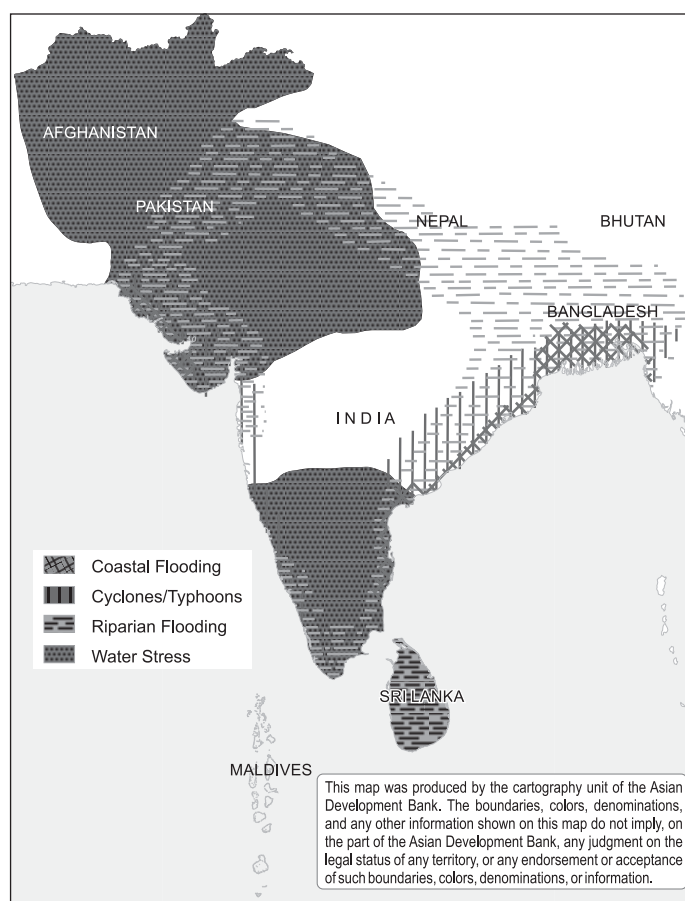
### D. Central and West Asia

102. Environmental hazards in the form of droughts are already a serious problem in Central and West Asia. The challenge of drought and longer-term natural resource management are likely to be exacerbated due to a projected drying trend across areas that are already in many cases semi-arid or arid (Arnell 2004). The implications for reduced quantity and quality of water resources could be significant as a result, as could be the impact on food production (Vörösmarty et al. 2000; Nohara et al. 2006). As Thomas (2008) suggests, however, changes in agricultural practices could significantly buffer the potential decline in crop yields resulting from climate change.

103. Widespread salinization, land degradation, water stress, and desertification are expected to affect many parts of Central and West Asia. Significant environmental changes have already occurred due to the shrinking of the Aral Sea and the decline of two most significant feeder rivers—the Amu Darya and Syr Darya. Increased cyclonic activity is expected to affect southern Pakistan. The mega city of Karachi in Pakistan is at high risk from sea-level rise, prolonged cyclonic activity, and greater salt-water intrusion. Figure 5 identifies the hot spots in Central and West Asia.

### E. The Pacific

104. One of the most discussed and analyzed climate change impacts has been that of sea-level rise on small island states. Projections suggest that low-lying islands and islands that are highly dependent on coastal areas are going to be highly vulnerable to the impacts of sea-level rise (Klein and Nicholls 1999). The impacts on coastal regions are likely to be exacerbated by an increase in the number of high-intensity cyclones and associated storm surges. South Pacific islands already experience relatively short recurrence intervals for cyclones of lower-to-middle intensity, but with warmer seas

**Figure 4 Environmental Hot Spots in South Asia**

Source: National Centre for Social Applications of Geographic Information Systems, University of Adelaide, from multiple sources.

more intense systems could become more frequent. There is also likely to be a drying trend across the southwestern part of the Pacific, if the La Niña phase of the Southern Oscillation becomes more dominant (as projected), which will significantly impact on natural resource management in the South Pacific (Preston et al. 2006). Thus, freshwater resources on small islands, many of which are dependent on the positive pressure of freshwater lenses to ensure that salinity does not influence groundwater resources, could also be highly problematic.

105. Kiribati, the Republic of the Marshall Islands, and Tuvalu consist of atolls, making them particularly at risk to sea-level rise. Papua New Guinea, the region's largest country, is expected to experience greater risk from flash flooding and landslides across the highlands and coastal flooding along the south coast. Figure 6 shows these and other islands.

## F. Populations at Risk

106. Eight of the top 10 countries in the world that are home to the greatest number of people living on low-elevation coastal zones are in Asia and the Pacific. Table 4 summarizes the population affected in low-elevation coastal zones as a percentage of the total in each country. Among all countries in Asia and the Pacific, Bangladesh and Viet Nam are at the highest risk, with nearly half of their total populations living in low-elevation coastal zones.

107. Whether and how each country copes with climate change, and whether migration will be a leading response to climate change, will depend on both vulnerability and adaptive capacity. The next section briefly reviews these concepts, and existing vulnerability assessment frameworks. It also examines the processes through which climate change can affect migration.



**Figure 5 Environmental Hot Spots in Central and West Asia**

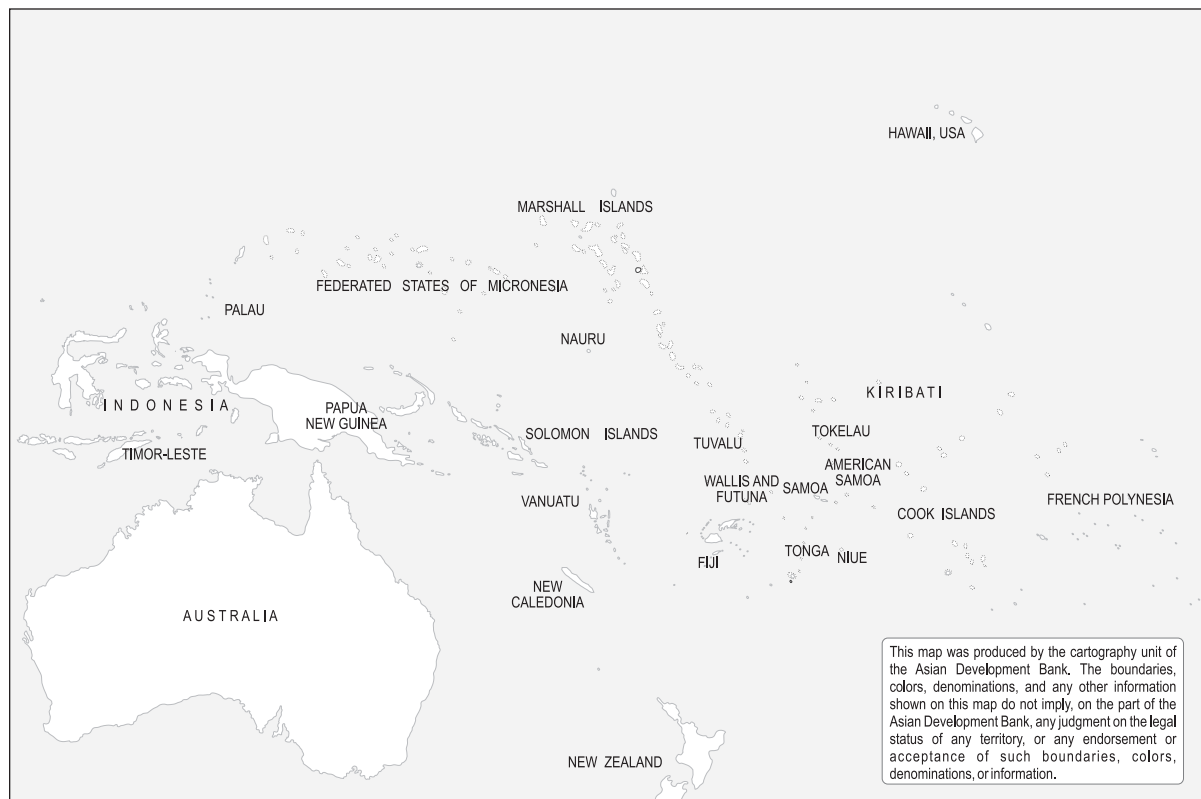
Source: National Centre for Social Applications of Geographic Information Systems, University of Adelaide, from multiple sources.

**Table 4 Forecasted Population at Risk from the Sea Level Rise in 2050, Top 10 Countries Globally (in million)**

India	37.2
Bangladesh	27.0
China, People's Republic of	22.3
Indonesia	20.9
Philippines	13.6
Nigeria	9.7
Viet Nam	9.5
Japan	9.1
USA	8.3
Egypt	6.3
Other Asian countries in the Top 20: Republic of Korea (12), Myanmar (13), Malaysia (16), Thailand (20)	

Source: Wheeler, 2011.

**Figure 6 Map of the Pacific**



# 4. How Climate Change Will Affect Migration

108. This chapter aims to combine the analysis of migration patterns with that of climate impacts. As said earlier, in the current state of science and given the wide range of uncertainties about how populations will respond to climate impacts, it does not seem possible to make accurate predictions or estimates of the number of climate-induced migrants. Thanks to local assessments of migration patterns, climate impacts, and vulnerability, it is, however, possible to identify areas where climate-induced migration could occur, and the processes through which these migration flows would occur.

109. When assessing the climate change–migration nexus, it is also important to consider how climate change will interact with other migration drivers, and not only the population movements that will directly result from the impacts of climate change. In short, one can say that climate change

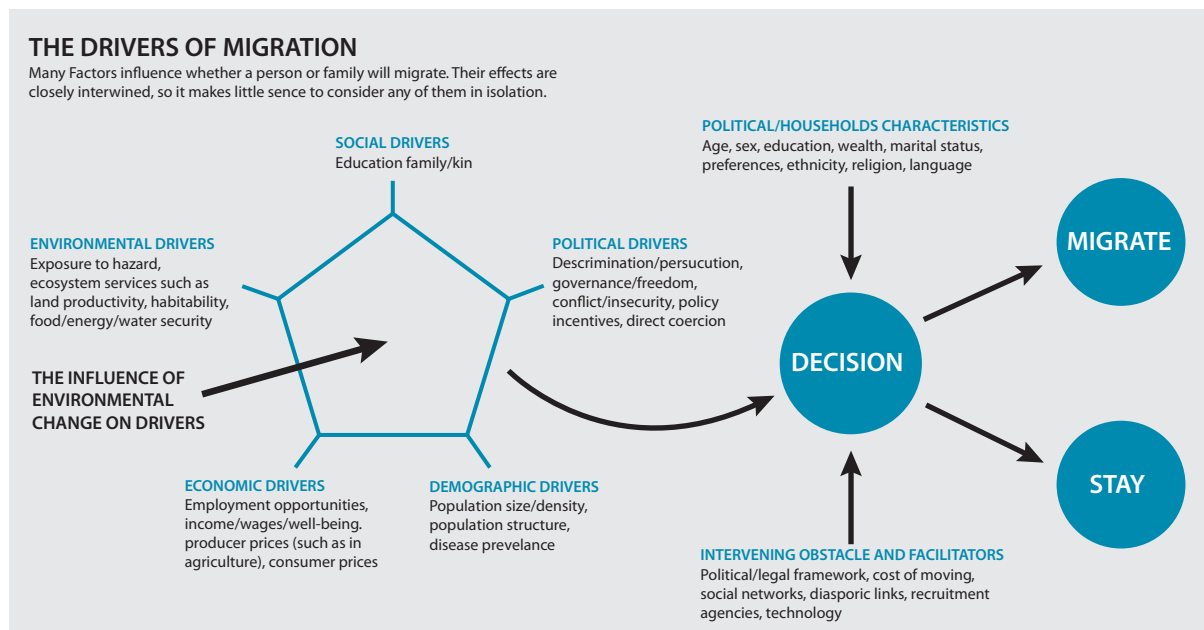
will influence not only migration itself but also the drivers of migration. The decision to migrate also needs to be considered as it will be mediated by personal and household characteristics as well as obstacles and facilitators. This relationship is summarized in the conceptual framework developed by the Foresight project (Figure 7).

The following paragraphs look at how climate change is likely to affect populations in the different regions of Asia and the Pacific.

## A. East Asia

110. The PRC receives particular attention in this section due to its large population as well as the relative poverty and vulnerability of many of its citizens living in hot spots compared to higher-income

Figure 7 A Conceptual Framework for Climate-Induced Migration



Source: Black et al. 2011.

economies such as the Republic of Korea and Japan. Several of the PRC's mega cities are located in coastal and inner valley areas vulnerable to coastal and riparian flooding and inundation. These at-risk populations are projected to grow substantially, despite low overall growth of the national population. In Japan, the numbers in at-risk urban areas will decrease over the period, reflecting a shrinking population due to low fertility and a restrictive immigration policy. Very low rates of fertility and net migration explain why Japan and the Republic of Korea will experience only limited urban growth. For similar reasons, only limited urban growth is anticipated in the Republic of Korea.

111. The PRC remains highly vulnerable to the impact of climate change. More than half of its workers are still in agriculture and, for those living in hot spots, livelihoods are at significant risk. Low per capita incomes, with many people still below the poverty line, and a lack of appropriate governance are elements that also contribute significantly to vulnerability.

112. Potential agricultural productivity has determined the essential characteristics of population distribution in the PRC for the past 2,000 years. East of the Heihe-Tengchong line, the climate is warm and humid, suitable for agricultural production, and the area is, therefore, the main area of human habitation. West of the line the climate is arid and extremely cold in winter, too harsh for crops, and less suitable for intensive settlement.

113. Given the country's huge population, this means that many people live in hot spots, with more than one-third in cities and several mega cities in the coastal areas and inner valleys vulnerable to coastal and riparian flooding and inundation. The deltas of the Yellow, Yangtze, and Pearl rivers each boast populations in the tens of millions. What is of particular note here is that these cities have been recording a massive influx of migrants, fueling rapid industrial and urban development. By 2030, it is expected that in the PRC more than 1 billion people will live in cities, with 221 cities of more than 1 million inhabitants (Roberts 2010). With regard to climate-induced migration, three regions call for particular attention, as identified by Roberts (2010):

- (i) In the upper reaches of the Yangtze and Yellow Rivers, "dams and soil degradation may

force local inhabitants towards the Qinghai-Tibet plateau or east coast cities in search of livelihoods."

- (ii) In the northern and northwestern parts of the PRC, farmers could be prompted to move because of droughts and desertification.
- (iii) Southeastern coastal regions will be affected with increased frequency of typhoons and flooding, which could also induce populations to move northward. Though the destinations of these migrants are difficult to predict, it is likely that many will seek job opportunities in the cities.

114. As shown in Table 4, the forecasted population in the PRC at risk from sea level rise in 2050 exceeds 22 million. While a majority of the people in hot spots in the PRC are in rural areas, rapid rural-urban migration means that, as early as 2020, urban populations in hot spots will be substantially larger.

115. It is therefore crucially important that the major coastal cities adapt to impending climate change and identify the groups most at risk. Huq and Satterthwaite (2008) point out that much of this risk in urban areas is concentrated in low-income households, which are least able to avoid the direct or indirect impacts of climate change because of the poor quality of their housing, their location in the most vulnerable parts of cities, or because they are least able to move if climate change threatens neighborhoods. Within these groups the most vulnerable are the elderly and children, who lack the resources to cope with illness; injury; or loss of income, livelihood, or property.

116. Rural-urban migration has been the main stream of movement since the mid-1980s and the dominant direction of migrant flow has been from west to east and from north to south. The principal drivers that have stimulated contemporary migration in the PRC are distance, economic factors (especially employment), and demographic factors (including degradation of the environment and natural resources in migrant origin areas).

117. By 2050, 10 million people, who mainly live in the western regions of the PRC, could be displaced. Half of the people live in ecologically fragile regions or in other regions defined by the state as lacking the basic conditions to adequately support livelihoods. Annual inflows of several million rural

migrants to urban areas will continue into the foreseeable future. Under current economic and infrastructure conditions, migrants from the western and central provinces would mainly move to three urban agglomerations in the east: that encircling the Bohai Sea (a gulf of the Yellow Sea east of Beijing), the Yangtze River delta, and the Pearl River delta.

118. Social networks linking residents with destinations within and outside the country are substantial and considerable future migration will be channeled through these corridors. In particular, it can be expected that there will be (i) continued rural–urban movement to established mega cities in coastal and valley areas, (ii) migration away from ecologically fragile areas in the northern and western parts of the country, and (iii) expanded international migration building on family and friendship links in OECD member countries.

## B. Southeast Asia

119. Coastal flooding poses the greatest risk induced by climate change in Southeast Asia, with around one-third of the population living in areas considered to be at risk. These populations are especially concentrated in Indonesia, Myanmar,

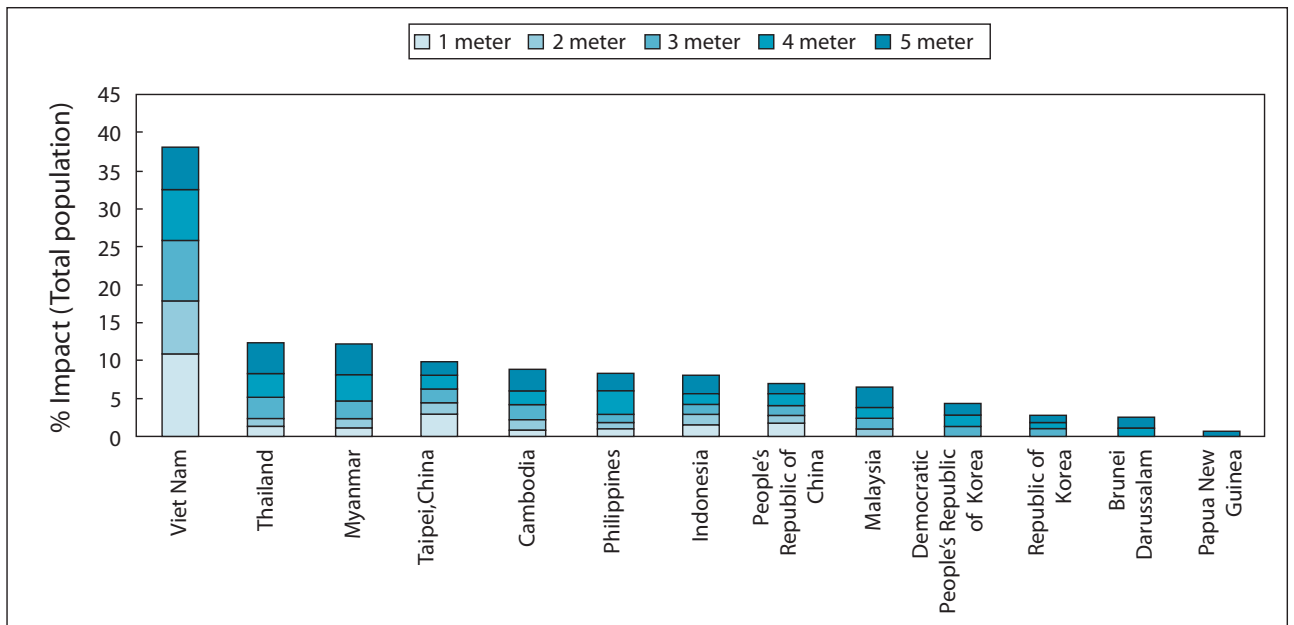
Philippines, Thailand, and Viet Nam. According to a World Bank study (Dasgupta et al. 2007), given a 1-meter sea-level rise, Viet Nam would be the most affected developing country in terms of population (10.8%), GDP (10 percentage point reduction), and wetlands inundated (28%).

120. Ho Chi Minh City has become not only a major focus of permanent rural–urban migration within Viet Nam but it also experiences massive seasonal temporary immigration. A qualitative study in the Mekong region has established that environmental factors are already an important element driving migration there (Dun 2009).

121. Southeast Asian mega cities are growing rapidly due in part to rural–urban migration. Southeast Asian countries figure prominently among countries with the largest numbers of urban dwellers in coastal areas at risk of inundation (with 3 of 10 of the world's countries with the highest populations in low-elevation coastal zones) as well as in those with the largest proportions of their national populations at risk of coastal inundation.

122. Millions of people in Southeast Asia reside in areas affected by cyclones—Indonesia, Myanmar, Philippines, Thailand, and Viet Nam are especially

**Figure 8** Percentage of Population of East Asian Countries Affected by a Sea-Level Rise of 1–5 Meters



PRC = People's Republic of China.

Source: Dasgupta et al. 2007.

at risk. Much of the Philippines is exposed to cyclones, especially the northern and eastern parts of the country. Densely populated coastal areas of Viet Nam and Cambodia are also at high risk of cyclones.

123. It is important to note that the impact of climate change on these populations will be influenced not just by the nature and severity of the impact but also by the ability of those populations to bring resources to bear to adapt to that change. The broader socioeconomic vulnerability of populations in the hot spots is therefore significant.

124. Figure 9 shows regional patterns of vulnerability in Southeast Asia. It is noticeable that high vulnerability coincides with several of the hot spots of most substantial potential climate change impact. This includes, for example, the Mekong Delta of southern Viet Nam and eastern Cambodia. In addition, the northern Philippines and western Java in Indonesia show up as areas of high vulnerability. This vulnerability lies not only in the large numbers living

in poverty in countries such as Cambodia, Indonesia, Myanmar, Philippines, and Viet Nam but also in the weak governance structures of several nations. Moreover, in the large countries of the region the number of workers reliant on agriculture remains high, raising the potential for climate change to impact substantially on livelihoods. ADB has documented the potential impacts of climate change on the agriculture sector in Southeast Asia (ADB 2009).

125. Thus far, we have considered only the projected population totals likely to be impacted in the hot spots, but only a certain percentage of those is likely to move. In **Thailand**, leading climate change risks are associated with a shift in rainfall from north to south; more frequent extreme weather events; and rising sea levels that will influence closely settled coastal areas, especially in the Bangkok area (ADB 2009).

