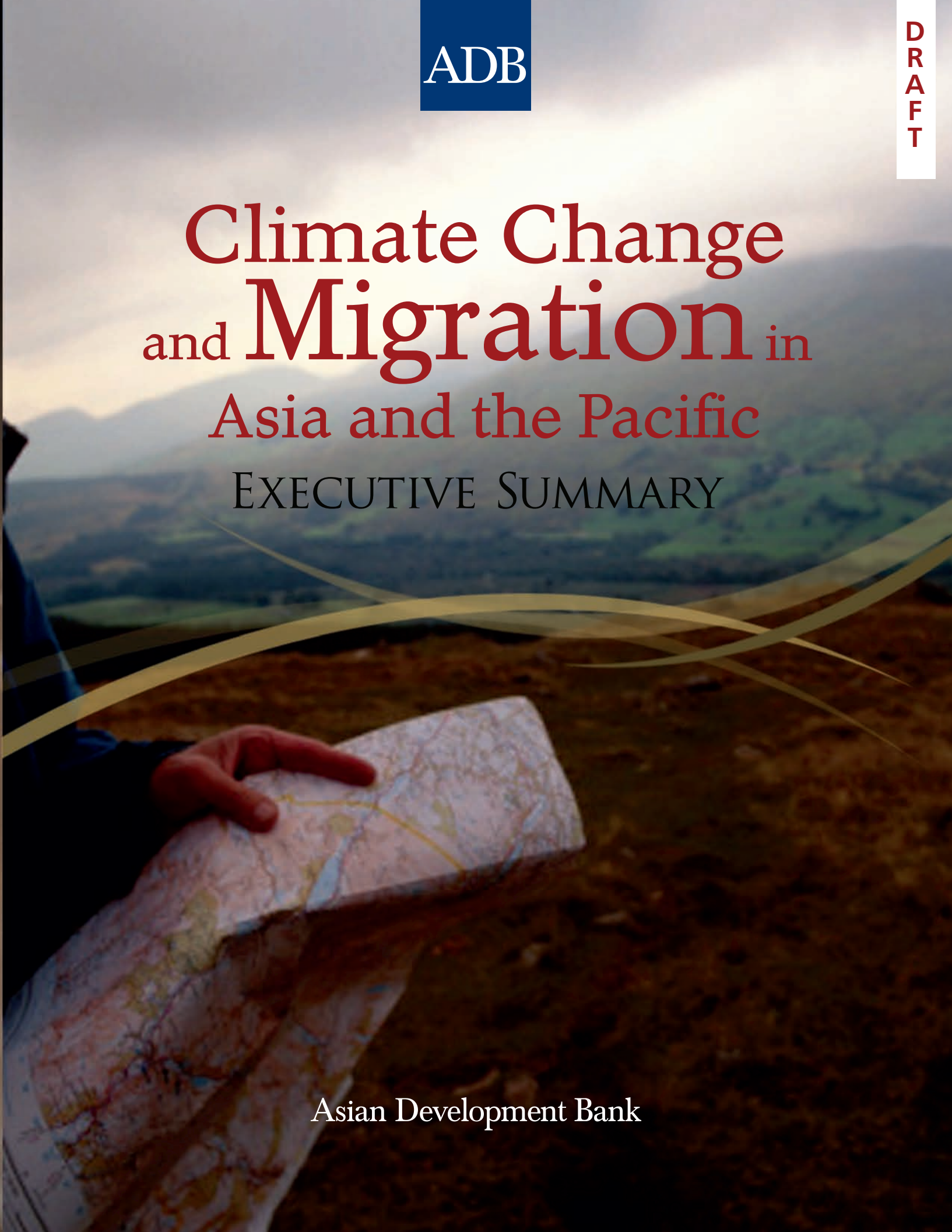
ADB

DRAFT

Climate Change and Migration in Asia and the Pacific

Executive Summary



Asian Development Bank

CLIMATE CHANGE AND MIGRATION IN ASIA AND THE PACIFIC

Executive Summary

DRAFT

by
The University of Adelaide
Flinders University
The University of Waikato

Asian Development Bank

Printed in the Philippines.

Cataloging-In-Publication Data

University of Adelaide, et al.
Climate change and migration in Asia and the Pacific.
Mandaluyong City, Philippines: Asian Development Bank, 2009.