126. A number of specific impacts are likely to reduce local opportunities for development, which

**Figure 9 Socio-economic Vulnerability in Southeast Asia**



Source: Yusuf and Francisco 2009.

in turn will enhance migration linearly along established corridors of migration. The variability in the timing and amount of rainfall associated with the monsoon is a significant factor in the viability of dryland rice farming, particularly in the northeast and north of Thailand (Kundzewicz et al. 2009). If, as projected, rainfall patterns become less predictable and/or reliable, cropping systems in some of the poorest rural areas could become less productive. Already, the northeast provides many workers for urban areas and internationally, and this migration pattern could increase. Flood risk is also significant in the north and central areas. If more extreme rainfall events occur more regularly, a greater number of people may wish to leave hazardous areas (Kundzewicz et al. 2009). Once again, this is likely to be a choice to move made in association with perceived opportunities.

127. One significant nonlinear change to migration patterns in Thailand could occur as a result of the risk of more flooding and sea-level rise in Bangkok. The core of the city is built around the Chao Phraya River and associated canals (Ericson et al. 2006; McGranahan, Balk, and Anderson 2007; Thaitakoo and McGrath 2008). The interaction of sea-level rise, storm surges, and riverine flood risk associated with climate change could lead to a significant displacement of people from the low-lying areas of Bangkok. This would lead to a fundamental change in the role of the city, both as a destination for internal Thai migrants and as a stopover point for international migrants, especially from neighboring countries such as Cambodia, Lao PDR, and Myanmar. The floods that struck Thailand and part of greater Bangkok during the latter half of 2011 show the urgent need for adaptation.

128. Climate change hotspots in **Cambodia** include the southeastern border area with Viet Nam, adjoining the Mekong Delta region. Floods and drought are likely to increase over time. The Tonle Sap Basin may see a reduction in annual flooding, while the coastal provinces of Kampot, Koh Kong, and Sihanoukville may witness greater seawater intrusion and storms. Battambang Province, in the northwestern part of the country, is vulnerable because a large part of the workforce is reliant on agriculture and there are high rates of poverty. Linear migration trends in the country include an increase in rural–urban migration, especially among rural youth; labor migration to Thailand; and marriage migration, especially of

women. There may also be a significant outflow from the densely settled Tonle Sap area.

129. In **Viet Nam**, where most of the population is employed in agriculture, almost half of the country's agricultural area would face inundation with a 2-meter rise in sea level (Warner et al. 2009). The increasing risk of sea-level rise and flooding may stimulate large-scale population displacement across the region (Dun 2009). Climate change could also exacerbate soil degradation and waterlogging, water pollution and overfishing, urban industrialization, and related population pressure on the environment (Chinvanno 2003).

130. Rural–urban migration is the most common pattern in Viet Nam, although rural migration (Dun 2009) to other rural areas has also been common due to the shortage of arable land. Migration from rural areas has increased, mainly to Hanoi, southeastern Viet Nam (particularly Ho Chi Minh City), and nearby provinces, both on a seasonal and more permanent basis (Dun 2009). Anecdotal evidence from the Mekong Delta suggests that “successive flooding events leading to destruction of crops on more than one occasion can drive people to migrate elsewhere in search of an alternative livelihood” (Warner et al. 2008). There is also some concern that water- and land-related environmental issues have encouraged human trafficking as those affected by degrading environmental conditions seek livelihood opportunities in, for example, border areas (Soda 2009).

131. In **Indonesia** there is a long history of responding to economic, social, or environmental adversity by moving on a temporary or permanent basis. Indonesia is an important source of low-skilled labor migrants, with about 6 million working abroad, particularly in more advanced Asian economies and in the Middle East. Within the country, rural–urban movement, both temporary and permanent, is significant, with western Java a common destination. However, with greater Jakarta expected to face multiple impacts of climate change in the years ahead, internal migration may shift to other urban areas less at risk, including on other islands in the archipelago nation.

132. As is the case elsewhere, the predominant adaptation to climate change impacts in Southeast Asia will be in situ. Although migration is not



mentioned in national adaptation action plans, it is already being used as an adaptation tool in response to changing environmental conditions.

## C. South Asia

133. With around one-quarter of the world's population and continuing high levels of poverty, South Asia is also an area at great risk of climate change impacts. Unlike many areas of East and Southeast Asia, however, population growth will continue at a substantial pace because fertility levels remain relatively high. A substantial proportion of the region's population lives in vulnerable areas. Moreover, modeling of the impact of climate change on agricultural production in South Asia points to a substantial decline in both rice production and wheat production. Rosegrant et al. (2009) show that climate change could lead to a decline of around 20 million tons (25%) in rice production and over 30 million tons in wheat (30%) in India over 2000–2050.

134. Large populations in **India** live in areas likely to experience greater riparian flooding and water stress as a result of climate change—major factors that will lead to lower agricultural productivity. A significant number will also be affected by coastal flooding. Substantial parts of Mumbai, a city with a metropolitan population of around 20 million people, are below sea level and already subject to flooding. In January 2011, flash floods ravaged Sri Lanka, affecting more than 1 million people, including more than 300,000 forced out of their homes. By 2050 it is anticipated that 1.4 billion Indians will be living in areas experiencing negative climate change impacts. Moreover, there will be more than 250 million people living in hot spots at multiple risk of climate change in both Bangladesh and Pakistan. While most people will adapt in situ, the potential for redistribution of population through migration is substantial.

135. Climate change represents an important potential brake on recent rapid economic growth in India. India is a vast nation with complex patterns of internal mobility (both permanent and temporary), and recent rapid economic growth has been accompanied by a significant redistribution of population, especially from rural to urban areas. This situation will be exacerbated by the impact of climate change on agriculture. India is also one of the world's major origin nations for international migrants, with a

diaspora of around 20 million. There are high levels of unskilled migration to the Middle East and rapidly growing skilled migration to OECD member countries and richer economies in Asia.

136. Some of the recurrent environmental patterns that can be expected in India include increasing intensity and frequency of cyclones and floods along important rivers such as the Ganges and Brahmaputra in the north; the Mahanadi, Godavari, and Krishna rivers in the south; the Indus in the west; and in the northeastern and eastern regions from Assam and West Bengal to Andhra Pradesh and Tamil Nadu (Revi 2008).

137. Northern India, including the states of Bihar and West Bengal—and large cities such as Chennai, Kolkata, and Mumbai—have already been exposed to frequent floods and to tsunamis (De, Dube, and Prakasa Rao 2005). Longer and more frequent droughts and water stress have been recorded in several states, particularly those in western and central India (Mall et al. 2006). Chennai and Mumbai are arguably the areas most vulnerable to sea-level rise (Kelkar and Bhadwal 2007).

138. Most of India's population is employed in the agriculture sector and is heavily dependent on water for irrigation purposes. It is predicted that, by 2050, annual runoff in the Brahmaputra and Indus basins will decline substantially (Kelkar and Bhadwal 2007). In light of the dependence on agriculture for daily subsistence and livelihoods, more floods, landslides, droughts, and cyclones will increase vulnerability and lead to displacement.

139. Most migration in India is rural–urban, particularly to regional urban areas such as Delhi (north), Mumbai and Ahmedabad (west), Kolkata (east), and Bangalore and Chennai (south) in search of better economic opportunities (Mitra and Murayama 2008). Growing population pressures have put great stress on urban infrastructure. A major migration corridor lies between the poor northern state of Bihar and Delhi and Kolkata. While socioeconomic factors continue to be the primary motivator for migration, anecdotal evidence suggests that floods and loss of agricultural lands are playing an increasing role in migration decisions.

140. Over time, it could be expected that India's coastal regions will witness a particularly nonlinear

change in their vulnerability to climate change impacts due to high urbanization, rural–urban migration, and dwindling agricultural productivity. The increase in population, infrastructure, and industrial activity along India’s coast—and especially along its western seaboard and stretches along the Bay of Bengal—will heighten vulnerability to sea-level rise (Revi 2008).

141. **Bangladesh** figures prominently in global discussions of climate change because of the millions of poor living in its low-lying deltaic region who are already subject to severe environmental hazards. The country is already at high risk of flooding due to sea surges, river flow, and local rainfall events, and interactions between all three. Migration, both internal and international labor migration of unskilled workers, is increasingly being used within Bangladesh as a coping mechanism in the face of environmental and economic challenges (Afsar 2005; Siddiqui 2005).

142. Forty percent of migrant workers originate from just 5 of 64 districts (Brahmanbaria, Chittagong, Comilla, Dhaka, and Tangail), all in the south of the country (Siddiqui 2005). These areas are especially prone to flooding and environmental events. It is clear that environmental factors are working together with economic forces in causing migration. Environmental processes and events have played an important role in shaping migration, although usually in combination with economic, social, and conflict-related factors. Nevertheless, it seems inevitable that climate change will strengthen those environmental forces so that pressure for permanent and temporary migration out of the areas affected will continue.

143. Temporary and permanent internal migration due to environmental displacement has a long history in Bangladesh, but it is arguably still the socio-economic vulnerability of the rural population that has been the primary driver. And it is times of famine, rather than extreme natural hazards, that have led to the greatest movements of people in recent history (Faisal and Parveen 2004; Dowlah 2006). Projected climate change would significantly increase the numbers and the permanency of those movements. In rural regions facing loss of agricultural productivity due to desertification and river erosion, migration of landless farmers to other rural areas is already common. But is there a threshold of environmental

impact that will suddenly cause large numbers of people to move? While linear migration responses will most likely be governable within existing policies and institutions (inasmuch as they are now effectively managed), climate change projections mean that sudden and dramatic nonlinear changes must be considered in discussions of resettlement and immigration policy.

144. As elsewhere, a high proportion of internal migration in Bangladesh is associated with a shift from rural to urban regions. Greater congestion of urban areas has already led to severe health, security, and resource issues for a large number of the urban poor. Metropolitan Dhaka is an important destination, but with more than 16 million residents it is itself highly vulnerable to socioecological degradation and to the impacts of climate change (Alam and Rabbani 2007). Indeed, Dhaka’s vulnerability to flooding and cyclonic events brings into doubt its role as a destination for the displaced—temporary or permanent. Dhaka is 2–13 meters above mean sea level, with most of the urbanized areas at elevations of 6–8 meters (Alam and Rabbani 2007). Nonetheless, Dhaka continues to attract large numbers of migrants.

145. As such urban centers grow, not just through the drawing powers of the city but also because of the underdevelopment and risks associated with life in rural areas, the infrastructure and planning needs of centers such as Dhaka will increase. McGranahan, Balk, and Anderson (2007) note that the coastal population in Bangladesh grew at about twice the national rate between 1990 and 2000, particularly in Dhaka and Chittagong. They suggest that “at the national level, measures to support previously disfavored inland urban settlements, away from the large cities on the coast, could not only reduce risks from climate change but also support a more balanced and equitable pattern of urban development.”

146. With changes in environmental and climatic conditions, Bangladesh will increasingly face the challenge of resettling and rehabilitating the affected population. The country’s international networks will therefore play a vital role in times of future environmental crises. Bangladeshi migrants have moved abroad in three different broadly defined forms: (i) movement across the Bangladesh–India border via traditional kinship and cultural ties; (ii) as temporary working migrants, primarily to countries in the

Association of Southeast Asian Nations (ASEAN) and the Middle East; and (iii) permanently to the United Kingdom and traditional immigrant-receiving countries such as Australia, Canada, New Zealand, and the United States.

147. Elsewhere in South Asia, landlocked **Nepal** is a country that has experienced substantial environmental degradation and could see much more due to climate change impacts. More extreme monsoonal rainfall and associated landslides and floods would impoverish many rural Nepalis in the hill and mountain valley regions. Nepal has experienced considerable rural–urban migration, primarily to Kathmandu and environs. A long-standing open-border policy with India has facilitated movement across the country’s southern frontier and swelled the ranks of a substantial Nepali émigré population.

148. A major threshold for a nonlinear increase in migration could originate from increasing flood risk in the relatively low-lying Terai region, which is comparatively densely populated and already experiences regular flooding. More flooding could boost outward migration from this southern region as residents escape regular inundation, which leads to crop and stock losses, impoverishment, and malnourishment. Climate change could reduce effective agricultural territory within the Terai region and provide less of a buffer within the country to absorb those people moving down from high hill and mountain valley regions.

## D. Central and West Asia

149. The concept of environmentally induced migration is not new in Central and West Asia. The region has experienced some of the world’s most dramatic environmental crises of recent years, with water problems predominant. In 1996, about 100,000 people were displaced by the environmental crisis in the Aral Sea region (Small, van der Meer, and Yupshur 2001). Beginning in the late 1990s, a multiyear drought associated with environmental degradation led to widespread unemployment in Karakalpakstan—an autonomous region in western Uzbekistan surrounding the southern end of the Aral Sea—and from 1999 to 2001 saw more than 250,000 people (about 20% of the region’s total population) migrate to Kazakhstan and Russian Federation in search of better economic opportunities (Glantz 2005).

150. A study by Médecins Sans Frontières in Karakalpakstan found that nearly half of the respondents wanted to migrate due to poor environmental conditions—almost half of them as a result of loss of livelihood and weak institutional support (Small, van der Meer, and Yupshur 2001). Continued poverty and problems of governance further add to the vulnerability of local populations to environmental disasters such as drought, loss of agricultural productivity, and resulting food insecurity.

151. “Millions of people [in Central Asia] are dependent on soils, water, and air which are often highly contaminated, while agricultural employment opportunities are under pressure in a context of rural population growth, in regions with relatively small areas of cultivated land” (Spoor 1998). Despite such a complex relationship between environmental degradation, demographic changes, and climatic changes, there is a clear lack of relevant empirical research, particularly in the Aral Sea Basin. This severely limits the region’s national and local capacity to establish timely adaptive mechanisms to address changes in regional climatic conditions (Glantz 2005).

152. A large part of the region’s population lives in areas at high risk of increased water stress due to climate change. Population growth in hot spots in each of the Central Asian countries indicates that, except for Kazakhstan, almost all of the population in the region is living in areas at risk of climate change impacts, which include water stress caused by a drop in rainfall and runoff.

153. The impact of climate change is exacerbated by a high degree of socioeconomic vulnerability. Average incomes are low, poverty is high, and governance is often weak, while many people are reliant upon agriculture for livelihood. However, agricultural modeling suggests there could be a small increase in wheat production in Central Asia despite climate change impacts (Rosegrant et al. 2009).

154. **Kazakhstan’s** 16 million people are about evenly divided between rural and urban areas. The country has seen considerable rural–urban migration, due in part to changes in agricultural policies and economic opportunities in cities. Rural poverty is a major driving factor in rural–urban migration (Bolsheva and Jolasov 2008). The most important risk from climate change in Kazakhstan is drying,

which would contribute to erosion and desertification, and subsequently relocation to urban areas of those dependent on agriculture for their livelihoods. Due to its relative wealth, Kazakhstan is a destination country for migrants from around Central Asia and the PRC (Becker et al. 2005).

155. In **Tajikistan**, higher temperatures and changes in precipitation patterns have led to retreat of small glaciers, and significantly reduced water flow is expected in many rivers over the mid-to-long term (Ministry for Nature Protection 2002). The intensity and frequency of floods has also increased within the country over the last few decades. About 95% of the country is vulnerable to environmental degradation, including floods, mudslides, salinity, water and soil erosion, and desertification (Khakimov and Mahmadbekov 2009). Climate modeling predicts that constantly increasing temperatures may further shift the existing pattern of glacial volume, thereby causing widespread decline in water availability by more than 30%. Water shortages can be expected to stimulate outward migration from affected areas.

156. Since the late 1990s, many educated and professionally skilled people have moved out of cities to neighboring countries, while low-skilled and unskilled workers have moved from rural to urban areas. Rural-urban migration has led to an increase in the population living in and around the capital Dushanbe. Tens of thousands of people emigrate each year to seek work in Germany, Russian Federation, and other Central Asian countries (Khakimov and Mahmadbekov 2009).

## E. The Pacific

157. The Pacific region faces significant challenges from climate change, especially from rising sea levels, cyclones, droughts, and storm surges. Low-lying atolls and coral islands have drawn global attention to the potentially devastating impacts on small nations such as Tuvalu and Kiribati. The situation is exacerbated by a demographic crisis, including high population growth, especially in the Melanesia subregion, and a bulging youth segment. The bulk of population growth from 2008 to 2050 will be in Melanesia (already home to more than 80% of the Pacific population), with Papua New Guinea dominating with 84% of the land and two-thirds of the

people of the Pacific. Significant growth is also anticipated in Solomon Islands and Vanuatu.

158. The Pacific will also experience a “youth bulge” over the next two decades, as large numbers of children from past periods of high fertility become young adults. As the most mobile age group, this is expected to lead to a substantial increase in migrants (Bedford and Hugo 2008).

159. The Pacific as a whole will be significantly affected by climate change, especially by sea-level rise and the increased incidence of cyclones. Indeed, with the exception of Papua New Guinea, virtually all the island states are to be considered hot spots of substantial impact, although the coastal areas are most at risk.

160. In **Papua New Guinea**, the southern coast and several low-lying islands are vulnerable to the effects of an increase in sea levels, while substantial inland areas are vulnerable to riparian flooding. Two-thirds of the population at risk from coastal flooding resides in urban areas, while almost all of those at risk of riparian flooding live in rural areas. There has already been some resettlement of people from the Carteret Islands off the coast of Papua New Guinea, due to the threat of inundation from a combination of subsidence, storm surge, and sea-level rise. Resettlement from the islands of Bougainville has also taken place.

161. As discussed, the effects of climate change will be exacerbated by rapid population growth. However, the relatively low level of resources available to many governments (and individual families) to adapt is also a problem.

162. Adverse environmental events and processes have already caused migration and population displacement within the region.

In 2008 alone the region experienced natural disasters of a kind likely to be exacerbated by climate change...a devastating tropical cyclone (Gene) resulted in substantial damage to agriculture, infrastructure and utilities in Fiji...Unusually high sea levels and swells have resulted in displacement of people in Kiribati, the Solomon Islands, the Marshall Islands

and the Federated States of Micronesia. Saltwater intrusion into field and crops and contamination of freshwater aquifers has been reported in the Solomon Islands. (Boncour and Burson 2009)

163. It is highly likely that during the next 30–50 years there will be significant migration to other countries from the central Pacific, especially to Australia, New Zealand, and the United States. There are already large numbers of Kiribati, Marshallese, Tokelauans, and Tuvaluans working and living overseas. The 1,170 atoll-based Tokelauans all have New Zealand citizenship by right. Relocation of entire populations from central Pacific atolls and reef islands may well be required, especially if sea levels rise by more than 1 meter. But this is unlikely to be the representative Pacific response to long-run climate change, as most countries will first seek to adapt within national boundaries. Virtually all population movement within Papua New Guinea will continue to be internal, in part because the country does not enjoy a special relationship with other jurisdictions relating to access for work or residence—a feature it shares with its Melanesia neighbors of Solomon Islands and Vanuatu.

164. Migration patterns in **New Caledonia** and **Fiji**, with their much more urbanized populations, established outlets for international migration, and (especially for Fiji) sizeable diaspora in Pacific Rim countries, are likely to be impacted by long-term climate change in different ways to other Melanesian countries. While internal migration to urban areas, particularly Suva (Fiji) and Noumea (New Caledonia) will continue, international migration is likely to be much more significant as an adjustment, especially among the non-indigenous populations.

165. Anticipated climate change over the next half century in the **eastern Pacific** will encourage large numbers of residents in the islands to move from small islands to larger ones or overseas. An overwhelming share of Polynesia's population lives close to the coast. Their villages, gardens, and cash crops are likely to be impacted severely by more frequent cyclones, as conditions associated with sustained El Niño Southern Oscillation events become more the norm than the exception. Compared to other parts of the Pacific, Polynesia enjoys well-established international migration outlets for its

people (especially Australia, New Zealand, and the United States).

166. Relocation of entire populations overseas in response to the increasing frequency and intensity of storms, droughts, and changes in sea level is unlikely to occur voluntarily. Pacific communities have proved to be remarkably resistant to abandoning their islands completely, even when offered the chance to do so after major natural disasters. In Tuvalu and Kiribati the prevailing view of the people is that they want to stay, and that it is the responsibility of the international community to reduce carbon emissions and slow the process of climate change.

## F. Resettlement as a last resort?

167. At some juncture, in some part of the vast Asia and Pacific region an area, large or small, may become unable to sustain the livelihoods of its resident population when a tipping point or threshold of tolerance is reached after which there is a nonlinear increase in the number of people forced to emigrate (Meze-Hausken 2008). In anticipation of such outcomes, some governments have already initiated resettlement programs—i.e., planned migration—for vulnerable populations. One of the clear lessons from decades of migration and resettlement experience is that it requires financial resources (de Sherbinin et al. 2011). If migration and resettlement is not to lead to further impoverishment or other harm for those displaced, more significant investments will have to be made to successfully establish those resettled in new locations and to provide them with security and sustainable livelihoods in destination areas.

168. The type of displacement anticipated due to changes in environmental conditions is, to a large extent, analogous to displacements which have occurred in the past as a result of large-scale infrastructure and development projects. There is considerable literature in Asia and the Pacific on the experience of resettlement of people displaced by mega projects (Cernea and McDowell 2000), resettlement of refugees and internally displaced persons (Hugo 2002), and government-sponsored resettlement of people from densely settled to less densely settled areas (Hardjono 1977). These studies point out that underfunding of resettlement



programs means that those resettled are often less well-off than they were in their original, now untenable, locations. Therefore, resettling those families and communities displaced by climate change will be expensive and few countries in Asia and the Pacific will be able to fund sustainable resettlement alone. International involvement and support will, therefore, be critical to successfully resettle those displaced by climate change.

169. One of the limitations of the existing experience of resettlement is that it overwhelmingly involves displacement from one rural community to another. Experience in resettlement of displaced communities has hitherto primarily been concerned with displacement within countries. There may be particular cases where international resettlement will be necessary, e.g., where low-lying island states do not offer any potential resettlement sites within national boundaries. In such circumstances, the preservation of the resettled community's social capital is of particular significance. Given the specific challenges of international forced migration due to climate change, it is important to have in place the international institutional capacity, systems of governance, funding arrangements, and programs in order to facilitate and support development of mobility as an adaptation and, in extreme cases, resettlement. Such programs will need to complement in situ adaptation and resilience-building mechanisms.