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

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

Table of Contents

Acronyms

ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
CNY	Chinese yuan
EDPs	Environmentally Displaced Persons
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
OECD	Organisation for Economic Co-operation and Development
PRC	People's Republic of China
RCP	Regional Consultative Process on Migration
SAARC	South Asian Association for Regional Cooperation
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees

Chapter 1: Introduction

Increased migration has been among the most significant demographic changes in Asia and the Pacific over the last five decades, during which massive changes in the form and scale of mobility have taken place. Economic factors, in particular, helped drive this change.

Yet, there is a growing appreciation of the role that environmental change has played and will play in future migration, as global concern grows about the impact of climate change. Among the key findings of this study is that climate change needs to be conceptualized as an additional factor among an array of existing factors driving migration. Policies and strategies to deal with climate change should not be seen as separate if they are to be effective. Indeed, a migratory response to climate change will be determined by past patterns of migration—whether environmental or economic, forced, permanent, or temporary—through long-established networks.

The interaction between environmental change and migration is little understood, however, even though its implications for migration—both within countries and across international borders—could be enormous. This study provides an initial analytical review of climate change and migration in Asia and the Pacific and discusses possible implications for policy and practice. It takes the view that if migration due to climate change is managed effectively, humanitarian crises will be minimized, conflicts avoided, and countries can benefit.

A growing scientific consensus suggests that human-induced climate change is already occurring, and a number of factors suggest the importance of climate change impacts on migration in the region. These are:

- population (4.1 billion people)[1] and environmental management pressures are already enormous;
- climate change impacts are projected to be large, particularly because monsoonal rainfall patterns could become less reliable and cyclonic activity more intense; and
- a large part of the population in the region lives in poverty (Asian Development Bank estimates 903 million struggle on $1.25 per day) and their well-being is highly vulnerable to environmental hazards and degradation of natural resources.

Potential responses to climate change either focus on risk management or societal adaptation to the impacts. Migration clearly falls under the latter. Yet it must be stressed that population mobility is only one possible adaptation to environmental change. There is also a

[1] UNESCAP (2008a).

range of *in situ*[2] mechanisms available, involving risk management, reducing vulnerability, infrastructure development, and increasing local resilience. Hence, migration must be seen as only one element in an array of potential responses to climate change.

Vulnerability to climate change, for many, will be determined by where they live. Java in Indonesia, the river deltas of southern Asia, the coastal areas of the People's Republic of China (PRC), and the river valleys of India and Bangladesh, are among the world's most densely settled areas. As will be shown later, these areas are among the most vulnerable to the impact of climate change, and considered as climate change "hot spots."

Rapid urbanization is also an important issue. Asia's urban population rose from 24% of the total in 1970 to 42% in 2007, and is likely to reach 50% in the next decade, with a strong coastal concentration (United Nations 2008). The countries of the Pacific—largely islands of volcanic origin or low-lying atolls—are similarly highly vulnerable.

Despite the importance of climate change impacts on migration, relatively little empirical research has been done on the topic for Asia and the Pacific because, as already stated, it remains very difficult to determine their likely origins or destinations or to estimate how many people may move.

There have been a number of speculative predictions of displacements at the global level:

- Environmentally displaced people by 2010: 50 million (UNFCCC 2007)
- Refugees due to climate change by 2050: 250 million (Christian Aid cited in Bierman and Boas 2007)
- People estimated to become permanently displaced "climate refugees" by 2050: 200 million (Stern 2006)

But in fact, there are so many gaps in current knowledge on climate change, migration, and the relationships among these in Asia and the Pacific that it would be irresponsible to speculate on future numbers of people likely to migrate.

It is possible nevertheless to investigate the potential impacts of climate change on migration, to explore the implications for societal development, and to discuss and analyze the

[2] *In situ* adaptation means it is undertaken at the place of origin, rather than through the movement of people.

institutional and structural adjustment and intervention needed. It is also possible to project the numbers of people who will be living in areas most likely to be affected by climate change.

Climate Change Impacts on Asia and the Pacific

Climate change is expected to have a significant impact on the environments and societies of Asia and the Pacific. This study does not intend to repeat the extensive work by the Intergovernmental Panel on Climate Change (IPCC) and others.[3] Rather, the discussion draws together the key projections. It looks at climatic issues relating to (i) primary impacts (resulting directly from changes to climatic patterns); (ii) secondary impacts (changes to environmental systems resulting from primary impacts); and (iii) tertiary impacts (broader impacts on societal systems, including the implications for migration patterns, and the implications of potential policy responses by governments).

Many complex and specific climate change impacts of particular importance exist for different areas and societies within the region. Some key points detailed in the review include the following:

- Warming across the region would, by itself, have significant impact on most societies. It would, for example, (i) have direct and indirect health impact; (ii) lead to increasing evapotranspiration rates, altering crop production systems and water management systems; and (iii) increase the rates of snow pack and glacial melt.
- Monsoonal activity is projected to increase in intensity, leading to increased average precipitation across much of the region, including South, East and Southeast Asia. A net drying trend for much of western Asia and large parts of the South Pacific is projected, with an associated decline in runoff.
- It may also be possible that intra-annual rainfall variability will increase in many areas, because large parts of South and Southeast Asia are projected to see less winter precipitation, even as the monsoons bring more summer rain.
- Upper level projections for sea-level rise to the end of the 21st century are in the range of 1 meter above current levels. Given the significant uncertainty and the possibility of nonlinear melting of terrestrial ice, the possibility of significantly greater global mean sea-level rise is real. In the last decade, many local measurements of sea-level rise are already suggesting that the rates of change exceed IPCC projections. In this report, we

[3] For example, Preston et al. 2006; Cruz et al. 2007; Meehl et al. 2007

also look at the potential impact of five-meter sea-level rises (particularly in Chapter 5) given that the coastal hot spots identified are projected to experience sea-level rise in combination with increasing storm surges. Some areas will also experience considerable sinking, particularly deltas where flood control measures are in place upriver. Storm surges to 4 meters above sea level are related to intense cyclonic activity in some areas, and such cyclonic activity is projected to intensify. In Bangladesh, storm surges over 10 meters above sea level have been recorded (see chapter 5). In the Red River delta in Viet Nam, three-meter storm surges are experienced during intense cyclones (Pilarcyzk and Nuoi 2005).

- On a global scale, the number of intense cyclones[4] is projected to increase with warmer seas; this shift may already be occurring. Because storm surge results from a combination of high winds, wave action, and low air pressure—often in association with high tides—stronger cyclones are likely to cause more regular, destructive storm surges and greater salt-water intrusion in low-lying areas. Migration from major urban centers in the major delta regions (the Indus, Ganges-Brahmaputra, Irrawaddy, Chao Phraya, Mekong, Red, Pearl, Yangtze, and Yellow rivers) is of particular concern. Some small Pacific island states could also be highly vulnerable.
- Cyclonic activity by itself could have an increasing impact on populations and economies in those areas that already experience cyclones, including Bangladesh, the coastal areas of the People's Republic of China (PRC), the Democratic People's Republic of Korea, northeast and northwest coastal India, Japan, the Republic of Korea (Korea), Myanmar, the south coast of Pakistan, the Philippines, and Viet Nam.
- Average annual runoff is projected to increase significantly in areas such as northeast India–Bangladesh, eastern PRC and Southeast Asia. Flooding is already a key concern in many parts of the region, but in some areas, particularly where monsoonal activity is projected to intensify, this hazard could become more problematic.
- Drought and less reliable rainfall could become an increasing problem in western Asia and in the Pacific, where both water resources and agricultural systems could be significantly affected.

[4] Referred to in different regions as typhoons or hurricanes.

Aims and Objectives

The present study expands our knowledge and understanding of the potential impact of climate change on future population movement in Asia and the Pacific by:

- establishing the extent to which it may do so;
- mapping the risks and vulnerabilities of displacement and other forms of migration under various climate change scenarios;
- examining the constraints and barriers to migration;
- discussing the impact of migration on socioeconomic structures;
- examining past patterns of climate-induced migration;
- scoping the extent of regional cooperation and multinational networks for migration; and
- detailing options and recommendations for policy, multilateral cooperation, infrastructure needs, and financing arrangements.

Key Research Issues

The following questions were addressed:

- What is the extent and nature of contemporary migration related to environmental change in Asia and the Pacific?
- What is its extent and nature in those parts of the region to be most influenced by climate change?
- What are the potential long-term impacts of climate change on migration in Asia and the Pacific under different scenarios?
- What are the projected numbers of vulnerable people in the areas to be most affected by climate change and what is the risk that they will be displaced?
- What is the potential for migration to assist in adaptation to climate change?
- What policies can be put in place to:
  - (i) facilitate the use of migration or other adaptation mechanisms to climate change?
  - (ii) cope with displacement of people by climate change?
- What role can regional cooperation on migration and settlement issues play in adjusting to climate change in Asia and the Pacific?

- What mechanisms are needed to develop an effective response to migration implications of climate change?
- What concrete and practical risk-reduction mechanisms involving mobility can be introduced to save lives and livelihoods, particularly among poor and vulnerable groups?