## G. Migration as an Adaptation Strategy

170. As noted earlier, in situ adaptations will be the most common response to climate change. Policy making therefore needs to address what is needed to allow communities to **not** migrate. Indeed, most of the adaptation mechanisms currently being canvassed (e.g., ADB 2009) are designed to keep people in place and promote an alternative to migration.

171. One of the distinctions which can be drawn is the need to develop new and effective governance systems and policy mechanisms that can cope with (i) the sudden onset of cataclysmic events which destroy or rapidly change livelihoods or displace populations on a permanent or temporary basis, and (ii) the longer-term processes which see an incremental decline in the ability of an area to

provide livelihood. In both cases, mobility-based and nonmobility-based adaptation strategies can be initiated. However, the institutions and strategies needed often differ between countries.

172. One of the challenges here is the need to convince policy makers to take action on both (i) and (ii). There is a considerable body of experience with disaster response, refugees, and internally displaced persons (as defined by the Office of the UNHCR). This is relevant to responding to sudden impacts induced by climate change. Creating policies, actions, and governance systems to cope with cataclysmic changes is by no means trivial, but it is clear that policy makers need to act with some urgency given the existence of a substantial body of relevant experience and the extreme nature of sudden changes.

173. On the other hand, longer-term incremental impacts have relatively less immediacy, raising the danger that policy makers will defer action on them. Policy makers must recognize that, while the full impact of these incremental processes will not be evident for several decades, the interventions needed are often very large in scale and will therefore need to be put into operation over time. The crucial point is that the need for action on hazards and long-term processes is urgent.

174. It is also important when framing policies for migration related to climate change to avoid complete isolation of internal migration responses to climate change from international migration responses, since the two are often strongly linked (Skeldon 2006). While it has long been recognized that migration has been beneficial to most migrants and to most of the economies they move in to, a prevailing view has been that the areas of origin suffer the loss of their best human capital.

175. The last decade has seen a shift in the dominant paradigm regarding migration and development, however. Whereas in the past outward migration and emigration from areas was seen as "brain drain" inevitably diminishing development potential, in recent times there has been focus on the positive impacts on origin communities through the remittances sent back; the return of migrants returning with newly acquired skills; and diaspora effects whereby expatriate communities assist their home areas through investment, advice, and support.

Migration is a way for origin areas to cope with environmental impact and, given an appropriate policy context, to enhance development.

176. It has been estimated that emigration of less than 5% of the population of poor world regions would bring global gains that exceed the gains from the total elimination of all policy barriers to merchandise trade and all barriers to capital flows (Clemens 2011).

177. It is important to stress that contemporary drivers of international migration other than climate change are also projected to increase significantly over the next few decades. Policy makers need to recognize that migration can have positive effects on origin communities, in part by making migration policies in destination areas more “development friendly.” This means developing policies and programs with the labor market interests of destinations and impacts in origin communities in mind.



## **Part II**

# **Addressing the Issue**



## 5. Framing Climate-Induced Migration in a Development Agenda

178. In recent years, most of the policy debates on climate-induced migration have focused on humanitarian assistance and legal protection. Though these issues are of utmost importance, they do little to address the root causes of the problem. Yet avoiding forced displacement of people and communities needs to remain a key priority. Thus, the resilience of communities needs to be strengthened, and this is the reason why climate-induced migration needs to be framed in a development agenda first.

179. Resilience to climate change is related to a community's adaptive capacity, which depends on a range of factors: financial resources, governance, information, social resources, infrastructure, and technology. Improvement in these factors can reduce the need for people to migrate, but migration can also be a way to improve these factors. Indeed, the impact of migration upon development is often overlooked, despite its importance.

180. Whereas migration should be facilitated for those wishing to leave the place where they live, people should ultimately have the right to choose between staying and leaving. Reducing the vulnerability of people and communities to environmental risks can be supported through various interventions.

### A. Social Protection

181. To minimize the need to migrate because of climate-related socioeconomic pressures, it is important that measures be adopted to provide relief from sudden deprivation, increase income-earning opportunities, and advance social inclusion. A major reason why people leave their communities is because their livelihoods are no longer sustainable. Environmental changes can cause job losses and force occupational shifts. In some instances, people are forced to move in order to pay debts that they have incurred. Social protection can enhance the disaster resilience of individuals and households, reduce poverty, and stimulate

human capital development. It also helps to smooth consumption, not only during and after an extreme environmental event but also before one strikes, and protects household and community assets (United Nations 2011).

182. Slow-onset environmental changes may lead to declining farm yields and other economic impacts that can be addressed through social protection measures that create new income-earning possibilities. Food or cash transfers can protect against poverty and hunger when natural disasters strike. As noted by (Adger et al. 2003), adaptation should not only aim to reduce the potential of harm from a changing climate but also accommodate people's rights and aspirations.

183. One example of a social protection program designed to prevent deprivation is the Mahatma Gandhi National Rural Employment Guarantee Act in India. The multibillion dollar program aims to enhance the livelihood security of people in rural areas by guaranteeing 100 days of wage employment in a financial year to a household whose adult members volunteer to perform unskilled manual work. The program is also intended to reduce distress migration and create useful assets in rural areas. It has contributed to adaptation through tree planting and construction of small dams and embankments to control floods.

184. In Viet Nam, the international nongovernment organization World Vision implemented a project between 2005 and 2009 to reduce storm and flood vulnerability in 10 targeted communes. The project supported the development of disaster risk reduction plans to strengthen commune capacity to address natural disasters. An important aspect of the project was promoting diversified income sources to reduce the livelihood impact of losing crops or fishing equipment in extreme weather. In addition, a revolving fund was created to finance household flood-preparedness improvements (World Vision 2009).

185. Access to basic social services and social protection is also important to those who have migrated due to environmental or other reasons. Low-skilled and low-income migrants in particular have weak employment rights and poor access to social welfare, as noted by a study of cross-border movement by marginalized people in Southeast Asia (Lee Kuan Yew School of Public Policy 2011). Even where the law requires employers to provide social insurance, it is not always enforced, as shown by research carried out in Viet Nam (Duong, Linh, and Thao 2011). Major flooding in Thailand in the last quarter of 2011 caused thousands of Burmese migrants in the country to flee from affected provinces. Not only did they suffer loss of income but they also faced harassment by authorities in both their home and host country. (Lee Kuan Yew School of Public Policy 2011).

## B. Disaster Risk Management

186. The fact that people in developing countries are more vulnerable to natural disasters has been documented widely. This is due to a number of factors, such as increased exposure to natural disasters, higher sensitivity, as well as lower adaptive capacity, e.g., a lack of early warning systems, weak infrastructure and governance, or fragile economies with few economic options. This is particularly true for socially disadvantaged or marginalized groups and makes them particularly susceptible to displacement. People at the lower end of the socioeconomic spectrum often live in highly exposed areas in vulnerable houses; have lower levels of prevention and response capabilities, savings, and assets; have language difficulties; and have limited knowledge of local rules, regulations, and practices.

187. Disaster risk management is a key tool to boost the resilience of vulnerable communities. Climate-proofing urban infrastructure can be a key part of disaster risk management in the context of climate change. Regional cooperation should be strengthened in the field of disaster risk management, especially with regard to technology and knowledge transfer. Overall, disaster risk management should be further mainstreamed into adaptation policies, at both the origin and destination of migration, with a view to preventing forced displacement.

188. The 2005 Hyogo Framework for Action (HFA) provides a comprehensive 10-year plan for disaster

risk management that has been adopted by 168 member states of the United Nations. The HFA is built upon five priority actions and provides resources for improving disaster resilience:

- (i) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
- (ii) Identify, assess, and monitor disaster risks and enhance early warning.
- (iii) Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.
- (iv) Reduce the underlying risk factors.
- (v) Strengthen disaster preparedness for effective response at all levels.

189. In 2005, ASEAN countries reaffirmed and complemented these priorities in the ASEAN Agreement on Disaster Management and Emergency Response.

190. Effective disaster risk management requires the synthesis of knowledge, means, and action on many fronts. Scientific research and engineering are needed to understand the risks and prepare for possible future disaster scenarios. Such research informs policy, including building codes and urban planning. Demographic studies, field research, and policy analysis are also needed to develop policies and programs that address the needs of the most vulnerable populations. Appropriate education is needed, both for the general public and for key decision makers in government and industry. Early warning systems and infrastructure are needed for responsive action in disaster scenarios. Financial resources need to be arranged to ensure that funding is available when required, whether through insurance, capital market instruments, or well-designed and funded self-insurance programs.

191. Disaster risk management is clearly a multidisciplinary topic that interacts with many other areas of policy, commerce, and society. Scientific research, early warning systems, and insurance risk modeling often rely on the same technologies to measure temperature, wind speed, floodwater depth, and other key data related to natural disasters. By analyzing such data, key agencies can develop and even rehearse plans to respond to the most threatening disasters.

192. Insurance interacts with other aspects of disaster risk management in ways that are often

overlooked in the contexts of development and humanitarian aid. Beyond providing the means for recovering from a disaster for insurance policyholders, insurance policies are designed to encourage policyholders to take prudent measures to reduce their risks. Because insurance is priced to reflect the risk assumed by the insurance company, actions that reduce risk may be rewarded with reduced insurance premiums. This provides an added incentive for individuals and institutions to manage their risks well and, as insurance companies are in the business of understanding risk, they can double as an educational resource for risk reduction strategies.

193. Despite (and perhaps because of) its complex and multidisciplinary nature, it is critical for governments and institutions to maintain focus on disaster risk management. Each country could appoint a chief risk officer to act as a clearing house of information and planning for disaster risk as well as other risks.

194. The relationship between disaster risk management and climate-induced migration is clear, but some examples are worth highlighting:

- (i) Reducing vulnerability through disaster-resilient structures and climate proofing urban infrastructure would help reduce the frequency and impact of forced displacements, as more people would be able to stay where they live.
- (ii) Well-designed temporary shelter plans, with readily available supplies and know-how to implement such plans, would help bring order to the chaotic aftermath of a natural disaster, reduce secondary impacts such as diseases and lack of water, and help victims move into permanent shelter more quickly.
- (iii) In some cases, effective early warning systems can enable people to board up their windows and take other measures to prepare their homes to survive the disaster, reducing the likelihood that they will need to find alternative shelter.
- (iv) To the extent insurance is utilized and priced according to risk, insurance pricing can act as an incentive for people to migrate to safer areas *before* disaster strikes.
- (v) Insurance can provide resources needed to migrate to a new home *after* a dwelling is destroyed or otherwise rendered uninhabitable by a disaster.

195. Regional cooperation on disaster risk management has been accelerating in recent years, but more needs to be done. Disaster risk management should be a key input into adaptation plans. The coordination of knowledge, research, and educational resources will be especially valuable as these are prerequisite to developing appropriate adaptation strategies.

196. After a disaster the reconstruction process can provide some new opportunities and therefore reduce vulnerability. Post-disaster employment opportunities, however, can also be an incentive for people from other regions to move in, which would then increase the number of people exposed to environmental risk. Inward migration is often associated with the reconstruction process, as new migrants come to seek work. Conversely, outward migration can also reduce further vulnerability to disasters, as it reduces the number of people exposed to hazard.

## C. Urban and Peri-Urban Planning

197. The movement of people to cities, which will be further catalyzed by climate change, will require better urban planning (including incentives to settle in less-vulnerable areas), greater investment in basic infrastructure, and portable social benefits for migrants. Socioeconomic drivers of migration are likely to push more migrants towards vulnerable areas, including cities in low-lying coastal zones.

198. Migrants often live in slums in urban and peri-urban areas. These slums are highly exposed to environmental risks, and the rights of migrants are often denied. The rights of urban migrants need to be better protected and guaranteed, and the codification and enforcement of these rights are particularly important; migrants often face a much higher risk of eviction, for example. Urban migration can yield positive outcomes for development and the environment, but needs to be better planned.

199. Cities—and, in particular, mega cities—lack the carrying capacity to accommodate the likely influx of climate-induced migrants. Urban development patterns will need to be rethought so that cities can grow in a more sustainable way and provide adequate services to their populations. Future settlement planning will prove key in reducing vulnerability. Future planning will need to map safe places for communities.

200. Further, adaptation policies of most developing countries have not yet considered the land use and public health risks that (large-scale) migration can cause. Therefore, it is important that adaptation funding also addresses the receiving urban areas, so that urban inward migration can be implemented as a component of climate change strategies. Obvious areas for intervention include affordable housing, slum rehabilitation, public health, water supply, sewage, and sanitation.

201. While the carrying capacity and resource exploitation might reach its limits for a city under normal migration circumstances, this will exacerbate here. Moreover, cities near the coast have less space for retreat, which makes the protection of property, infrastructure security, and human livelihood a further challenge.

202. Increasing resource scarcity in rural areas—partly caused by environmental degradation, exploitation, and misuse and partly caused and amplified by climatic changes and diminishing economic opportunities—have already drawn and will continue to draw people from the rural areas to urban centers and mega cities. Landlessness, rural poverty, unemployment, and natural hazards are fueling this process. Urban areas promise access to the cash economy rather than relying on subsistence farming. Black and Kniveton (2011) note that nonagricultural incomes in Bangladesh grew six times faster than agricultural incomes between 1988 and 1995. Urban incomes are also regarded as more secure. Cities offer access to services and are often given priority when it comes to the spatial distribution of energy and water. However, most urban regions in the developing world experience urbanization that is so rapid and unplanned that urban welfare and service provision is seriously threatened.

203. When arriving in urban areas, new migrants particularly from poor rural backgrounds, often settle in slums at the outer urban regions or near construction sites and other places of economic opportunity. The high population densities, unregulated and limited water supply, and lacking sanitation and sewage operations are favorable conditions for spreading diseases. Higher population (and building) densities increase the urban “heat

island” effect,<sup>5</sup> air pollution, and local flooding when unplanned development occurs along open sewage canals and marginal places. These in turn have major health impacts.

204. Another observation refers to the need for more diverse skills among family members, with men and women learning new skills and working longer and with children contributing to the family income. Rural–urban migration might therefore decrease school attendance and increase child labor, which would strongly classify as maladaptation in the long run.

205. An important policy implication for urban areas is the linking of disaster risk management with urban or regional long-term development plans and planning.

## D. Development and Poverty Reduction Strategies

206. Poverty reduction remains one of the key activity areas for international donors as well as national organizations in Asia and the Pacific. With about 1.8 billion people living on less than \$2 per day, the region continues to face a huge challenge in lifting people out of desperate social and economic circumstances.

207. National poverty reduction programs often target many aspects of social and economic problems. Poverty becomes noticeable in different forms and appears different in different countries, political settings, societal forms, and natural characteristics. It differs between rural and urban areas as well as between social groups. In general, poverty reduction programs can address single individuals or more comprehensively target economic growth, social inclusion, and improved living conditions in vulnerable areas as a whole. One can distinguish between income poverty, social poverty, and environmental poverty. Climate change and environmentally induced migration can both render formerly successful poverty reduction efforts of international and national agencies inefficient and increase poverty. Similarly, inefficient or missing poverty reduction strategies can increase the impacts of climate

<sup>5</sup> The heat island effect in cities is due in large part to the absorption of light and radiation by buildings and pavement, and consequent emission of heat, as well as to the relative absence of vegetation compared to rural areas.

change and foster environmental migration. All poverty reduction strategies should therefore incorporate the potential impacts of climate change and environmental degradation. And more successful poverty reduction strategies can help alleviate climate change impacts and migration.

208. These national and strategic programs are often flanked by compensation measures, and subsidies or other forms of financial aid in case of natural hazards often also exist, e.g., such as for crop damage in India. However, not only the climate but also insecurity in other respects feeds back into poverty. A study by the International Food Policy Research Institute found that the management of land rights is a cornerstone of social management and poverty

reduction, mostly in agrarian states (Sørbø and Strand 2007). Clarifying land ownership, agricultural production, and fostering rural employment are therefore areas in need of attention.

209. Security, including tenure security, is important for poverty reduction and there is a growing body of research on that relationship. Insecurity, such as that resulting from armed conflict, increases the vulnerability of poor people and is a key reason for the perpetuation of poverty traps. As aspects of land ownership and the resulting insecurity of it following migration (at least when whole families move) directly touches upon the key areas of this report, land rights require attention in any comprehensive discussion of climate-induced migration.



## 6. Strengthening Adaptation Through Migration

210. Migration has often been presented as a solution of last resort—a desperate flight that would suggest a failure to adapt to environmental changes. As a result of this, migrants have often been portrayed as lacking in resources, as helpless victims of environmental forces beyond their control. Such discourses are detrimental to the migrants; they can shape their identities and put them in a relativist trap.

211. On the contrary, it is increasingly recognized that migration can also be used by migrants as an adaptation strategy, a fact that has been recognized in the Cancún Adaptation Framework, which was adopted at the United Nations Conference on Climate Change (COP 16) in 2010.

212. Though migration can come at a significant cost for both the migrants and those left behind, it can also provide significant benefits to the region(s) of origin and destination. For source communities, it means that the pressure on resources and the environment is alleviated, and remittances can usefully complement adaptation funding as well as improve the adaptive capacity of communities. In the long-run, migration can be instrumental in fostering resilience at the household level, as it allows for income diversification and better access to information and social networks. Migration has long been recognized as an effective tool for development, and this report makes the case that it can also be a pertinent adaptation strategy. For migration to realize its potential as an adaptation strategy, however, different policy interventions are required.

### A. Expanding Migration Opportunities for the Poor

213. When faced with environmental disruptions, the poorest populations are often unable to move and can only migrate very short distances. At the

same time that an increasing number of populations find themselves forced to move because of climate change, significant numbers of populations often find themselves forced to stay. Climate change could indeed prevent the most vulnerable from migrating, as their resources will be reduced (Figure 10). This report makes the case that any policy intervention aimed at addressing climate-induced migration should care not only for those who leave but also for those who stay, as they are often the most vulnerable.

214. The propensity to move is highly dependent upon poverty. While poverty is a significant driver of migration, the very poor often don't have access to the resources that would enable them to move, and are thus deprived of migration options. Climate change is further expected to reduce these resources.

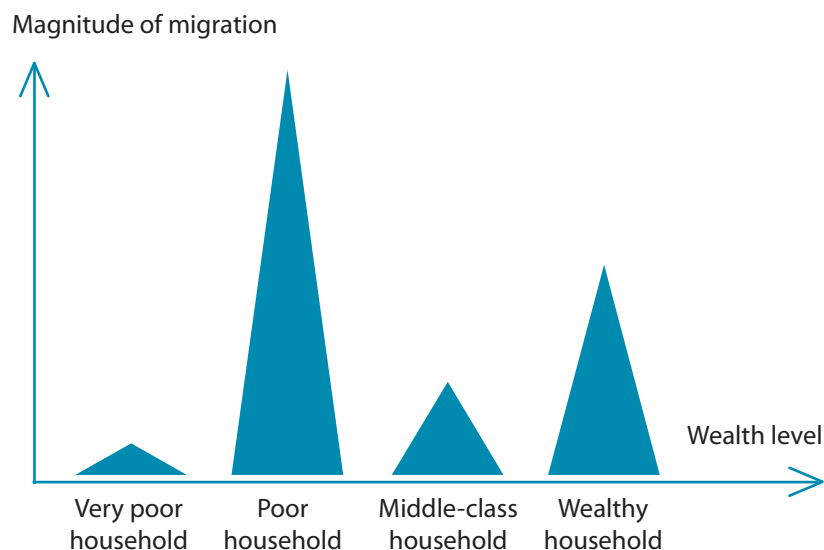
215. As the poor often live in vulnerable and highly exposed areas, on marginal land, or nearer to coastal zones than the well-off, they are more likely to experience damage. They often live in poorly constructed dwellings in densely populated neighborhoods which results in proportionately more people being affected when a climatic event hits. Taken together, the poor are more likely to be forced out of their homes.

216. When poor people move, evidence suggests that migration can reduce poverty in pure financial terms (World Bank 2011a). But it has also shown that the very poor move less or to “low-return” destinations, or to other high-risk marginal places nearby. In Bangladesh, people living on chars<sup>6</sup> often need to move regularly to another char, though these are places of extreme environmental vulnerability.

217. When migrants leave voluntarily, the very poor have often sold assets at discounted prices upon leaving and experienced loss of assets such as land,

---

<sup>6</sup> Chars are ephemeral sandbanks that are formed in the riverbeds.

**Figure 10 Magnitude of Migration According to Wealth Level**

Source: Authors.

housing, jewelry, and livestock, although the amount of consumer durables such as radios, televisions, and bicycles has increased (Sundari 2005). Due to the loss of livelihood, habitat, assets, financial and social capital, social integration, and social order, these households are even more vulnerable than they were before moving. Poor households enter a circular movement of rebuilding and regressing, and too often remain in poverty. Or, as Sundari (2005) notes for India, family migration can increase the households' income and help the migrant households avoid hunger, starvation, and death but often it is accompanied by a deterioration of living conditions. This self-sustaining cycle prevents many of those living in developing countries from accessing the potential benefits and poverty-reducing potential of migration.

218. If migration is not carefully planned and assisted, there is a serious risk that it can turn into maladaptation, i.e., leave people more vulnerable to environmental changes. Therefore, any adaptation scheme or migration policy has to be planned carefully. However, for now, migration planning as an adaptation strategy is virtually nonexistent in policy design. Few if any national action plans for adaptation give serious attention to migration. Furthermore, it is important that migrants are entitled to the same rights and benefits as the host communities.

219. About 50% of all cross-border migrants in developing countries move to other developing countries, and about 80% of this movement occurs between neighboring countries with small wage differentials (World Bank 2011a). Despite the small difference in wages, the welfare gains can still be significant and do help in alleviating poverty in many countries. "Migration can both cause and be caused by poverty. Similarly, poverty can be alleviated as well as exacerbated by population movement" (Sundari 2005, 2,301). Similarly, environmental stress can be alleviated by population movement. Migration often mediates the relationship between population pressure and resources.

220. Wealth and socioeconomic status are among the most influential determinants of vulnerability, as they provide households with a buffer mechanism and more options to overcome hardships (beyond the fact that more wealthy households tend to live in less dangerous and exposed dwellings). One of these options is migration. Migrating over long distances, particularly, requires capital in a number of forms:

- (i) **Financial capital:** income, savings, insurance, and borrowing capacity.
- (ii) **Social capital:** networks between origin and destination areas.

- (iii) **Human capital:** marketable skills, entrepreneurship.
- (iv) **Cultural capital:** language, experience with customs in destination area.
- (v) **Political capital:** legal status, visa issues.

221. Clearly these apply not only to the move itself but also to life at the chosen destination. Migrants must be able to afford to live at their destinations. A lack of financial and other resources explains why poorer households often migrate internally, short distances, or to more lucrative economic places in the proximity or in neighboring countries.

222. It is of utmost importance that migrants are provided with portable benefits and entitled to equal rights, such as health care, education, and political participation. Service schemes for workers displaced by disasters could include emergency employment or livelihood restoration. Migrants are often denied their rights because of anti-immigrant attitudes and policies in host communities. Such attitudes and policies fuel prejudices, are detrimental to both the migrants and the host communities, and increase the vulnerability of migrants.

223. Wealthy classes mostly move to international destinations or as a faster reaction to slow-onset or repetitive disasters (Laczko and Aghazarm 2009). However, the migration rates of less-skilled workers who are nonetheless financially able to migrate for work are also on the rise. Both the wealthy and the poor choose to migrate disproportionately more than other groups and, among the poor, those from rural areas tend to migrate in higher numbers.

224. The risk of brain drain is particularly justified in that context and international organizations have raised concerns about the ability to retain a critical mass of skilled workers in areas where this is common, such as migration from the Pacific island states (Bailey 2010).

225. Raleigh and Jordan (2010) showed that migration often depends on social networks, which are a measure of costs. As the network grows, the likelihood of migration grows for all income groups, but more so for the poor. Hence, lowering the costs of migration particularly benefits the poor and allows them to participate in international migration, which they can use to escape poverty. Internal restrictions of many developing countries are also

a key impediment to pro-poor migration, with the timely and expensive passport acquisition procedure (sometimes issued in only a limited number of offices) being one example, and the restrictions of free movement for certain groups, especially women, being another.

226. In a world of increasingly skill-selective immigration policies, there is a need to provide and increase the opportunities of the poor and less-skilled people to take part in and benefit from international migration. Therefore, sending governments can react in a number of ways to allow poor people to harness greater benefits from migration.

227. However, despite the large numbers of poor people on the move, studies uniformly show that, because of the lack of any means to adjust, the poorest households often cannot move. Therefore, particular attention should be paid to those social groups that lack any means to adjust. For example, studies have shown that massive outward migration does not occur if aid and its effective distribution (e.g., in Bangladesh) or economic incentives such as compensation (e.g., in India) are granted. Both are promising ways of targeting poor people but dedicated action is needed to ensure that it reaches them.

## B. Housing, land, and property

228. Home ownership is often an impediment to moving and can increase the number of people (such as women) left behind, which has been shown for developed and developing countries. Land-owning families choose other coping strategies under hardship; e.g., they might send a family member to a nearby city or town or try to diversify their livelihood strategies. After disasters, homeowners tend to remain in the area to reclaim their land and secure property as soon as the disaster situation has resolved.

229. Home-owning families are, by definition, likely to be of middle-income levels and are therefore not wealthy enough to abandon their home completely and not poor enough to leave. Housing, land, and property are core components of livelihoods, without which the vulnerabilities of populations can not be reduced.

230. In destination areas, land tenure issues can lead to competition and conflicts with host communities.

It is therefore crucially important that migrants are provided with adequate housing, land, and property in these areas. Unequal distribution of land can lead to integration issues for new migrants and hinder adaptation and disaster risk reduction strategies.

231. In the area of origin, Barnett and Webber (2010) highlight that displaced people are sometimes stripped of their land by opportunistic actors, which impedes on their ability to return. They note that “codifying and enforcing the property rights of the temporarily displaced is therefore important.” A key reason that often prevents people from moving away from disaster-impacted zones is the fear of losing land and property. Indeed, land and home grabbing often occur in the aftermath of disasters. In many countries, keeping a record of land ownership would represent a major step forward, as land grabbing would no longer be an issue. In 2005, the United Nations Sub-Commission on the Promotion and Protection of Human Rights endorsed the UN Principles on Housing Property Restitution for Refugees and Displaced Persons. These become known as the Pinheiro Principles. They highlight the right of refugees and displaced people to return not only to their country but also to their land and home. They provide an international standard and rights-based approach that should also apply to those displaced by environmental changes.

### C. Gender issues

232. Climate change impacts and the use of migration as a coping strategy are far from being gender neutral. The stronger relationship between women and poverty and between women and vulnerability to environmental impacts, and the fact that women in many countries of Asia and the Pacific (particularly in the developing countries) are less powerful than men, means that environmental impacts are strongly gender specific. There is a disproportionate risk to women from natural disasters. More women than men die in severe storms in flooding because of a lack of mobility due to gender barriers, the fact that women are less likely to know how to swim than men, and other factors (Oxfam 2005).

233. Women comprise about half of all international migration, although this differs significantly from country to country (United Nations Population

Fund [UNFPA] 2007). In Nepal, for example, the overwhelming majority of migrants are male. The same was seen for the substantial labor migration from Bangladesh and India to the Middle East. These migrants are mostly male and are semi-skilled or unskilled. In other countries—such as Indonesia, Philippines, and Sri Lanka—women migrants far outnumber their male counterparts, with 60%–80% of international migrants being women.

234. Men are assumed to account for the majority of seasonal internal migration, which is partly based on the gendered reactions after natural disasters. Naik (2009) points out that women respond to disasters by mobilizing social networks, whereas men more frequently adopt strategies that take them away from their families or communities. So, households under environmental stress and serious livelihood concerns will often decide to send a male member of the family to work in another region or nearby urban area, if they can afford it. If this is the father, the family is seasonally separated and the woman becomes the de facto head of household. Women then have increased responsibility to care for the household, the children, and themselves, which might entail substantial responsibilities and opportunities. Women might enjoy greater autonomy, decision-making power, and independence—a change in traditional gender roles that sometimes goes along with a change in expectations of men too. For example, Kerala “Gulf wives” in India have sometimes evolved into a new generation of self-confident, independent female managers, which is only possible where females have the right to own land, make household decisions, and have their own bank account. In other parts of India and Asia this is not yet the case.

235. However, women might find it difficult to enforce their de facto decision-making power and protect their goods against others when their role is not accepted. Women in very traditional or strongly Muslim regions may even not be able to take decisions themselves without the consent of their husband or his natal kin and are strongly dependent on the remittances he sends back. Women tied to their households have less time for other community work and governance activities, to get an income themselves or an education, or to migrate. In particularly hard times, girls drop out of school to help their mothers and the probability for domestic violence increases (Bernabe and Penunia 2009).

236. Another important aspect of the gender dimension is the extent to which it enables not only men but also women to migrate, and the implications that follow. Recent trends show that women from Asia and the Pacific increasingly migrate, and that some governments, e.g., in Nepal, have dropped the ban on female formal sector workers (Ahluwalia 2005). Still, in many traditional societies migration of women is restricted; unmarried women are not allowed to migrate without the consent of the father or another adult relative, and married women cannot migrate without the permission of their husbands. Countries that impose such regulations on women show 5%–6% fewer migrants per capita than those that do not (Gibson and McKenzie 2009). Nepal has incorporated the rights of women workers into the Foreign Employment Act.

237. Female migrants increasingly move to the Middle East and to high- and middle-income countries within Asia and the Pacific, e.g., Malaysia; Hong Kong, China; Japan; and Australia. Domestic employment opportunities, occupations as caretakers or caregivers, as well as jobs in nursing and manufacturing (particularly the garment industry) have outperformed but not replaced traditional female migration drivers such as family reunion and marriage migration (Jolly and Reeves 2005).

238. Women more often work in professions classified as unskilled or enter the skilled labor market at lower levels of management than do men, with greater rights granted for skilled jobs (Jolly and Reeves 2005). This leaves women migrants with fewer rights and less protection or enforcement power. Female migrants are more often at risk of a cut in wages for taking leave or of termination for absenteeism; they also accept or have to accept lower wages than local workers, mainly because of the lack of knowledge of current wage rates or illiteracy (Sundari 2005). It leads to de-skilling, disqualification, and lost qualities.

239. For men, the highest push factor for migration is the lack of employment in sending areas and the seemingly favorable employment conditions at the destination. However, women also migrate for the prospects of self-realization or to flee marriages or very traditional forms of living. For example, the large rates of female migration in the Philippines, Sri Lanka, and Indonesia have been attributed amongst other things to the fact that women in these

countries are taking life decisions relatively independently of their husbands and kin (Omelaniuk 2005). For this reason, women are also found less likely than men to express the desire to return to their countries (UNFPA 2007).

240. It should be noted that environmental disasters can increase women's exposure to the risk of human trafficking. The vulnerability of women and girls to exploitation, illegal trafficking, and other forms of gender-based violence is often greater in the aftermath of such disasters, as their families and livelihoods are lost or disrupted. A recent United Nations Environment Programme (UNEP) report draws a link between environmental disasters and human trafficking, with a notable increase in trafficking after such events (UNEP 2011).

241. Finally, women's rights also need to be addressed in their home countries. Women who are voluntarily or involuntarily left behind by their husbands (e.g., when the husband is killed in a disaster) have extremely few rights in many traditional societies. Remarriage, migration, or sex work is often the only solution left; otherwise women languish in extreme poverty. Staying in their home region, these women keep being exposed to environmental extremes and are then even more vulnerable, as the financial base and the social protection mechanisms vanish.

## D. Remittances for adaptation

242. Remittances are seen as a major contributor to development, household risk reduction, and decreased vulnerability at the household level while affecting inflation, exchange rates, and interest rates at the macro level. They add to the household income of recipients, and are usually not disrupted by environmental disasters. Remittances are used to fund basic needs (food and housing) and for investments in education and health, thereby helping to break the cycle of poverty in poor recipient families.

243. The majority of studies on remittances refer to financial flows. However, in addition to the pure financial fluxes, social and cultural exchanges are also witnessed. The exchange of knowledge and skills are often called "social remittances" (Bailey 2010). Social remittances are characterized by movement of social capital into weakly developed

innovation systems and lead to a shift in focus away from brain drain to “brain gain” or “brain articulation” (Bailey 2010, 377). Social remittances can initiate trade through better market information, trust, and loyalty among ethnically alike business partners, and thereby reduce business risks on various levels. Cultural remittances as the third group lead to the reworking of gender roles and class in both the sending country and the receiving country.

244. Economic remittances reduce the need for migration in the sending countries (Bailey 2010) and are seen as significant resources for development. However, remittances vary in size, dynamics, and distribution, and there is variance in the strategies for and effectiveness of financial exchanges based on skill, occupational position, and gender. Women have been found to remit proportionately more of their earnings than men, although the absolute amount is less because of lower absolute payments (Omeliyanuk 2005). The UNFPA (2007) found that Bangladeshi women working in the Middle East remit 72% of their earnings while men remit 56%. Men spend remittances on consumer items, such as cars and television sets, and invest in livestock or property; women more often invest in education.

245. Although generally regarded as positive, remittances can also impose an enormous stress on the remitting household member. Workers exposed to the expectations to remit home are faced with the psychological aspects—the emotional and social stress. Bailey (2010) takes up that argument and questions the overall sustainability and ethics of a development policy based on remittances.

246. Another critical factor of the sole concentration on remittances in the environment–migration–adaptation nexus is highlighted when people can stay in high-risk areas only through remittances. Their adaptive capacity might increase and property damage after events quickly indemnified, but the households cannot make use of the remittances to such an extent as without the recurring damage. Moreover, the risk to human beings cannot be averted in areas of frequent extreme events. The inequality between households with remitting household members and those without is another critically discussed aspect. Skeldon (2006) argued that remittances increase inequality. Still others assume that such difference might drive migration in return (Laczko and Aghazarm 2009).

247. Several initiatives are under way across Asia and the Pacific to improve remittance services. For example, to address the needs of overseas Filipino workers, the Philippine National Bank created a reloadable prepaid automated teller card that users can hold without the requirement that they open a bank account. Remitters can transfer money directly to the card. The Philippine National Bank has also created over-the-counter and door-to-door services that allow clients to directly receive cash without either an account or bank card. The over-the-counter option allows clients to claim cash from a number of payment outlets in major Philippine cities, where the door-to-door service provides direct delivery to client homes. These two services are useful for clients that are not technologically savvy or who live in remote areas that do not have access to bank branches and automated teller machines (Lee Kuan Yew School of Public Policy 2011).

248. In January 2012, ADB’s Japan Fund for Poverty Reduction provided a \$2 million grant to improve access to remittance services in Bangladesh. The grant will raise awareness of remittance processes through information dissemination and training on remittances and financial literacy for tens of thousands of rural households.

249. It is worth remembering that remittances are private family income and should not be considered as a substitute for state investments, development aid, or international obligations to address climate change. Lowering remittance costs (Box 4) remains a powerful way to contribute to the capacity of communities to manage environmental risk.

## E. Resettlement

250. Several Asian and Pacific country governments have already implemented resettlement schemes in order to protect the environment or protect people from environmental changes. Such resettlement processes have been conducted in Viet Nam and in the PRC, for example. If the global temperature increase averages 4°C or more, it is highly likely that some parts of the region will become unsuitable for human settlement (Gemenne 2011a). Resettlement processes will thus become more frequent. They should ideally be considered as solutions of last resort, undertaken only if people’s lives are directly threatened.



251. When resettlement is considered, it will be vital to learn from past efforts so that the schemes can be improved to better address the needs of the resettled populations. Factors that have made successful resettlements work need to be identified so they can be replicated when there is no other viable solution (de Sherbinin et al. 2011).

252. Populations should be involved in the resettlement process from the beginning, and constant consultation needs to be conducted at all stages of

the process. It is particularly important that populations have a say in the place where they are resettled and are integrated in the resettlement organization process. Assistance before, during, and after resettlement should be provided to affected persons and communities.

253. Support and cooperation from other countries and the international community would be required if inland resettlement is impossible, as could eventually be the case with small island states.

#### Box 4 Lowering Remittance Costs

The cost of money transfers remains too high and is too often a deterrent to the sending of remittances. Fees can represent as much as 10%–15% of the amount transferred, especially for small transactions. Such fees include the fees of the sending agent, currency conversion fees, and sometimes fees from the receiving agent.

Governments can seek to reduce these costs by improving access to financial services—such as bank accounts—for migrants, encouraging competition amongst financial services providers, or setting a cap on transfer fees. Poor migrants in particular should be provided with greater access to banking services, which usually offer cheaper transaction fees.

At their summit in L'Aquila in July 2009, the G8 heads of state made a pledge to achieve the objective of reducing the global average costs of transferring remittances from 10% to 5% in 5 years. Average remittance costs were 8.8% in 2008 and 7.3% in the third quarter of 2011, but remain high in small countries (World Bank 2011b).

#### Box 5 Safeguards for Resettlement in Development Projects

Involuntary resettlement under development projects can give rise to severe economic, social, and environmental risks, and result in long-term hardship and impoverishment of affected people if it is not managed well. Recognizing this, the Asian Development Bank has adopted a policy for involuntary resettlement to minimize the negative impact of physical relocation in the projects that it finances. Elements of this policy could be adopted for the resettlement of persons residing in areas no longer safe for human habitation due to environmental threats.

The Asian Development Bank's involuntary resettlement safeguards aim to

- (i) avoid involuntary resettlement wherever possible;
- (ii) minimize involuntary resettlement by exploring project and design alternatives;
- (iii) enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and
- (iv) improve the standards of living of the displaced poor and other vulnerable groups.

Involuntary resettlement safeguards call for meaningful consultation with affected people; compensation of losses and provision of assistance to and benefit sharing with displaced persons; and special measures for the poor and vulnerable. Involuntary resettlement safeguards also require the preparation, implementation, and monitoring of time-bound resettlement plans.

Source: ADB. Involuntary Resettlement. <http://beta.adb.org/site/safeguards/involuntary-resettlement>



## 7. Improving the Knowledge Base

254. Many uncertainties remain about how populations in particular locations react to environmental changes, both sudden and of a slow-onset variety. For this reason, more focused research is required in order to inform decision making.

### A. Data Collection

255. A major limitation of all policy initiatives is the lack of data, and especially of quantitative data. In particular, for many countries in Asia and the Pacific, there is a lack of appropriate data to

- (i) be spatially and temporally specific about the location, extent, timing, and nature of climate change and its likely impacts on different population groups (e.g., men, women, wealthy, and poor); and
- (ii) establish accurately and comprehensively the contemporary patterns of internal and international mobility.

256. Accordingly, there is a need for improved data collection, modeling, and analysis of both climate change and migration for the individual countries in Asia and the Pacific. In many countries, statistical information on both internal and cross-border migration is not consistently collected. The systematic collection of data is a key challenge, as many developing countries simply don't have the capacity to monitor migration flows, especially within their own borders. Data collection on climate-induced migration needs to be commissioned.

257. The development of country profiles could be a first step, although it will require significant resources and capacity building. The inclusion of questions related to the perception of environmental changes and internal mobility in national surveys and censuses would be another major step in this direction.

258. Censuses need to be more inclusive and account for the most vulnerable populations, who

are often invisible. They need to reach out to marginalized communities and include questions on migration and perception of environmental changes. Too often the plight of the most vulnerable populations is unheard because they are simply not accounted for in the national databases. In Bangladesh, for example, populations living on chars are unaccounted for in national censuses.

259. A common set of indicators needs to be developed throughout Asia and the Pacific. Such indicators would make it possible to monitor the progress made in reducing the vulnerability of communities, as well as make comparisons over time and across countries.

260. Data is insufficiently shared on a regional level. Existing data and research need to be shared more effectively amongst researchers and across countries in order to allow for mutual learning. Setting up a network of local researchers could prove instrumental in this task, as would be the setting up of common indicators and benchmarks. A regional database would also prove a key asset.

### B. Empirical research

261. Along with quantitative data, more systematic and wider empirical studies are needed. Such studies are particularly needed to understand

- (i) how slow-onset environmental changes affect migration patterns,
- (ii) country and subnational trends of climate-induced migration,
- (iii) the impact of climate change on migration behaviors of men and women,
- (iv) tipping points for migration,
- (v) circular migration,
- (vi) situations of protracted displacement,
- (vii) impacts of climate change on labor conditions, and
- (viii) how migrants and vulnerable communities perceive environmental changes.

262. Most of the aforementioned areas require qualitative information, which is only sporadically available and infrequently on a sex-disaggregated basis. There is also a need to improve and increase the number of empirical studies on climate-induced migration so that policy responses can rely on a more robust understanding of migration patterns, drivers, and networks.

263. Research findings from academic and research institutions are poorly transmitted to opinion formers and decision makers. Research needs to be made relevant to policy so that it can inform public policy making. This implies that contacts between researchers and policy makers should be facilitated through policy forums and joint policy-oriented research projects.

264. Current qualitative research is often too fragmented and short term. On a regional scale, research should be coordinated through the development of common frameworks and methodologies in order to allow for comparisons across countries. Similarly, migration patterns and evolutions are not monitored in the long run. Migration dynamics need to be understood over long periods in order to capture their evolutions—longitudinal studies are a key tool here but are seldom used because of their costs and complexity.

## C. Research Capacities

265. Too often, research on climate-induced migration in Asia and the Pacific is conducted from industrialized countries, sometimes without field studies.

Local expertise needs to be better mobilized and research capacities need to be improved. A promising avenue for this lies in collaboration between local researchers, who can learn from each other, and across regions. There is a great need to train local researchers about this issue so that it can be studied with local expertise. Setting up local observatories, for example, could provide monitoring of climate-induced migration in the long run.

266. Communities need to be more involved and research should be more participatory. This would ensure that research benefits directly vulnerable communities. This could be done by involving members of the communities directly in the research design and process.

267. The links between environmental changes and migration can only be fully understood if natural sciences and social sciences are combined. Yet there is still too little interdisciplinary research on this subject. Reasons for this are multiple and lie in different methodologies, scholarly journals, and conferences. Natural and social scientists need to be brought together, and data on climate change need to be cross-checked against data on migration.

268. Finally, research on climate-induced migration needs to be better addressed by scientific bodies. It has so far been insufficiently considered by the Intergovernmental Panel on Climate Change (IPCC), and research remains too scattered and poorly coordinated across countries.

## 8. International Cooperation

269. For migration to play an effective role as an adaptation and response mechanism to the effects of climate change in a way that does not result in further deterioration in living conditions of the communities affected but instead facilitates an improvement in their well-being, it is necessary for appropriate policies and programs to be formulated and made operational. Effective management of migration, both international and internal, will be required if migration is to be effective in responding to climate change. Building sound migration management capacity to enable this is, therefore, a fundamental basic requirement.

270. In particular, it is important to improve the utilization of current migration channels to accommodate climate-induced migration; these channels should be reinforced to allow for increased migration flows. This would be in the interest of both the sending and receiving countries, as human mobility can play a key role in filling skills gaps in Asian labor markets. The sending of remittances by migrants should also be facilitated, as it can greatly reduce the vulnerability of families and communities living in regions at risk. Migration channels could also be improved through the provision of better portable services for migrants, such as social benefits (with regard to health services in particular) or access to financial services.

271. Promoting regional cooperation through dialogue and deliberation to enable knowledge sharing, risk pooling, and security provision for environment migrants—both internal and international—should therefore be on the core agenda. Personal security concerns will be particularly crucial for women climate migrants as they face significant personal security risks such as sexual violence and trafficking.

272. In some cases it is expected that resettlement of communities will be necessary. When inland resettlement is not possible, as could be the case for some island communities, international cooperation and support will be needed. In all cases,

the participation of affected communities in the decision-making process will be vital to limit the negative impact on culture and social networks, and to ensure livelihood opportunities and social services after relocation.

273. Overall, adequate protection frameworks will be needed regionally and globally. Currently there are no international legal frameworks that specifically target the people displaced by environmental disruption. Numerous instruments and mechanisms exist, but they are little known and inconsistently implemented. It is important to gather these instruments together, publicize them, and then work towards filling policy gaps. Such instruments include

- (i) the Geneva Convention, relating to the status of refugees;
- (ii) the International Labour Organization Convention on the Protection of Labor Migrants;
- (iii) the Guiding Principles on Internal Displacement;
- (iv) the Inter-Agency Standing Committee Operational Guidelines on the Protection of Persons in Situations of Natural Disasters; and
- (v) the Pinheiro Principles, stating the right for refugees and displaced people to return to their land and home.

274. Such protection frameworks will be particularly important in the cases of forced displacement (be it because of a sudden or slow-onset disaster) and relocation.

### A. Regional and International Frameworks

275. Although most climate-induced migration in Asia and the Pacific will continue to take place within national borders, pressure will grow for increased international migration as degrading environments combine with population increases, lack of

livelihood opportunities, access to migration channels, and other factors. Thus, attention to international frameworks is required. Fortunately, there are existing standards, guidelines, processes, and principles that can assist countries in negotiating solutions to environmentally driven migration.

276. Zetter (2011) notes that, in order to increase protection for migration, three recurrent and overlapping challenges have to be considered, i.e., whether the displacement and migration that occurs (i) is voluntary or forced, (ii) is temporary or permanent, or (iii) involves internal or cross-border migration. In all three instances, “protection gaps” have to be identified.

277. In principle, people who are internally migrating or displaced have more established rights protections than those who cross international borders. However, whilst the existing international rights framework favors internal over international migrants, a significant protection gap remains, mainly because of poor or nonexistent implementation of or compliance with legal standards. For international migrants, significant gaps in both principles and practice are recognized (Zetter 2011).

278. There are important debates in the scholarly community as to whether or not new protection frameworks should be developed. In particular, many observers have stressed that the Geneva Convention could not apply to migrants who crossed an international border because of environmental changes. These people, however, are often assisted by international organizations as part of international emergency efforts. Though the lack of international protection frameworks will eventually require attention, the real urgency is in the implementation of existing protection frameworks. These frameworks—such as the Guiding Principles on Internal Displacement or the Inter-agency Standing Committee Operational Guidelines on the Protection of Persons in Situations of Natural Disasters—are neither widely known nor implemented. Greater efforts should be made to familiarize national governments with these useful guidelines and their relevance to environmental migration.

279. At the same time, further consideration should be given to the need to consolidate existing protection frameworks or to shape a new one. One of the more significant initiatives is the Nansen

Principles, an instrument of “soft law” promoted by the UNHCR and the Government of Norway (Box 6). These principles were shaped at the Nansen Conference on Climate Change and Displacement in the 21st Century, held in June 2011 in Oslo, Norway. They define responses needed to the complex challenges raised by displacement in the context of climate change and other environmental hazards. States are encouraged to ensure the adequate implementation and operationalization of these principles through national legislation, policies, and institutions.

280. Different world regions have drafted regional conventions to address migration at large. Such conventions, such as the Kampala Convention (for Africa) and the Carthagena Declaration (for Latin America), include provisions to address environmental migration. No similar instrument exists for Asia and the Pacific. The Colombo Process provides the basis for countries to negotiate such a convention in the world’s most populous region (Box 7).

281. Member countries of ASEAN have agreed to create an ASEAN Economic Community providing for the free movement of goods, people, and services by 2015. Despite the implementation of visa-free travel, there is not yet free movement of labor. Guest worker programs control the inflow of workers into wealthier ASEAN countries, and typically contain exclusionary features such as occupations closed to foreigners, mandatory health checks, and a ban on family members joining the migrant worker (Lee Kuan Yew School of Public Policy 2011).

## B. Bilateral Arrangements

282. Regional cooperation and existing migration channels may provide much of the answer in addressing future climate-induced migration. For example, Williams (2008) states that regional cooperation which builds on existing geopolitical bonds and economic relations is more likely to be effective in addressing the problem of climate change displacement. In Bangladesh, for example, it is said that about 60% of the labor migration to Southeast Asia and the Middle East is related to kinship relations and social networks (McAdam 2011). Such agreements can help fill gaps in the labor market of the receiving country and reduce the population pressure on resources in the sending country, while

### Box 6 The Nansen Principles

Building on the legacy of the humanitarian, diplomat, and Nobel Peace Prize laureate, Fridtjof Wedel-Jarlsberg Nansen, the following principles were recommended to guide responses to some of the urgent and complex challenges raised by displacement in the context of climate change and other environmental hazards:

- (i) Responses to displacement related to climate and the environment need to be informed by adequate knowledge and guided by the fundamental principles of humanity, human dignity, human rights, and international cooperation.
- (ii) States have a primary duty to protect their populations and give particular attention to the special needs of the people most vulnerable to and most affected by climate change and other environmental hazards, including the displaced, hosting communities, and those at risk of displacement. The development of legislation, policies, and institutions, as well as the investment of adequate resources, are key in this regard.
- (iii) The leadership and engagement of local governments and communities, civil society, and the private sector are needed to effectively address the challenges posed by climate change, including those linked to human mobility.
- (iv) When national capacity is limited, regional frameworks and international cooperation should support national action and contribute to building national capacity, underpinning development plans, preventing displacement, assisting and protecting people and communities affected by such displacement, and finding durable solutions.
- (v) Prevention and resilience need to be further strengthened at all levels, particularly through adequate resources. International, regional, and local actors have a shared responsibility to implement the principles enshrined in the Hyogo Framework for Action 2005–2015: Building Resilience of Nations and Communities to Disaster.
- (vi) Building local and national capacity to prepare for and respond to disasters is fundamental. At the same time, the international disaster response system needs to be reinforced. The development of multihazard early warning systems linking local and global levels is critical.
- (vii) The existing norms of international law should be fully utilized, and normative gaps addressed.
- (viii) The Guiding Principles on Internal Displacement provide a sound legal framework to address protection concerns arising from internal displacement related to climate and other environmental factors. States are encouraged to ensure these principles are adequately implemented and made operational through national legislation, policies, and institutions.
- (ix) A more coherent and consistent international approach is needed to meet the protection needs of people displaced externally by sudden-onset disasters. States, working in conjunction with the UNHCR and other stakeholders, could develop a guiding framework or instrument in this regard.
- (x) National and international policies and responses, including planned relocation, need to be implemented on the basis of nondiscrimination, consent, empowerment, participation, and partnerships with those directly affected, with due sensitivity to age, gender, and diversity. The voices of the displaced or those threatened with displacement or loss of home or livelihood must be heard and taken into account, without neglecting those who may choose to remain.

Source: Foreign Ministry of the Government of Norway. [www.regjeringen.no/upload/UD/Vedlegg/Hum/nansen\\_prinsipper.pdf](http://www.regjeringen.no/upload/UD/Vedlegg/Hum/nansen_prinsipper.pdf)

providing remittances as a complementary source of income for the household.

283. An often-cited example is the pre- and post-migration preparation of Sri Lanka and the Philippines, which have very pro-active approaches to migration. The Philippines licenses recruitment agencies, markets its workers worldwide, has signed 56 bilateral agreements with receiving countries, provides predeparture seminars, and provides contact points for its migrants at the embassies in the destination countries.

284. Another example is New Zealand's Recognised Seasonal Employer (RSE) Program. Seasonal labor shortages in New Zealand's agriculture sector are addressed with unskilled workers from Pacific island countries. In addition to reducing labor shortages, other stated aims of the program are to encourage economic development, regional integration, and good governance within the Pacific region. The scheme has successfully allowed poorer households to diversify their livelihoods and take up employment in New Zealand, although different application and implementation mechanisms with different

### Box 7 The Colombo Process

In response to calls from several Asian labor-sending countries, the Ministerial Consultation for Asian Labour Sending Countries was held in 2003 in Colombo, Sri Lanka. The 10 initial participating states—Bangladesh, the People's Republic of China, India, Indonesia, Nepal, Pakistan, the Philippines, Sri Lanka, Thailand, and Viet Nam—made recommendations for the effective management of overseas employment programs and agreed to regular follow-up meetings.

Since the meeting, the member states of the “Colombo Process” have met in Manila (2004), Bali (2005), and Dhaka (2011) to review and monitor the implementation of previous recommendations and identify areas of future action. The ministerial consultations in Bali and in Dhaka were enriched by the participation of several destination countries or regions—Australia, Bahrain, European Union, Italy, Kuwait, Malaysia, Qatar, Saudi Arabia, Republic of Korea, Switzerland, United Arab Emirates, and the United States of America.

As the Colombo Process has evolved with each ministerial consultation, new members and partners have joined and the consultations have expanded in scope.

The process aims to continue to provide a forum for dialogue among member states. With the continued participation of the destination countries and regions, this dialogue is set to evolve and contribute to strengthening migration management both in Asia and in other destinations.

Source: IOM's Mission with Regional Functions for Dhaka, [www.colomboprocess.org/index.php?option=com\\_content&view=article&id=7&Itemid=3](http://www.colomboprocess.org/index.php?option=com_content&view=article&id=7&Itemid=3)

success rates exist. Another positive aspect of the RSE Program is that applicants are eligible for loans to finance their move.

285. In July 2012, Australia will launch the Seasonal Worker Program on a 3-year trial basis. The program will permit Australian firms in the horticulture and tourism sectors to hire workers from Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu. Employers will be required to demonstrate that they have a commitment to employing Australian job seekers as a first priority, employ seasonal workers in accordance with Australian work standards, and contribute to the workers' travel costs.

286. In September 2011, a court in Hong Kong, China ruled that foreign domestic workers who have resided for at least 7 years in the Hong Kong Special Administrative Region of the PRC could be eligible for residency status. The ruling could apply to more than 100,000 workers, a large number of whom are Filipina household staff. However, the government is appealing the ruling.

287. India is by far the largest market for Nepalese migration to foreign countries. This is explained not only by geographic proximity and cultural similarities but also by the absence of a requirement for Nepalese migrants to have a visa to work in India.

## C. National Responses

288. Often, national institutional arrangements limit the migration opportunities of people in their own country. For example, the household registration system in Viet Nam regulated population migration before 1990 (Zetter 2011); a similar registration system that prevented people from voluntary internal movement existed in the PRC until the late 1970s. Both systems have primarily addressed migration from rural to urban areas. Only with the increasing demand for urban labor and the economic liberalization in the country were the rules of such systems relaxed. Still, today many people find themselves unable to move because they lack proper identification documents. These documents, such as birth certificates, should be automatically provided to all.



289. Viet Nam has an explicit and instrumental approach to the potential impacts of climatic change in Asia and the Pacific, and a well-grounded institutional and policy apparatus. The government has sought to relocate people living in disaster-prone areas (Zetter 2011). Similar approaches are likely to be adopted in other countries in the future. A major

challenge for authorities will be to harmonize strategy and policy frameworks for development with those for environmental protection and migration.

290. Some OECD member countries have adopted laws that permit acceptance of persons emigrating from areas affected by natural disasters (Box 8).

### Box 8 Asylum for those Displaced by Disasters

The United States (US) and Nordic countries grant asylum under different conditions to those displaced by natural disasters.

In the United States, the Temporary Protection Status (TPS) was introduced for those who did not meet the criteria of the legal definition of refugees but were fleeing dangerous situations. The US Immigration and Nationality Act stipulates that nationals of a foreign country can be granted TPS in the United States if the following conditions are met:

- (i) there has been an environmental disaster in the foreign state resulting in a substantial, but temporary, disruption of living conditions;
- (ii) the foreign state is unable, temporarily, to handle adequately the return of its own nationals; and
- (iii) the foreign state officially has requested such designation.

The status can be issued for periods of 6–18 months, with a possible extension if the conditions do not change in the foreign country. However, TPS remains a temporary status, and should not be mistaken for a permanent residence status.

Immediately after Haiti suffered a major earthquake in January 2010, about 200,000 Haitians living in the United States without proper documents were granted TPS, allowing them to work—and send money home—without fear of deportation. That single step may have been the greatest official contribution made by the United States towards Haiti's reconstruction. That is because the 535,000 Haitian migrants in the United States send home remittances worth as much as \$2 billion a year. An early estimate by World Bank economist Dilip Ratha suggested that the temporary protected designation might have been worth as much as \$360 million in additional remittances to Haiti in 2010 alone. That is more than the total US aid disbursements to the country in 2010 and 2011 (Kenny 2012).

Laws in both Sweden and Finland recognize “environmental migrants” as a category of “person in need of protection”, and in theory offer protective measures for those people. However, there are two major problems with the Swedish legislation. First, the legislation is based on a preparatory foundation that limits its applicability to cases of sudden environmental disasters and does not extend to cases of continuous environmental decline – meaning that populations displaced by storms would be eligible for subsidiary protection, but those displaced by drought would not. And, secondly, no person has ever been granted subsidiary protections in Sweden for environmental reasons, raising questions about whether Sweden would be prepared to deal with a large number of cases of environmental asylum, should they arise.

In the Finnish case, the preparatory framework informing the legislation does not contain the same limitations as in the Swedish case, and includes a specific reference to cases when a person's home environment has become too dangerous for human habitation either because of human actions or as a result of natural disaster. Although the Finnish Immigration Service confirms that this specific aspect of the Finnish Aliens Act has been used rarely, this kind of legislation points to the ability of individual states to create immigration and asylum policy in ways that can provide legal categories of protection for environmental migrants. The inclusion of “human causes” may also point towards a way of ensuring that the legislation covers cases where climate-change-induced displacement represents a clear causality.

Source: Glahn, Ben. 2011. “Climate Refugees? Addressing the International Legal Gaps - Part II.” International Bar Association. [www.ibanet.org/Article/Detail.aspx?ArticleUid=3E9DB1B0-659E-432B-8EB9-C9AEEA53E4F6](http://www.ibanet.org/Article/Detail.aspx?ArticleUid=3E9DB1B0-659E-432B-8EB9-C9AEEA53E4F6)



# 9. Funding Climate-Induced Migration

## A. Overview of Cost and Funding Issues

291. Adaptation to climate change through the year 2050 has been projected to cost \$40 billion in Asia and the Pacific alone, but this projection immediately prompts questions about its meaning and proper interpretation. How much is the \$40 billion figure affected by future economic conditions, technologies, policy decisions, demographics, and the like? How will the considerable cost of adaptation be funded, particularly in poor countries? What is happening now that could drive adaptation costs higher? Can anything be done to reduce costs?

292. Further questions emerge when considering the relationship between adaptation and migration—it should be clear by now that migration is an adaptation strategy. Are the costs of migration included in the all-encompassing \$40 billion cost of adaptation? How could migration affect the costs of adaptation for better or worse? To what extent will adaptation measures be migration-inducing activities themselves?

293. Issues of costs and funding for climate-induced migration extend far beyond simply putting a fixed price tag on the phenomenon. This section evaluates climate change and its impacts on migration as a multifaceted risk management problem that requires a well-equipped toolbox to be managed effectively. The optimal toolbox utilizes both public and private funding sources to turn a well-planned strategy into action. While the programs and transactions will vary widely based on local requirements, the following illustrates the kind of innovative risk management tools that could be applied to climate-induced migration:

- (i) In 2008, Hurricane Ike made landfall on the Turks and Caicos Islands as a category 4 hurricane, with sustained winds of over 210 km/hour. The storm made a direct hit on the capital of Grand Turk, causing damage

to an estimated 85% of homes there as well as widespread flooding and infrastructure damage. About 2 weeks later, the government of the Turks and Caicos Islands received payment of approximately \$6.3 million from the Caribbean Catastrophe Risk Insurance Facility (CCRIF). According to the terms of the insurance policy purchased by the Turks and Caicos Islands from the CCRIF, the payment amount was based on a pre-arranged parametric formula using objective data about storm intensity (wind speed, rainfall, storm surge, etc.) from the National Hurricane Center in the United States. In contrast to traditional insurance, no assessment of loss or damage was required, enabling the final calculation and payment to be made only 14 days after the event, thus ensuring the flow of funds available for disaster response and other government functions when they were needed most.

- (ii) The Government of Malawi, together with the Department for International Development of the United Kingdom, entered into a weather derivative contract in the summer of 2008 to help satisfy the country's food requirements in the event of a severe drought. With the World Bank as intermediary, the contract provided that daily rainfall data from about 20 stations would be put into a formula to compute an estimate of maize yields. In the event of a severe drought (based solely on the rainfall data), the Government of Malawi could receive a payment of up to \$5 million that could be used to resolve the resulting food shortage by, for example, purchasing grain or distributing grain stored in national stocks.
- (iii) Two companies in the Philippines—Smart with its Smart Money and Globe with its GCash product—have led the innovation in mobile phone banking that is used increasingly by low-income Filipinos to send and receive domestic remittances. Many users of these products have no access to formal banking services.

- (iv) In August 2011, Tropical Storm Muifa battered the coastal city of Daila in the PRC, breaching a dike near the Fujia chemical plant. Fortunately, a feared chemical spill did not materialize but authorities considered alternative locations for the plant where it would be safer from storm and sea threats. Whether formally or informally, many governments work with local authorities to provide post-disaster assistance that may include funding for longer-term adaptation or relocation strategies that affect migration patterns, either into or away from exposed areas.

294. Many other examples could be cited, but it should be clear that a wide variety of existing financial mechanisms and innovations can be applied to climate-induced migration, and the optimal strategy will be to draw upon a diverse set of mechanisms tailored to particular needs.

295. Unfortunately, the financial tools for managing climate-induced migration (as well as other consequences of climate change) are grossly inadequate throughout much of developing Asia and the Pacific. While humanitarian aid and development agencies have begun taking a more disciplined risk management approach to providing services, this rarely extends into managing funding sources. Development assistance comes primarily from bilateral and multi-lateral agencies. When more funding is needed, e.g., to respond to a natural disaster or armed conflict, an appeal is sent to donors to meet the additional funding needs. This money-raising strategy is risky, especially as donor resources become increasingly constrained.

296. The tools for managing climate-induced migration will both benefit from—and spill over into—many other areas that do not necessarily relate to climate change or migration directly. Mobile phone banking is not just for sending remittances. Insurance ought to address more than just risk of damage and loss from bad weather and floods. Development in climate-safe areas may induce migration to safer areas, but neither climate change nor migration figure prominently in most development interventions. Migrants affected by climate change represent only a tiny fraction of the beneficiaries of robust and reliable financial and insurance markets. Research and modeling required for efficient trading of weather and disaster risk will use the same technology that is needed for early warning systems, urban planning, and disaster

preparedness plans. In fact, only in exceptional cases does a funding mechanism or policy apply just to environmentally related displacement.

## B. Costs of Climate-Induced Migration

297. We proceed by analyzing costs related to climate-induced migration, including uncertainty itself as a cost with aspects that can be monetized and traded in insurance and capital markets. This leads to a discussion of public and private funding mechanisms available for climate-induced migration. Finally, we briefly discuss strategies for selecting, developing, and promoting appropriate funding mechanisms to address climate-induced migration, focusing on what development banks, intergovernment organizations, and official development assistance agencies can do.

298. Costs associated with climate-induced migration fall into three general categories:

- (i) **Up-front costs**, or money required to pay for goods and services related to climate-induced migration, including costs for
  - (a) migration, including costs for
  - (b) transporting and accommodating migrants,
  - (c) providing disaster relief,
  - (d) protecting migrants,
  - (e) collecting data and researching climate-induced migration issues,
  - (f) developing technology that benefits climate-induced migrants,
  - (g) educating stakeholders and sharing information,
  - (h) advocating on behalf of migrants and threatened populations,
  - (i) developing disaster response plans, and
  - (j) assisting host countries.
- (ii) **Economic losses**, or opportunity costs resulting from climate-induced migration, including
  - (a) lost productivity that occurs when a refugee gives up work at home to dwell in a camp with few or no opportunities to do the same kind of work;
  - (b) loss of real estate and property left behind, particularly where ownership and title are not adequately recorded or enforced; and

- (c) economic deterioration in the place of origin due to the departure of productive individuals (“brain drain”).
- (iii) **Social, cultural, and personal costs**, the value of which exceeds what can be expressed in money terms, including
  - (a) extinction of languages and cultural heritage,
  - (b) separation of individuals from families and friends,
  - (c) mental illness, and
  - (d) constrained liberties.

299. Looking to the future adds a fourth cost category—the cost of **uncertainty**—which encompasses all three cost categories and is especially important in the context of funding mechanisms.

300. To set the stage for the discussion of funding mechanisms, this section begins by describing uncertainty as a cost, reflecting the way climate-related risks are often analyzed in insurance and financial markets. Then, more specific costs are highlighted, with emphasis on up-front costs for which funding may be required, and opportunity costs that may be reduced or eliminated through appropriate funding mechanisms. It is understood that any funding or policy mechanism will impact social, cultural, and personal conditions and these impacts will also need to be considered in the final analysis.

## 1. Uncertainty is a Cost of Climate-Induced Migration

301. In nearly every respect, climate-induced migration is characterized by a high degree of uncertainty. In evaluating the costs of climate-induced migration, it is important to note that uncertainty itself is a cost. People are generally risk averse, meaning that they prefer a more certain outcome over a riskier one with the same value on average. To the extent uncertainty about climate-induced migration can be reduced, costs are also reduced.

302. In seeking solutions for climate-induced migration, it helps to view it as a risk management problem rather than as a deterministic process. More precisely, it is a collection of risk and capital management problems linked together by the common threads of climate change and migration.

The risk characteristics of climate-induced migration are central to policy options generally and, in particular, form the basis for constructing financial mechanisms for managing these risks effectively.

## 2. Financial Markets Specialize in Uncertainty

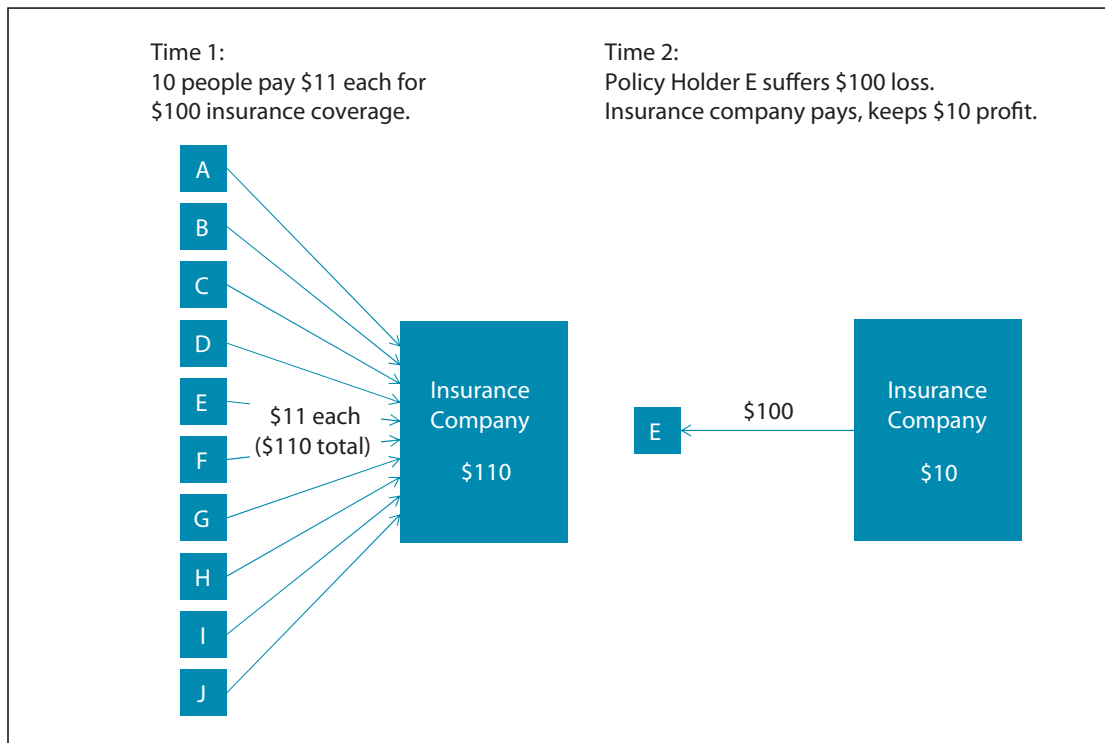
303. Uncertain future outcomes are analyzed, monetized, and traded in large amounts on a daily basis in insurance and financial markets all over the world. Investors, businesses, governments, insurance companies, and households bring different needs, beliefs, and capacities to the table and develop mechanisms that reduce uncertainty for one party in a way that is profitable to the other.

304. Financial and insurance markets exist and are viable in part due to differences of opinion about future outcomes and their probabilities. To the extent that any aspect of climate-induced migration can be turned into a tradable financial commodity or insurance policy, the market clearing price becomes the ultimate expression of all personal opinions simultaneously, adding objectivity to temper political motivations in debates over climate change and migration.

305. Insurance companies profit from people’s risk aversion and the law of large numbers, which essentially holds that unpredictable single risks will have a more predictable average as more single risks are aggregated, assuming each single risk is independent of all the others. That is, while an insurance company may not be able to predict who will have a kitchen fire or automobile accident, given a large enough number of policyholders it can predict with some confidence the percentage of policyholders who will suffer such losses. Thus, the insurance policy allows many individuals to convert an uncertain future outcome into a certain cost in the present (Figure 11).

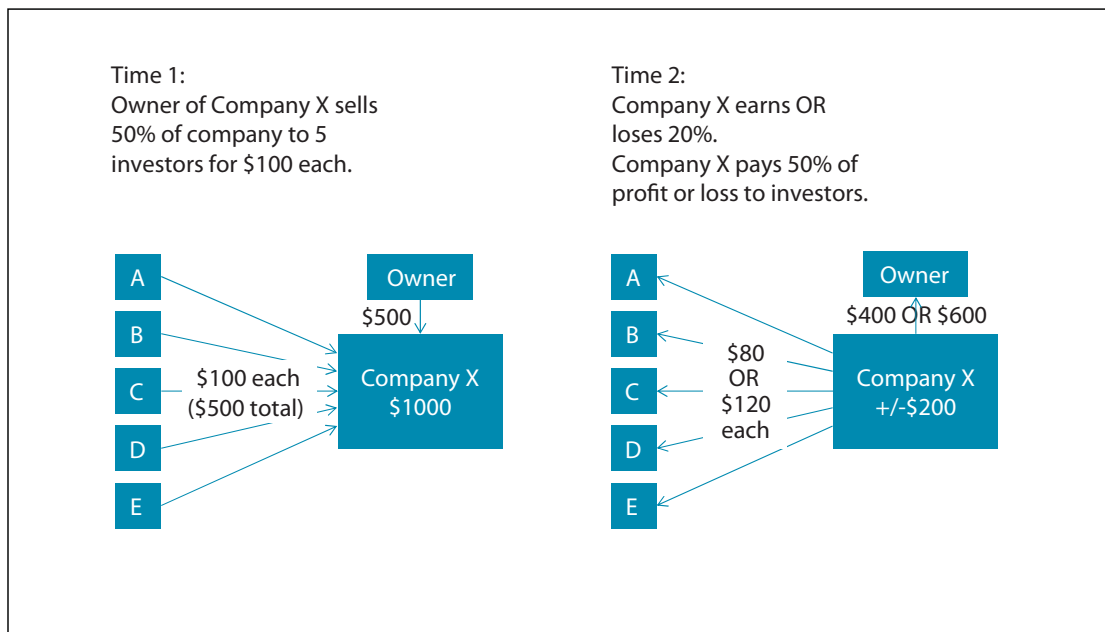
306. Financial markets provide investors with opportunities for an uncertain gain by assuming downside risk. Figure 12 shows how a company owner can transfer away downside risk by offering shares that provide access to profits as well. Investors, in turn, may invest in many different companies and they gain if the companies are profitable on average, even if some money losers are in the portfolio.

**Figure 11 How Insurance Transforms Uncertainty About a Possible Future Loss into a Fixed Up-Front Cost**



Source: Author's illustration.

**Figure 12 How Selling Shares in a Company Transforms Uncertainty About Possible Future Losses or Gains into a Fixed Up-Front Share Price**



Source: Author's illustration.

### 3. Future Impacts of Climate Change are Unknown

307. Climate change is an uncertain process and its effects are even more uncertain. Climate affects the likelihood and severity of weather and flood disasters (uncertain events in themselves) but the future impacts of climate change are unknown and difficult to measure. Slow-onset disasters brought about by rising oceans and melting glaciers present uncertainty with the additional dimension of time.

308. The data and methods to reliably predict climate change outcomes, such as the number of people affected by a given rise in sea level over a given time, is currently lacking. The assumption that everyone within a certain distance from the shore will be displaced is simplistic and underestimates people's resilience and adaptive capacity but, on the other hand, not enough is known to adjust the model reliably to account for such things.

### 4. Migration is Risky

309. Migration is a risky undertaking. Simply transporting oneself from here to there can be dangerous in itself. Migrants often have expectations about opportunities in the destination but without full knowledge that these opportunities will be realized. In some cases, migrants risk losing their livelihood in a place where their movement is so restricted that they even lack a means of returning home.

### 5. Any Response to Climate-Induced Migration is Risky

310. Any action taken in response to climate change (whether or not related directly to migration) carries some risk. Policy actions risk unwanted political consequences. There are risks of overspending, e.g., a mitigation or adaptation plan may go over budget, it may be less effective than originally hoped, it may not be utilized widely enough to justify the expense, or time may reveal that a costly program was unnecessary after all. Well-intentioned programs can have unintended consequences, e.g., Tun Lin, De Guzman, and Cuevas (2007) point out that some adaptation programs may accelerate population growth in high-risk flood plains, thereby multiplying the long-term costs of adaptation, where appropriately priced insurance would make the high-risk area less appealing and lead people toward lower-risk areas.

### 6. Inaction is a Costly Strategy

311. As mentioned above, inaction is a risky and therefore costly response to climate-induced migration. While the full effects (and even the very definition) of inaction are replete with unknowns, we can begin with a simple model for analyzing some of the impacts. In particular, we introduce a simple way to model potential increased costs associated with refugee camps, first in terms of the cash outlay required to provide enough camps for the increased numbers of refugees, and second in terms of the economic deadweight loss that results from lost productivity of refugees.

### 7. Costs of Relocating and Caring for Migrants Vary Widely

312. Costs associated with relocating and caring for migrants are highly dependent on the circumstances of migration (Box 9). Among the factors that influence these costs are

- (i) permanency of relocation,
- (ii) cause or purpose of relocation,
- (iii) resources available to migrants,
- (iv) infrastructure,
- (v) government and organizational structures,
- (vi) special requirements (medical, children, orphans, widows, etc.),
- (vii) number of people migrating together, and
- (viii) local economic conditions.

### 8. Accommodating Refugees is Relatively Inexpensive by Design

313. The budget of the United Nations High Commissioner for Refugees (UNHCR) indicates widely varying costs, generally ranging from under \$30 to over \$100 per refugee per year (UNHCR 2011). These funds are used mainly to manage refugee camps and provide basic temporary shelter and survival aid to refugees. As the assistance provided to refugees is often minimal, and some refugees have access to other funding and resources (e.g., some refugees engage in limited commerce in their host countries), the UNHCR budget provides at best a very rough indication of the lowest up-front, usually short-term costs that might be expected in climate-induced migration scenarios with similar characteristics.

### Box 9 Costs Associated with Temporary Post-Disaster Migration

Following is a partial list of cost categories that may apply when extreme environmental events force people from their homes temporarily. Note that this list emphasizes costs that may be borne by government and humanitarian organizations. Not all costs will apply in every situation; other costs may arise, and many of these costs also apply to other migration scenarios.

- (i) transportation;
- (ii) shelter;
- (iii) beds/cots;
- (iv) linen, blankets, pillows;
- (v) towels, washcloths;
- (vi) personal comfort kits—soap, shampoo, toothpaste, toothbrush, etc.;
- (vii) food and drinking water;
- (viii) medical;
- (ix) communications (phone, internet);
- (x) TV/radio (community);
- (xi) washers/dryers (community);
- (xii) power;
- (xiii) water (for purposes other than drinking);
- (xiv) sanitation;
- (xv) administration/management;
- (xvi) security;
- (xvii) special circumstances—disabilities, prescription drugs, mental health, pregnancy, other medical needs, etc.;
- (xviii) care for pets and livestock; and
- (xix) repairs to make existing shelter habitable.

Source: Review of budgets and literature of organizations assisting displaced persons and refugees, including IOM, UNHCR, International Federation of Red Cross and Red Crescent Societies; interviews with practitioners and field workers.

## 9. The Cost of Lost Productivity Can be Catastrophic

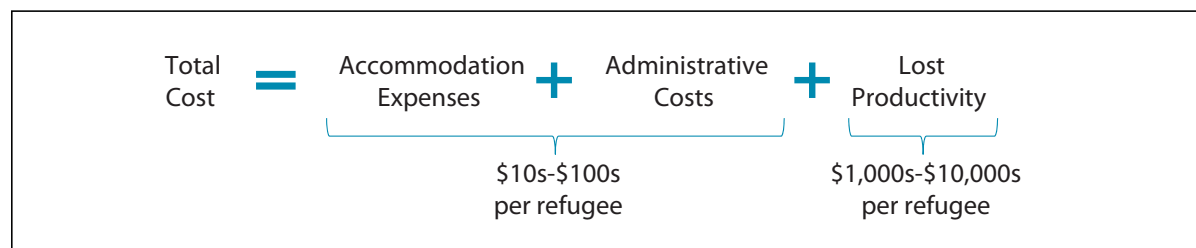
314. It is important to note that refugee camps, though necessary as a temporary solution in some circumstances, represent a situation that a well-conceived climate policy should seek to avoid. Protracted refugee situations in particular often result in an economic deadweight loss when refugees are constrained by poor information, language barriers, restrictions on movement, limited economic activity, isolation from commercial centers, and lack of assimilation in local economies.

315. Werker (2007) suggests that the 3.9 million refugees in camps supported by the UNHCR in 2004 would represent around \$4 billion–\$6 billion of real GDP “if they produced the same as typical citizens of a Zambia or a Senegal.” Using updated figures, and assuming refugees’ unconstrained productive capacity is equal to the per capita GDP of their country of origin, the 5.85 million international refugees assisted by the UNHCR in 2010 represent about \$4.8 billion of GDP.

316. Applying the same methodology across the nearly 34 million persons of interest to the UNHCR (including asylum seekers, internally displaced persons, and stateless persons) yields an annual productive capacity of nearly \$52 billion. Recognizing that refugees are not entirely unproductive, the total economic deadweight loss is equal to the premigration productive capacity minus productivity of refugees in the refugee state. The total economic cost associated with refugees (not considering social and cultural costs) would be the sum of this economic deadweight loss plus the funding resources and administrative costs required to provide assistance to refugees (Figure 13).

317. Looking at ADB member countries in particular, the productive capacity of the 3.25 million refugees assisted by the UNHCR is around \$1.6 billion per year. Note that Afghanistan currently accounts for a vastly disproportionate share of refugees—more than 90% of all refugees from ADB member countries which receive assistance, and half of all refugees worldwide who receive assistance. With a per capita annual GDP of less than \$500, Afghanistan



**Figure 13 Lost Productivity due to Forced Migration**

Source: Derived from UNHCR 2011, Werker 2007.

brings the per capita averages down significantly in all of these computations.

318. This methodology is not precise enough to provide reliable figures beyond simply demonstrating the possible magnitude of economic costs of forced migration into situations where economic opportunities are severely constrained. The methodology is problematic as many refugees are from war-torn countries where the GDP is affected by war. Negative effects of war on productivity may be especially severe on individuals who choose to migrate and seek refugee status. This could be relevant to the focus of this report in cases where environmental factors interact with those related to armed conflict to displace people. Generally, the demographic makeup of refugees can be significantly different from the general population, though this may bias productivity figures in either direction, depending on local circumstances.

319. For purposes of calculating the costs of climate-induced migration, a similar methodology to analyze risks associated with different migration scenarios might be applied. For such figures to be useful in tailoring policy recommendations, preparedness strategies, and risk transfer solutions, analysis would need to be fine-tuned using localized data and factor in the distribution of demographic and economic data, rather than relying exclusively on national means such as the aggregate data used for this section.

320. A more immediate conclusion of this analysis is that forced migration already has a significant cost that could be severely strained by the impacts of climate change. The 2010 UNHCR Global Report

Summary reports that “at the end of 2010, more than 50 per cent of the refugees assisted by the Office lived in protracted situations. These people have all been in exile for at least five years; many for decades.” While it is unclear whether climate change would result in longer or shorter periods of transition, the current abundance of protracted refugee situations will be complicated by the addition of new types of refugees and forced migrants.

321. In many cases, economic deadweight loss is something that can be minimized or eliminated without diminishing the welfare of anyone. Since most international migrants are hosted by developing countries,<sup>7</sup> policy and financial mechanisms may be constructed to catalyze improvements in migrants’ economic opportunities such that the host country also benefits. Betts (2009) suggests that “targeted development assistance” is used in protracted refugee scenarios to enhance economic benefits to host countries while providing more durable solutions for migrants. More generally, over the long term, if the goal is to facilitate orderly and sustainable adaptation and (where necessary) migration, programs established primarily to relocate people may be less effective than holistic approaches that emphasize climate-resilient development.

322. The UNHCR advocates inclusion of refugees in protracted situations and their hosting areas in long-term national development programs. Future capacity for large increases in climate-induced migration may benefit from efforts to find permanent solutions for protracted refugee situations and, incidentally, the UNHCR has begun integrating these solutions with its data collection activities, which could supply a valuable source of information in the future.

<sup>7</sup> About 75% of international refugees to ADB member countries are in countries with a per capita GDP of less than \$1,000 per year.



## C. Funding Mechanisms and Organizations for Climate-Induced Migration

323. Public and private funding mechanisms for climate-induced migration include personal savings, remittances, and other private funds; public grants and aid; private donations; loans subsidized or guaranteed by public entities; equity investments, bank loans, and other private credit; public insurance pools; and private insurance and risk transfer. In general, the choice of funding mechanism mirrors the economics and the mechanics of the migration scenario.

324. No international funding source or relief organization is dedicated exclusively to climate change and migration, but at least three categories of funds and organizations can be directly linked to climate-induced migration. This section includes discussion of possible funding sources to address climate-induced migration.

### 1. Organizations Concerned with Migration

325. While funding mechanisms dedicated exclusively to migration are relatively few, resources for migration under certain circumstances are provided by organizations dedicated to displacement of people. The UNHCR is the primary intergovernment agency dedicated to managing refugee situations. The UNHCR was established under the 1951 Convention relating to the Status of Refugees, including some assistance for internally displaced persons. In 2009, the UNHCR flagged climate-induced migration as a serious concern but raised objections to changing the legal definition of refugee to include climate or environmental criteria. The UNHCR anticipates its roles in facilitating climate-induced migration to include general environmental sustainability, disaster reduction, urban policy, and, to the extent needed, support for people displaced by war or violence precipitated by climate change and advocacy for people who become stateless due to climate change.

326. IOM is the main intergovernment body dedicated to migration in general. The IOM works to (i) help ensure the orderly and humane management of migration; (ii) promote international cooperation on migration issues; (iii) assist in the search for practical solutions to migration problems; and

(iv) provide humanitarian assistance to migrants in need, including refugees and internally displaced people. The IOM's first policy and research activities regarding the link between migration and climate change date back to 1992, and the IOM has since published widely on this subject and participated actively in policy dialogue and awareness raising, nationally and internationally.

327. The impact of climate change has also been felt in the IOM's operational activities, with more than 500 funded projects since 2000 in the context of the IOM's response to environmental migration. In line with the IOM's comprehensive approach to human mobility, activities include humanitarian response to displacement caused by natural disasters and promoting adaptation to gradual environmental degradation through migration and development activities. In general terms, the IOM's response aims to (i) increase the resilience of communities to underlying risk factors and expected changes in their natural environment, thus preventing forced migration; (ii) promote migration as an adaptation strategy; and (iii) build the capacity of governments in addressing environmental migration.

328. The IOM Development Fund (formerly known as the 1035 Facility) provides special support to IOM developing member states and member states with economies in transition for the development and implementation of joint government-IOM projects to address particular areas of migration management. Since its inception in 2001, the facility has allocated \$32 million for 360 projects in 112 countries to address specific areas of capacity building in migration management. The facility has funded and is funding pilot migration and climate change and environment projects (in Egypt, Mauritius, and Kenya).

329. In December 2011, IOM member states established the global Migration Emergency Funding Mechanism, for which the IOM is seeking \$30 million in contributions. The roll-over, replenishable fund is intended to reinforce the IOM's operational response capacity to provide assistance during emergencies, and bridge the gaps between the onset of a crisis and the receipt of donor funds. Although creation of the fund was stimulated by the movement of hundreds of thousands of people during unrest in Libya in 2011, the fund could be used in Asia and the Pacific to provide IOM assistance in cases where people are displaced by environmental events.

330. In addition to intergovernment organizations, the governments of some Asian countries have implemented large-scale relocation initiatives supported by public funding. Examples include the PRC, Sri Lanka, and Viet Nam.

## 2. Disaster Relief Resources

331. Disaster relief is provided by numerous charities and public entities as well as by private enterprises including insurance and reinsurance companies, financial institutions, and other businesses.

332. Working with local authorities and governments, the United Nations Central Emergency Response Fund and Red Cross and Red Crescent societies are among the first to respond, coordinating the efforts of various government bodies and charities to deliver medical help, food, temporary shelter, and other necessities to victims. Over the longer term, funding for recovery may be supplied through government bodies, insurance, and financial institutions including development banks. Major nongovernment organizations, such as Care International and Oxfam, and other private charities also play a significant role in providing disaster relief.

333. Disaster relief organizations typically facilitate short-distance migration to camps or other temporary shelter with the intent of returning migrants to their homes as soon as the affected area is habitable again. When disasters necessitate long-term or permanent migration, funding may come from public or private sources, depending on individual circumstances.

334. In recent years, international organizations including ADB, World Bank, and the International Federation of Red Cross and Red Crescent Societies have increasingly promoted the benefits of anticipatory disaster risk management programs over programs that begin responding only after a disaster has occurred. New scientific and technological resources have made active disaster risk management more reliable and accessible, and less expensive. Anticipatory risk management includes both contingency plans for possible disaster scenarios and resources to execute those plans. Funding resources, in particular, may be pre-arranged through risk transfer mechanisms available in insurance and capital markets.

335. Specialized insurance for migration is rare and insurance exclusively for climate-induced migration

is rarer still, if it exists at all. In some special cases, a displacement insurance policy may be available and useful, but the vast majority of people who receive insurance funding for climate-induced migration will do so under an insurance policy that covers many other things as well. For example, a general home-owners policy might include coverage for fire, wind, flood, burst pipes, mold, bedbugs, and many other causes of loss, not all of which have any relationship with climate change. However, due to the fact that a climate-induced event could result in an insurance recovery that could be used to fund relocation of the policyholder, this could be considered insurance for climate-induced migration (or an anticipatory funding mechanism for climate-induced migration). In Peru, new contingent insurance policies are being developed that ensure payouts a month ahead of forecasted floods from an El Niño event (United Nations 2011).

336. The maturing of Asia's insurance market would have numerous positive side-effects including improved prospects for post-disaster migration when necessary. Insurance penetration is particularly low in Asia, despite an abundance of reinsurance capacity for Asian catastrophe risk. Robust insurance markets would also reduce dependence on international aid, improve resources for modeling and managing risk (including climate-related risks), and help establish order and transparency in distribution of relief. It might be noted that an active and disciplined program of self-insurance is a valid form of insurance that would help produce some of the same positive effects.

337. For cases where it is inefficient for a localized or small insurance company to carry its policyholders' risks, portions of both incoming premiums and outgoing loss payments is transferred to reinsurers. For disaster risk, reinsurers apply the law of large numbers on a regional or global scale by assuming risk from many parts of the world. Reinsurers are active in Asia, bringing much-needed expertise and creativity that could catalyze the spread of insurance throughout Asia, but their activities are constrained by the limited uptake of insurance in the region. The Asian insurance market would also benefit from ongoing development of commodity and capital markets in Asia. Capital markets are increasingly used as a source of secure risk transfer capacity for peak natural catastrophe risks in advanced economies in North America, Europe, and Japan.

338. AfatVimo, a micro-insurance scheme in India, covers damage or loss through 19 kinds of disaster, including flood, cyclone, lightning strike and landslides. It is sold to disaster-affected communities in certain states, and applies to loss of life, trade stock, livelihood assets, and house and house contents of policyholders. The annual premium is about \$4.50 with a total potential benefit of \$1,560 across the various components of the coverage. The scheme has attracted interest in Indian states where it is not yet offered, as well as in other countries in Asia and the Pacific (Bhatt, 2012).

339. ADB<sup>8</sup> has long recognized disaster risk management as an integral part of development. It has provided disaster-related assistance exceeding \$12.3 billion since introducing its first dedicated disaster policy in 1987 and now actively promotes sound disaster risk management practices through its Disaster and Emergency Assistance Policy. Approved in 2004, the policy is part of ADB's Strategy 2020 (ADB 2008), and is built on the three pillars of disaster risk reduction, climate change adaptation, and disaster risk financing. In April 2009, ADB introduced the Asia Pacific Disaster Response Fund, which provides immediate financial aid to member countries following a declared major emergency. ADB is active in knowledge sharing through conferences, workshops, and published papers, and by supporting projects and organizations such as the Asian Disaster Preparedness Center and the Disaster Risk Reduction Project Portal.

340. ADB promotes awareness and understanding of disaster risk management among key personnel throughout the organization and continues to develop disaster risk management and funding mechanisms. It has been working to develop a contingent financing facility to provide post-disaster funding, and is seeking to expand the range of available disaster risk financing mechanisms through technical assistance in Indonesia, the Philippines, and Viet Nam. ADB has also been working to establish a multidonor trust fund for integrated disaster risk management, which could help fund innovation, risk assessment, capacity development, and scoping studies in ADB member countries. Finally, in response to the unique risks faced by cities, ADB has sought to include disaster risk management prominently in its Urban Operational Plan and is using

technical assistance projects to develop guidebooks on risk-sensitive land use planning, an urban risk reduction toolkit for local authorities, and models for urban disaster risk financing.

341. The following examples illustrate risk transfer and funding mechanisms that could be useful in the context of climate-induced migration; most of them include some degree of interplay between insurance and commodity and capital markets.

342. **Catastrophe bonds** facilitate the transfer of natural catastrophe risk (typically in the \$1 million–\$200 million range) to capital market investors, who risk losing all or part of their investment in the event of a natural catastrophe exceeding certain thresholds. Catastrophe bonds are used mostly for “peak risks” such as the Miami hurricane and Tokyo earthquake—catastrophe risks of such scale and concentration that they strain the capacity of even the largest reinsurers. One reason for the relatively low cost of catastrophe insurance for Asian mega cities outside Japan is that they still present a diversifying risk for reinsurers due to their low insurance penetration. However, the economics and demographics of these cities suggest that capital market capacity will become an important resource to sustain any large increase in the use of catastrophe insurance.

343. Although many market players have expressed a keen interest in the development of a robust catastrophe bond market for Asia, transacting in bond form is costly and generally is not a cost-effective means of transferring risk in amounts smaller than tens of millions of dollars. For this reason, it may be best for Asia and the Pacific to concentrate first on developing reliable financial markets and the healthy growth of insurance markets.

344. **Weather derivatives** are contracts between two parties that identify conditions under which payments are made in the case of certain weather-related events. They are used to manage a variety of risks related to temperature, rainfall, and other objective measures of the weather. The World Bank has intermediated weather derivatives for purposes of food security and drought protection in Africa since 2006 and has established facilities for developing and promoting the use of weather derivatives by developing countries to manage risks that can be

<sup>8</sup> Much of the information in this paragraph is from ADB (2011).

linked closely to the weather. Capital markets also present attractive means of transferring longer-term risks associated with climate change, such as risks associated with rising sea levels. A financial product could be constructed with payments linked to a sea-level index, and featuring some characteristics similar to a catastrophe bond or weather derivative. However, as many of these risks will take a number of years for their impact to be felt, the new financial product would need a carefully balanced structure to (i) keep premiums affordable, (ii) provide attractive long-term returns to investors, and (iii) provide a sufficiently secure source of payments in the event of rising sea levels.

### 3. Climate change funds

345. Concern about climate change has spawned an unprecedented proliferation of new international funding mechanisms, beginning with the United Nations Framework Convention on Climate Change (UNFCCC) in 1994. Some of the climate change funds are dedicated to reducing the causes of climate change, while others also address the effects.

346. The Global Environmental Facility is the largest climate change fund and includes several smaller funds for different purposes, of which the Special Climate Change Fund and the Least Developed Countries Fund could be of interest in the context of climate-induced migration. Two others—the Adaptation Fund and the Green Climate Fund—also have their roots in the UNFCCC. Following the Durban Conference (17th Conference of the Parties [COP 17]), it appears that the Green Climate Fund should be the key vehicle for adaptation funding in the future. The fund is supposed to provide \$100 billion per year to developing countries, a significant part of which will be devoted to adaptation programs and strategies. Such programs and strategies could include policies related to migration, displacement, and resettlement.

347. The Pilot Program for Climate Resilience, approved in November 2008, was the first program developed and operational under the Strategic Climate Fund, one of two funds within the design of the Climate Investment Funds. It pilots programs and projects built on National Adaptation Programs of Action and other relevant country studies and strategies. Country programs are in operation in Bangladesh, Cambodia, Nepal, and Tajikistan. There

is also a regional program in Papua New Guinea, Samoa, and Tonga.

348. Several country and regional programs have been initiated to (i) formalize commitments to the international community; (ii) support and supplement the efforts of international organizations; and (iii) in some cases, engage in bilateral climate-related activities and assistance. Among the country and regional funds that could relate to climate-induced migration are the Global Climate Change Alliance (European Union), the International Climate Fund (United Kingdom), the International Climate Initiative (Germany), the Millennium Development Goals Achievement Fund (Spain), and the Indonesia Climate Change Trust Fund.

349. In most cases, however, the purposes and operations of new climate change funds are still under development and funding for climate-induced migration is, at best, a theoretical possibility. A review of funded projects reveals little or no evidence of funds being used for migration of any kind. Where funding for relocation is included, e.g., in adaptation funds, it is not clear how often its purpose is to accommodate the project rather than to facilitate.

350. Climate change funds will become a meaningful resource for migration only to the extent that (i) their structures are appropriate for accommodating migration, and (ii) fund managers are willing to consider migration as a valid means of adaptation. However, despite the growing number of funds, existing funds are already strained and more resources may be required to add effective management of climate-induced migration to the list.

## D. Prospects for Climate-Induced Migration Funding

351. The prospects for funding mechanisms specializing in climate-induced migration are limited due to problems including attribution, definitions, and economic efficiencies of bundling coverage with needs unrelated to climate-induced migration. Still, there are some instances where a specialized mechanism may be the most attractive solution. As outlined already, an index-based insurance or financial product could be developed to provide protection from sea-level rise. Protection would come in the form of a higher payment to the policyholder if

the sea level rises more quickly than expected and a lower or zero payment if the sea level rises less quickly. Some creativity would be needed to make such a product acceptable to both the policyholder and insurer, but it is quite feasible.

352. The prospects for funding mechanisms related to climate-induced migration are strong and opportunities are abundant. Paragraph 14f of the Cancún Adaptation Framework (2010), adopted in late 2010, includes “measures to enhance understanding, coordination and cooperation with regard to climate change induced displacement, migration and planned relocation, where appropriate, at national, regional and international levels” (UNFCCC 2011). It is unclear exactly what kind of policy interventions will be eligible for funding under the Green Climate Fund. A key challenge of future negotiations will be in making this article operational, i.e., determining how adaptation funding can be attributed to policies related to climate-induced migration.

353. For mechanisms developed by the private sector, such as mobile phone banking as a means to send remittances cheaply, ADB and other development finance institutions could consider playing “matchmaker,” especially helping identify areas where such mechanisms could be accepted and used to the benefit of poor populations. Development finance institutions also have a role to play in effectively implementing mechanisms such as weather derivatives, catastrophe bonds, and other index-based financial or insurance products.

354. It needs to be recognized that any enterprise or project that receives funding is potentially a migration-inducing activity, especially where outside workers are required for some aspect of the project, such as construction or engineering. Funding some adaptation activities may actually increase the long-term cost of adaptation by stimulating economies and attracting migration to the most exposed places. In choices of whether to relocate or adapt, this impact needs to be weighed against the cost of relocating.

355. Marketing, educational, and informational campaigns may help increase demand for insurance, especially in an environment of increasing risk, but they are not enough. It is instructive to look at areas where insurance penetration is relatively high

and where the purchase of insurance is often motivated by more than just a perception of risk on the part of the buyer. Insurance is often required by law (e.g., liability insurance may be required to operate an automobile) or by lenders, landlords, or others with a financial stake in a property. Insurance may also be coupled with discounts, especially where the insurance protects more than just the policyholder, or the tax code may afford special advantages for certain types of insurance. Similar principles apply to government and institutional use of insurance, except that insurance must satisfy objectives of key decision makers whose identity and interests may be difficult to ascertain.

356. Negotiating a regional program such as the CCRIF requires the simultaneous fulfillment of many divergent national objectives and would be especially difficult in an area as diverse as Asia and the Pacific. However, there may be subregions or individual countries where similar programs would be feasible, and some governments and institutions may be interested in establishing pilot programs under the right conditions. In short, although promoting insurance uptake is easier said than done, the following steps can help catalyze the growth of robust insurance markets throughout Asia and the Pacific:

- (i) Promote insurance and risk management through educational and informational campaigns.
- (ii) Establish insurance requirements or incentives where appropriate in lending activities; designate a portion of loan proceeds to be used to insure assets or properties acquired with the funds.
- (iii) Work with governments and other agencies interested in promoting insurance uptake to determine effective strategies, focusing on who the appropriate buyers of insurance will be and what will motivate them to insure. In some cases, this may be done in the context of a loan, for example, funding for public housing may be subject to a requirement that tenants hold a certain amount of insurance, or funding for agricultural development could be tied to agricultural insurance.
- (iv) Implement successful pilot programs in countries or localities to demonstrate the benefits of insurance to governments and institutions for replication purposes.



# 10. Recommendations

357. Climate-induced migration can be effectively addressed as part of a broader development framework, and within a climate change adaptation strategy. This section outlines a series of actions that can be taken by governments in Asia and the Pacific to address climate-induced migration, a phenomenon which will only become more pronounced in the coming years. The following recommendations build on constructive examples already being undertaken by governments, acting within a domestic context, or in collaboration with other governments bilaterally, regionally, or globally to tackle this challenge. Naturally, the relevance and priority of each action will vary by country and context, including the vulnerability to environmental hazards and climate change.

## A. Overarching Issues

358. Climate-induced migration has gained greater attention from policy makers in Asia and the Pacific. A few aspects of the phenomenon are worth keeping in mind as deliberations begin on how to better address it:

- (i) There are different ways to improve the situation of migrants to reduce their vulnerability and sustain their livelihoods in the context of climate change. This report has identified several interventions that could achieve such goals. It is important to note, however, that these interventions will deliver the best results if they are well coordinated and, where cross-border issues come into play, through international cooperation among countries concerned.
- (ii) Migrants will continue to move to vulnerable areas in Asia and the Pacific, and in particular to cities located in low-lying areas, mostly because of economic opportunities. Urban and peri-urban planning and zoning requirements, together with land allocation and rights, represent major policy challenges in this regard.
- (iii) Though most migration flows associated with environmental events tend to be internal movements, it is important to keep in mind that

internal and international migration are typically interlinked. Further, international migration can play a key role in fostering the resilience of households and communities (e.g., through remittances), and can be highly beneficial to both sending and receiving countries. At the same time, the economic, environmental, and social impact of migration on host communities must also be considered.

- (iv) The most vulnerable population groups will often be unable to move in the face of worsening climatic conditions due to a lack of resources or other constraints. Policies addressing climate-induced migration should therefore take into account the needs of communities that are not mobile without some assistance.
- (v) Overall, climate change is expected to become a key migration driver in Asia and the Pacific, not only because of its direct impacts on migration patterns, but also because of its impacts on different migration drivers, such as poverty, joblessness, and conflict over resources.

## B. Recommended Government Actions

### 1. Promote Adaptation and Broader Development Aims

359. Climate-induced migration occurs in the broader context of migration, which itself provides multiple opportunities to promote development in low-income and middle-income Asian and Pacific countries. Also, discussion of climate change adaptation is incomplete without attention to human mobility. The following actions would promote adaptation and broader development aims:

- (i) carry out national assessments of natural disaster risk and systematically account for disaster losses to improve understanding of investment needs for disaster risk management;
- (ii) bolster disaster risk management systems, particularly at the community level; improve

- accuracy of disaster early warning systems; and improve design and awareness of post-disaster sheltering plans;
- (iii) provide social protection and income-earning opportunities for those who remain behind in areas affected by environmental change (e.g., community-driven development initiatives, skills training, alternative livelihood programs);
- (iv) invest in sustainable infrastructure and basic services in migrant-receiving cities, utilize vulnerability mapping to guide future settlement planning, and engage local communities in construction of storm-resistant homes; and
- (v) systematically include discussion of climate-induced migration in policy deliberations on adaptation and in updating national adaptation programs of action.

## 2. Improve The Condition of Migrants

360. Migrants are often among the most marginalized groups in society. Measures must be taken to reduce their vulnerability and risk, and protect them from abuses, such as the following:

- (i) provide migrants with access to the same basic services as current residents (education, health, water, and sanitation);
- (ii) actively promote a positive image of migrants to facilitate their integration into receiving communities, and refrain from the “language of fear” in migration discussions;
- (iii) apply internationally recognized standards and principles on human mobility, as well as good practice on involuntary resettlement; and
- (iv) codify and enforce landownership, and take action against land grabbing.

## 3. Increase Knowledge and Awareness of Climate-Induced Migration

361. A major impediment to developing effective policies to address climate-induced migration is the absence of up-to-date data on migration patterns and trends. The following measures would increase knowledge and awareness:

- (i) systematically collect sex-disaggregated data on internal and cross-border migration flows;
- (ii) take steps to ensure that censuses are conducted thoroughly and include marginalized populations;

- (iii) support policy-relevant research on climate-induced migration, establishment of an Asia-Pacific Migration and Environment Network of researchers, and interaction between researchers and policy makers;
- (iv) undertake longitudinal studies to capture long-term migration patterns; and
- (v) promote youth educational and cultural exchanges between areas highly exposed to climate change and more climate-resilient areas.

## 4. Strengthen international cooperation

362. Many problems connected with climate-induced migration can only be tackled through cooperation between and among sovereign states. Bilateral and multilateral agreements can help to build a regional network of law and standards to manage and facilitate cross-border migration:

- (i) negotiate bilateral and subregional agreements to enhance freedom of movement (e.g., visa-free ASEAN), and extend mutual recognition of academic and skills qualifications;
- (ii) expand seasonal, short-term, or more permanent labor migration that serves the interests of both source and destination countries, as well as migrant workers (also involves countries outside the region); and
- (iii) step up collaboration among intergovernmental organizations in a position to address climate-induced migration.

## 5. Finance Responses to Climate-Induced Migration

363. Tackling the challenge of climate-induced migration will require substantial resources, from the public, private and nonprofit sectors. Governments, both individually and acting collectively, must take the lead.

- (i) for countries in and outside the region, support IOM’s Development Fund and new Migration Emergency Funding Mechanism, as well as the United Nations Central Emergency Response Fund, and the Green Climate Fund;
- (ii) encourage active private sector provision of insurance and risk management tools, and provide incentives for people to live in areas at less risk of extreme environmental events; and
- (iii) create a regulatory framework that encourages competition and service provision that reduces the cost of sending remittances.



# 11. Conclusion

364. Depending on the extent, measure, or level of vulnerability, individuals and communities will, in the context of climate threats, resort to different migration-related adaptation techniques: permanent migration, temporary migration, or in situ adaptation. Even in the case of gradual but irreversible changes in the climate, such as increases in sea level or temperature, migration may not be permanent due to social factors and perceptions of risk.

365. There remains great uncertainty regarding future climate change, including the scope and scale of impacts and societal responses to mitigate and adapt to changes. Impact will be a complex mix of minor irritations and severe disruptions that in cases will lead to impoverishment and loss of life, requiring responses that are also complex.

366. Changes to migration patterns will take various forms but are likely to involve an increase in the push forces (those at origin) that lead to emigration pressures. They will probably manifest themselves through three main processes:

- (i) increasing risk of environmental hazards and associated socio-ecological events;
- (ii) changing resource conditions in linear and nonlinear trends that alter access and effective use of natural resources; and
- (iii) perceptions of risk of climate change impacts, irrespective of real experiences.

367. Thus, it will not just be the real hazards or a depletion of resources that will potentially lead to greater migration, but also the changes in perception towards environmental risks. As the frequency and severity of hazards increase, the associated importance of perceived risks will increase, and thresholds or tipping points may be reached after which the normal rules of understanding migration may not apply.

368. Of key interest here will be those impacts of climate change, or perceptions of likely future impacts, that (i) significantly increase the numbers migrating in a linear manner using established patterns (internal and international), primarily through voluntary mechanisms; and (ii) lead to nonlinear changes in migration that result as thresholds of resilience or tipping points are reached.

369. It is also important to recognize that climate change will not only increase or, in a few cases, decrease the pressure to move out of areas which it influences, but it will also impact on existing and potential destinations to reduce or, in a few cases, increase opportunities for migrants.

370. Finally, migration as a form of adaptation will be a more common response to the impact of climate change than the displacement of entire communities. Displacement will occur as a last resort once adaptation possibilities and community resilience are exhausted, and relocating becomes a matter of survival.

371. Uncertainties—especially uncertainties regarding the number of potential migrants—should not be an excuse for inaction. Extreme environmental events already displace millions of people each year in Asia and the Pacific. Many of these become migrants. Their numbers will grow, and the patterns of their migration will evolve over time, particularly as slow-onset environmental change, such as drought and sea-level rise, registers its impact on human settlements. Unfortunately, international cooperation to address the cross-border aspects of such migration remain inadequate to the task at hand and the challenges yet to emerge. Thus, it is urgent to address this issue proactively through policy, projects and financing at all levels of government. Failure to give serious, timely attention to the issues involved will result in otherwise avoidable humanitarian crises.

372. Actions taken in response to climate-induced migration are most appropriately carried out within a development framework, and incorporated into climate adaptation strategies. The most vulnerable communities should be provided with migration options, including the option to remain where they are (and adapt), or to move to a safer and more secure area. Responses will require greater public resources for urban investments, disaster risk management, social protection, and livelihoods development. The private sector also has a potentially large role to play reducing risk.

373. Whether climate-induced migration emerges as forced displacement and relocation, or as a planned and facilitated adaptation strategy, depends in large part on policies and investments agreed today. Governments at all levels, regional bodies, and international organizations have a responsibility to act with urgency on this issue. They have before them an opportunity to shape a future of human mobility that promotes better, more inclusive living conditions for the people of the world's most populous region.

# Bibliography

Adger, W. N. 1999. Social Vulnerability to Climate Change and Extremes in Coastal [Viet Nam]. *World Development* 27 (2): 249–70.

———. 2006. Vulnerability. *Global Environmental Change* 16:268–81.

Adger, W. N. et al. 2003. Adaptation to climate change in the developing world. *Progress in Development Studies* 3 (3):179–95.

Afsar, R. 2005. Internal Migration and the Development Nexus: The Case of Bangladesh. In *Migration and Development: Prop-poor Policy Choices*, edited by T. Siddiqui. Dhaka: University Press. 39–69.

Ahluwalia, M. 2005. Gender and Migration. *INBRIEF - BRIDGE Bulletin* 16.

Alam, M. and G. M. D. Rabbani. 2007. Vulnerabilities and Responses to Climate Change for Dhaka. *Environment and Urbanization* 19:81–97.

Arnell, N. W. 2004. Climate Change and Global Water Resources: SRES Emissions and Socio-Economic Scenarios. *Global Environmental Change* 14:31–52.

Asian Development Bank (ADB). 1998. *Handbook on Resettlement. A Guide to Good Practice*. Manila.

———. 2004. *Disaster and Emergency Assistance Policy*. Manila.

———. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

———. 2009a. *Technical Assistance for Policy Options to Support Climate-Induced Migration*. Manila (TA 7408–REG).

———. 2009b. *The Economics of Climate Change in Southeast Asia: A Regional Overview*. Manila.

———. 2011. *Ahead of the Curve: Protecting Development Gains—the Role of Integrated Disaster Risk Management*. <http://beta.adb.org/features/ahead-curve-protecting-development-gains-role-integrated-disaster-risk-management>

ADB, Japan International Cooperation Agency, and World Bank. 2010. *Climate Risks and Adaptation in Asian Coastal Megacities*. Washington, DC: World Bank.

Becker, C.M., Musabek, E.N., Seitenova, A. -G., S. and Urzhumova, D.S., 2005. The Migration Response to Economic Shock: Lessons from Kazakhstan, *Journal of Comparative Economics*, 33, pp. 107-132.

Bailey, A. J. 2010. Population geographies, gender, and the migration-development nexus. *Progress in Human Geography* 34 (3):375–86.

Balk, D. 2008. Urban Population Distribution and the Rising Risks of Climate Change. Presented at the United Nations Population Division Expert Group Meeting, Baruch College, New York.

Barnett, J. 2001. Adapting to Climate Change in Pacific Island Countries: The Problem of Uncertainty. *World Development* 29 (6):977–93.

Barnett, J. and J. Campbell. 2010. *Climate Change and Small Island States. Power, Knowledge and the South Pacific*. London: Earthscan.

Barnett, J. and M. Webber. 2010. *Accommodating Migration to Promote Adaptation to Climate Change*. Washington, DC: World Bank. 5,270.

Bedford, R. 2005. Perspectives on Population Growth, Migration and Sustainable Development in the Pacific Region. In *Population, Environment and Development. Prace Geograficzne 202*, edited by A. Potrykowska. Warsaw: Polish Academy of Sciences.

- Bedford, R. and G. Hugo. 2008. *International Migration in a Sea of Islands: Challenges and Opportunities for Insular Pacific Spaces*. Hamilton, New Zealand: Population Studies Centre, University of Waikato. 69.
- Bernabe, D. and E. Penunia. 2009. Gender Links in Agriculture and Climate Change. *Women in Action* 11:19–22.
- Bertram, G. and R. F. Watters. 1985. The MIRAB Economy in South Pacific Microstates. *Pacific Viewpoint* 26 (3):497–519.
- Betts, A. 2009. *Development assistance and refugees. Towards a North-South grand bargain?* Oxford: Refugee Studies Centre.
- Bhatt, Mihir. 2012. Investing in Insurance: Reducing Vulnerability and Risk. *Alliance* 17(1):45.
- Black, R. 2001. *Environmental Refugees: myth or reality?* Geneva: United Nations High Commissioner for Refugees (UNHCR).
- Black, R., S. R. G. Bennett et al. 2011. Migration as adaptation. *Nature* 478:447–9.
- Black, R. and D. Kniveton. 2011. Migration and Climatic Change: Towards an Integrated Assessment of Sensitivity. *Environment and Planning A* 43 (2):431–50.
- Black, R., D. Kniveton et al. 2008. *Demographics and Climate Change: Future Trends and their Policy Implications for Migration*. Brighton, United Kingdom (UK): Development Research Centre on Migration, Globalisation and Poverty.
- Blaikie, P. and H. Brookfield, eds. 1987. *Land Degradation and Society*. New York: Routledge.
- Bolsheva, D. and A. Jolasov. 2008. *Kazakhstan: EACH-FOR Case Study Report*. Brussels. Center for Ethnic and Migration Studies (CEDEM) for European Commission.
- Boncour, P. and B. Burson. 2009. *Climate Change and Migration in the South Pacific Region: Policy Perspectives*. Washington, DC: Institute for Policy Studies.
- Brown, O. 2008. *Migration and Climate Change*. Geneva: International Organization for Migration (IOM).
- Cernea, M. M. 1990. Internal Refugee Flows and Development-Induced Population Displacement. *Journal of Refugee Studies* 3 (4).
- Cernea, M. M. and C. McDowell. 2000. *Risks and Reconstruction, Experiences of Resettlers and Refugees*. Oxford: Berghahn Books.
- Chinvanno, S., 2003. *Information for Sustainable Development in the Light of Climate Change in Mekong River Basin*, Closing Gaps in the Digital Divide: Regional Conference on Digital GMS, Bangkok.
- Clemens, M. 2011. Economics and Emigration: Trillion-Dollar Bills on the Sidewalk? *CDG Working Paper* 264. [www.cgdev/content/publications/detail/1425376](http://www.cgdev/content/publications/detail/1425376)
- Connell, J. 2003. Losing ground? Tuvalu, the greenhouse effect and the garbage can. *Asia Pacific Viewpoint* 44 (2):89–107.
- Connell, J. and R. P. C Brown. 1995. Migration and Remittances in the South Pacific: Towards New Perspectives. *Asia and Pacific Migration Journal* 4 (1):1–34.
- Crisp, J. 1999. *Who has counted the refugees? UNHCR and the politics of numbers*. Geneva: UNHCR.
- Cruz, R. V. et al. 2007. Asia. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by M. L. Parry et al. Cambridge: Cambridge University Press. 469–506.
- Dasgupta, S. et al. 2007. *The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis*. Washington, DC: World Bank.
- De, U. S., R. K. Dube, and G. S. Prakasa Rao. 2005. Extreme Weather Events over India in the last 100 years. *Journal of Indian Geophysical Union* 9 (3): 173–87.

- de Sherbinin, A. et. al. 2011. Preparing for Resettlement Associated with Climate Change. *Science* 334:456–7.
- Displacement Solutions. 2008. The Bougainville Resettlement Initiative: Meeting Report. <http://displacementsolutions.org/wp-content/uploads/BG.pdf>
- Dowlah, C. 2006. The politics and economics of food and famine in Bangladesh in the early 1970s—with special reference to Amartya Sen's interpretation of the 1974 famine. *International Journal of Social Welfare* 15 (4):344–56
- Dun, O. 2009. [Viet Nam]: *Linkages between flooding, migration and resettlement*. EACH-FOR.
- Duong, L. B., T. G. Linh, and N. T. P. Thao. 2011. Social Protection for Rural-Urban Migrants in Viet Nam: Current Situation, Challenges and Opportunities. *CSP Research Report* 08.
- Dyson, T., R. Cassen, and L. Visaria, eds. 2005. *Twenty-First Century India: Population, Economy, Human Development and the Environment*. New York: Oxford University Press.
- Emergency Events Database (EM-DAT), Office of US Foreign Disaster Assistance (OFDA), WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED). International Disaster Database. [www.emdat.be/natural-disasters-trends](http://www.emdat.be/natural-disasters-trends) (accessed 21 February 2012).
- Ericson, J.P., Vörösmarty, C.J., Dingman, S.L., Ward, L.G. and Meybeck, M. 2006. Effective Sea-Level Rise and Deltas: Causes of Change and Human Dimension Implications, *Global and Planetary Change*, 50, pp. 63–82.
- Faisal and Parveen 2004Foresight. 2011. *Migration and Global Environmental Change. Final Project Report*. London: Government Office for Science.
- Foresight. 2011. *Migration and Global Environmental Change. Final Project Report*. London: Government Office for Science.
- Gemenne, F. 2010. Tuvalu, un laboratoire du changement climatique? Une critique empirique de la rhétorique des “canaris dans la mine”. *Tiers Monde* 204:89–108.
- . 2011a. Climate-induced population displacements in a 4°C+ world. *Philosophical Transactions of the Royal Society A* 369 (1934):182–95.
- . 2011b. Why the numbers don't add up: A review of estimates and predictions of people displaced by environmental changes. *Global Environmental Change* 21 (S1):41–9.
- Gibson, J. K. and D. McKenzie. 2009. How Can Developing Country Governments Facilitate International Migration for Poverty Reduction? In *Migration and Poverty. Toward Better Opportunities for the Poor*, edited by E. Murrugarra, J. Larrison, and M. Sasin. Washington, DC: World Bank.
- Gibson, J. K. and K. Nero. 2007. *Are the Pacific Island Economies Growth Failures? Geo-Political Assessments and Perspectives. Report for the Pasifika Project*. Wellington, New Zealand: Institute of Policy Studies.
- Glantz, M. H. 2005. Water, Climate and Development Issues in the Amu Darya Basin. *Mitigation and Adaptation Strategies for Global Change* 10:23–50.
- Guha-Sapir, D., D. Hargitt, and P. Hoyois. 2004. *Thirty years of natural disasters 1974–2003: The numbers*. Louvain-la-Neuve, Belgium: Presses Universitaires de Louvain.
- Hai-Lun, Z. and W. Kang. 2001. Flood Control and Management for Large Rivers in [the People's Republic of] China: A Case Study from the Huaihe River Basin. [www.unescap.org/esd/water/disaster/2001/china.doc](http://www.unescap.org/esd/water/disaster/2001/china.doc) (22 April 2009).
- Hardjono, J. M. 1977. *Transmigration in Indonesia*. Kuala Lumpur: Oxford University Press.
- Hugo, G. 1996. Environmental Concerns and International Migration. *International Migration Review* 30 (1):105–31.
- . 2002. Pengungsi – Indonesia's Internally Displaced Persons. *Asia and Pacific Migration Journal* 11 (3):297–331.

- . 2006. Improving Statistics on International Migration in Asia. *International Statistical Review* 74 (3):335–55.
- Huguet, J. W., ed. 2008. Special Issue: International Migration Data and Sources in Asia. *Asia and Pacific Migration Journal* 17: 3–4.
- Huq, S. and D. Satterthwaite. 2008. *Climate Change and Cities*. Brighton: id21.
- Intergovernmental Panel on Climate Change (IPCC). 2001. Climate Change 2001: Synthesis Report. In *Third Assessment Report of the Intergovernmental Panel on Climate Change*, edited by R. T. Watson and the core writing team. Cambridge: Cambridge University Press.
- International Centre for Integrated Mountain Development. 2011. Labor Migration: Opportunities and Challenges for Mountain Livelihoods. *Sustainable Mountain Development* No. 59.
- Internal Displacement Monitoring Centre. 2011. Internal Displacement Monitoring Centre Preliminary Data: Disaster Induced Displacement 2011: Asia Summary.
- International Organization for Migration (IOM). 2005. *Internal Displacement in Central Asia: Underlying Reasons and Response Strategies*. Vienna: IOM Technical Cooperation Center for Europe and Central Asia.
- . 2010. *World Migration Report 2010. The Future of Migration: Building Capacities for Change*. Geneva.
- Jäger, J. et al. 2009. *EACH-FOR Synthesis Report*. Budapest: EACH-FOR.
- Jolly, S. and H. Reeves. 2005. *Gender and Migration. Cutting Edge Pack*. Brighton: Institute for Development Studies.
- Kelkar, U. and Bhadwal, S. 2007. *South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development*. New Delhi. The Energy and Resources Institute.
- Kenny, C. 2012. The Haitian Migration. *Foreign Policy*. 9 January. [www.foreignpolicy.com/articles/2012/01/09/the\\_haitian\\_migration](http://www.foreignpolicy.com/articles/2012/01/09/the_haitian_migration)
- Khakimov, P. and Mahmadbekov, M., 2009. *Republic of Tajikistan: EACH-FOR Case Study Report*, Brussels, Center for Ethnic and Migration Studies (CEDEM) for European Commission.
- Klein, R. J. T. and R. J. Nicholls. 1999. Assessment of Coastal Vulnerability to Climate Change. *Ambio* 28 (2):182–7.
- Klugman, J. dir. 2009. *Human Development Report 2009. Overcoming barriers: Human mobility and development*. New York: United Nations Development Programme (UNDP).
- . 2010. *Human Development Report 2010: The Real Wealth of Nations*. New York: UNDP.
- Kolmannskog, V. O. 2008. *Future floods of refugees. A comment on climate change, conflict and forced migration*. Oslo: Norwegian Refugee Council.
- Kothari, U. 2003. Staying put and staying poor? *Journal of International Development* 15:645–57.
- Kundzewicz, Z.W., Nohara, D., Tong, J., Oki, T., Buda, S. and Takeuchi, K., 2009. Discharge of Large Asian Rivers – Observations and Projections, *Quaternary International*. In Press.
- Laczko, F. and C. Aghazarm. 2009. *Migration, Environment and Climate Change: Assessing the Evidence*. Geneva: IOM.
- Lee Kuan Yew School of Public Policy. 2011. Low-Income Migration: When the Marginalized Move Across Borders. *Asian Trends Monitoring Bulletin* 14.
- Lokshin, M., M. Bontch-Osmolovski, and G. Elena. 2011. World-Related Migration and Poverty Reduction in Nepal. In *Migration and Poverty. Toward Better Opportunities for the Poor*, edited by E. Murrugarra, J. Larrison, and M. Sasin. Washington, DC: World Bank.
- Mall, R. K. et al. 2006. Water Resources and Climate Change: An Indian Perspective. *Current Science*, 9012:1,610–26.
- Massey, D. S., W. Axinn, and D. Ghimire. 2007. *Environmental Change and Out-Migration: Evidence from Nepal*. Ann Arbor: Population Studies Center, University of Michigan.



- McAdam, J. 2011. Swimming against the Tide: Why a Climate Change Displacement Treaty is Not the Answer. *International Journal of Refugee Law* 23 (1):2–27.
- McGranahan, G., D. Balk, and B. Anderson. 2007. The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones. *Environment and Urbanization* 19 (1):17–37.
- McTegart, W. J., G. W. Sheldon, and D. C. Griffiths, eds. 1990. *Impacts Assessment of Climate Change. Report of Working Group II*. Edited by IPCC. *IPCC First Assessment Report*. Canberra: Australian Government Publishing Service.
- Meze-Hausken, E. 2008. On the (im-)Possibilities of Defining Human Climate Thresholds. *Climate Change* 89:299–324.
- Ministry for Nature Protection, 2001. *The First National Communication of the Republic of Tajikistan to the United Nations Frameworks Convention on Climate Change*. Dushanabe, Ministry for Nature Protection, Republic of Tajikistan, pp. 112.
- Mitra, A. and M. Murayama. 2008. *Rural to Urban Migration: A District Level Analysis for India*. Chiba, Japan: Institute of Developing Economies.
- Mortreux, C. and J. Barnett. 2008. Climate change, migration and adaptation in Funafuti, Tuvalu. *Global Environmental Change* 19 (1):105–12.
- Naik, A. 2009. Migration and natural disasters. In *Migration, environment and climate change: Assessing the evidence*, edited by F. Laczko and C. Aghazarm. IOM. Geneva. 247–317.
- Nohara, D. et al. 2006. Impact of Climate Change on River Discharge Projected by Multimodel Ensemble. *Journal of Hydrometeorology* 7:1,076–89.
- O'Brien, K. et al. 2008. *Disaster Risk Reduction, Climate Change Adaptation and Human Security. A Commissioned Report for the Norwegian Ministry of Foreign Affairs*. Oslo: University of Oslo.
- Omelaniuk, I. 2005. Gender, Poverty Reduction and Migration. <http://siteresources.worldbank.org/EXTABOUTUS/Resources/Gender.pdf> (20 July 2011).
- Oxfam. 2005. The Tsunami's Impact on Women. Briefing Note. [www.oxfam.org/en/policy/bn050326-tsunami-women](http://www.oxfam.org/en/policy/bn050326-tsunami-women)
- Piguet, E. 2008. *Climate change and forced migration*. Geneva: United Nations High Commissioner for Refugees (UNHCR).
- Preston, B. L. et al. 2006. *Climate Change in the Asia/Pacific Region: A Consultancy Report Prepared for the Climate Change and Development Roundtable*. Canberra: Commonwealth Science and Industry Research Organisation (CSIRO).
- Raleigh, C. and L. Jordan. 2010. Climate Change and Migration. In *The Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World*, edited by R. Mearns and A. Norton. Washington, DC: World Bank. 103–33.
- Renaud, F. et al. 2007. *Control, Adapt or Flee. How to Face Environmental Migration?* Bonn: UNU-EHS. 5.
- Revi, A. 2008. Climate Change Risk: An Adaptation and Mitigation Agenda for Indian Cities. *Environment and Urbanization* 20: 207–29.
- Roberts, D. W. 2010. *Social Dimensions of Climate Change in Urban China*. Manila: ADB.
- Rosegrant, M. W. et al. 2009. *Building Climate Resilience in the Agricultural Sector. Addressing Climate Change in Asia and the Pacific Region*. Washington, DC. International Food Policy Research Institute. 15 July.
- Siddiqui, T. 2005. International Migration as a Livelihood Strategy of the Poor: The Bangladesh Case. In *Migration and Development: Pro-poor Policy Choices*, edited by T. Siddiqui. Dhaka: University Press. 71–107.
- Skeldon, R. 2006. Interlinkages Between Internal and International Migration and Development in the Asian Region. *Population, Space and Place* 12:15–30.
- Small, I., J. van der Meer, and R. E. G. Yupshur. 2001. Acting on an Environmental Health Disaster: The Case of the Aral Sea. *Environmental Health Perspectives* 109 (6):547–9.



- Smit, B. and J. Wandel. 2006. Adaptation, Adaptive Capacity, and Vulnerability. *Global Environmental Change* 16:282–92.
- Sørbo, G. M. and A. Strand. 2007. *Land issues and poverty reduction. Requirements for lasting peace in Sudan and Afghanistan*. Washington, DC: International Food Policy Research Institute.
- Spoor, M. 1998. The Aral Sea Basin Crisis: Transition and Environment in Former Soviet Central Asia. *Development and Change* 29:409–35.
- Suhrke, A. 1994. Environmental degradation and population flows. *Journal of International Affairs* 47 (2):473–96.
- Sulaimanova, S. 2004. Migration Trends in Central Asia and the Case of Trafficking of Women. In *In the Tracks of Tamerlane: Central Asia's Path to the 21st Century*, edited by D. Burghart and T. Sabonis-Helf. Washington, DC: National Defense University.
- Sundari, S. 2005. Migration as a Livelihood Strategy: A Gender Perspective. *Economic and Political Weekly*: 2,295–303.
- Suzuki, K. 2003. Sustainable and Environmentally Sound Land Use in Rural Areas with Special Attention to Land Degradation. Background paper for the Asia-Pacific Forum for Environment and Development Expert Meeting. Gulin, PRC. 17 January.
- Thaitakoo, D. and McGrath, B., 2008. Changing Landscape, Changing Climate: Bangkok and the Chao Phraya River Delta, *Places*, 20, pp. 30–35.
- Thomas, R. J. 2008. Opportunities to Reduce the Vulnerability of Dryland Farmers in Central and West Asia and North Africa to Climate Change. *Agriculture, Ecosystems and Environment* 126:36–45.
- Tubiana, L., F. Gemenne, and A. Magnan. 2010. *Anticiper pour s'adapter. Le nouvel enjeu du changement climatique*. Paris: Pearson.
- Tun Lin, F. D. De Guzman, and M. C. Cuevas. 2007. *Flood Insurance as a Flood Management Tool: An Economic Perspective*. ADB. 99.
- United Nations. 2009. GDP data from National Accounts Main Aggregates Database, Economic Statistics Branch. United Nations Statistics Division, [unstats.un.org/unsd/snaama](http://unstats.un.org/unsd/snaama) (6 July 2011). Refugee data from UNHCR.
- . 2010. *World Population Prospects: The 2009 Revision*. United Nations, Department of Economic and Social Affairs, Population Division. <http://esa.un.org/unpd/wup/index.htm> (accessed 23 February 2012).
- . 2011. *Global Assessment Report on Disaster Risk Management*. Geneva.
- United Nations Economic and Social Commission for Asia and the Pacific. 2011. *Statistical Yearbook for Asia and Pacific 2011*. [www.unescap.org/stat/data/syb2011/II-Environment/Natural-disasters.asp](http://www.unescap.org/stat/data/syb2011/II-Environment/Natural-disasters.asp)
- United Nations Environment Programme. 2011. *Women at the Frontline of Climate Change: Gender Risks and Hopes*. Released at COP 17 in Durban, South Africa.
- United Nations Framework Convention on Climate Change. 2011. Report of the Conference of the Parties on its 16th Session, Cancun, 29 November–10 December 2010.
- United Nations International Strategy for Disaster Reduction. 2005. *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*. Geneva.
- United Nations Population Fund. 2007. *State of World Population 2006. A Passage to Hope: Women and International Migration*. New York.
- United Nations Refugee Agency (UNHCR). 2010. *Global Report Summary*. Geneva. [www.unhcr.org/4dfdbf3816.pdf](http://www.unhcr.org/4dfdbf3816.pdf)
- . 2011. *Global Trends 2010. 60 years and still counting*. Geneva.
- Vörösmarty, C. J. et al. 2000. Global Water Resources: Vulnerability from Climate Change and Population Growth. *Science* 289:284–8.
- Warner, K., Afifi, T., Dun, O. and Stal, M., 2009. Climate Change and Migration: Reflections on Policy Needs, MEA Bulletin, Guest Article No. 64, 27 February, [www.iisd.ca/mea-1/guestarticle64.html](http://www.iisd.ca/mea-1/guestarticle64.html).

Webster, M. et al. 2003. Uncertainty analysis of climate change and policy response. *Climatic Change* 61 (3):295–320.

Werker, E. 2007. Refugee Camp Economics. *Journal of Refugee Studies* 20 (3):461–80.

Wheeler, David. 2011. Quantifying Vulnerability to Climate Change: Implications for Adaptation Assistance. Washington, DC: Center for Global Development. [www.cgdev.org/content/publications/detail/1424759](http://www.cgdev.org/content/publications/detail/1424759)

Wihlto de Wenden, C. 2009. *Atlas mondial des migrations*. 2nd ed. Paris: Autrement.

Williams, A. 2008. Turning the Tide: Recognizing Climate Change Refugees in International Law. *Law & Policy* 30 (4):502–29.

World Bank. 2008. *Migration and Remittances Factbook 2008*. Washington, DC.

———. 2011a. *Migration and Poverty. Toward better opportunities for the poor*. Washington, DC.

———. 2011b. Migration and Development Brief 17.

World Vision. 2009. *Reducing Flood and Storm Vulnerability, Viet Nam*. Climate Change Case Studies.

Yusuf, A. A. and H. A. Francisco. 2009. *Climate Change Vulnerability Mapping for Southeast Asia*. Singapore: Economy and Environment Program for Southeast Asia.

Zetter, R. 2011. *Protecting environmentally displaced people: Developing the capacity of legal and normative frameworks*. Oxford: Refugee Studies Centre.



## **Addressing Climate Change and Migration in Asia and the Pacific**

Climate change will increase the frequency of extreme weather events, making more geographic places inhospitable to human habitation and secure livelihoods. This report presents a detailed picture of the potential impacts of climate change on migration in Asia and the Pacific. It draws upon a wealth of research to provide policy makers with informed analysis of an emerging phenomenon requiring urgent attention by governments and the international community. The report also suggests that climate-induced migration should be seen not only as a threat to human well-being but also as a potential tool to promote human adaptation to climate change.

## **About the Asian Development Bank**

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.8 billion people who live on less than \$2 a day, with 903 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.