Scope

The study addressed the issues through the following:

- Synthesis of the literature on the relationship between environmental change and migration in Asia and the Pacific.
- Use of standard climate change models to identify the hot spots of greatest vulnerability to climate change in the region up to 2050 and the nature of impacts in those areas.
- Assessment of the likely impact of these climate change effects on migration in the hot spots through analysis of the size and characteristics of the populations affected, the resources they have available to them to cope with change, and the existing patterns of migration.
- Assessment of the economic impacts of climate change and their influence on population movement.
- Review of existing policies and programs relating to migration and population displacement and potential new policy interventions that will be required to cope and adapt.

In addition to assessing the impacts of climate change on migration across the entire region, a number of case studies were carried out in particular hot spots, such as Bangladesh–India, the PRC, and the Pacific. Smaller case studies were done using secondary data in Central Asia, Indonesia, the Mekong, Nepal, and Thailand. But the major objective has been to provide a broad perspective of the potential effect of climate change on migration across the entire region, not at the country level.

In Chapter 2, the study looks at the evidence linking climate change and migration followed in Chapter 3 with a brief look at the nature of migration in the region. Chapter 4 then presents the potential hot spots of climate change in Asia and the Pacific, leading into the Chapter 5 discussion of the possible impact on migration (projecting the numbers of people who

will be vulnerable). The implications for policy are than analyzed in Chapter 6, closing the study with a series of recommendations dealing directly with migration and the possible effects of climate change.

Chapter 2: Linking Climate Change and Migration

There is little evidence that climate change has directly influenced contemporary migration patterns, although historically climate change has impacted significantly on changing population distribution. This chapter summarizes existing knowledge of the links between environmental change and migration and how this relates to the potential effects of climate change and migration.[5]

There is often a misconception that environmental change leads directly to migration (and that climate change will too), but in reality the situation will be far more complex. Environmental change interacts with a range of economic, social, and demographic factors.

A key distinction is needed between mobility as a strategy for *adapting* to the impacts of environmental deterioration and as *a displacement* when deterioration becomes so extreme that people are forced to leave an area. Too often, it is assumed that all environmental impacts will result in displacement migration. For example, in the atoll Pacific countries, the discussion on potential sea-level rise has focused exclusively on resettlement migration as a response, such that other forms of mitigation and adaptation have been neglected (Connell 2003). This is especially the case in projecting the impact of climate change (Black 2001: 9).

Population mobility as a response to environmental change can and does take many forms. Often, it is also one of several mitigation and adaptation strategies adopted by communities to cope with that change. It is essential then that environmentally induced migration be seen as a wide array of mobility types and not just displacement; that it be seen as only one of the responses among many potential mitigation and adaptation strategies that populations will implement or undertake.

It is important to view environment as a cause of migration along a spectrum. At one extreme are people moving voluntarily in anticipation of environmental change, while at the other people are forced to flee for their lives from flooding or some other environmental disaster.

[5] There is a case for having separate identification of environmental migrants at the extreme forced end of the migration spectrum (that is, from voluntary to forced), from the perspective of arranging assistance provision to such migrants. The United Nations High Commissioner for Refugees and the International Organization for Migration (IOM) have identified a separate category of "environmentally displaced persons" (EDPs). IOM more recently proposed a broader working definition of environmental migrants that has gained wide acceptance (IOM 2007: 1): “Environmental migrants are persons, or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad.” This is an improvement because it encompasses all forms of mobility initiated by environmental change, and the term and definition are primarily applied here. Yet, that definition could be very difficult to apply in practice because of the complexity of factors leading to any migration. Perhaps some definition of "climate change displaced persons" could apply, which would be defined as "people forced to leave their homes because of the complete and irreversible loss of their habitat resulting from climate change."

Recognizing the key differences between forced and voluntary migrants influences the ability to settle them successfully at a destination.

Migration is likely to result directly from climate change in two dominant forms: (i) migration associated with real or perceived direct environmental hazards, and (ii) migration associated with real or perceived reduced access and effective use of natural resources, including land, water, soil or biological resources.

There will also be migration due to policy and practice, which aims to adapt to climate change or mitigate the risks through societal interventions.

This raises a fundamental question: Will migration be influenced by climate change in a linear manner or a nonlinear manner—that is, will there be thresholds or tipping points where fundamental changes to migration levels and patterns result?[6] In other words, will we see levels of change in the experienced or perceived natural resource condition, or changes to the impacts or likelihood of hazards, after which there will be fundamental changes in migration levels or patterns? The research question emerges from this uncertainty: Will it be possible to identify points at which the impacts of climate change are so severe or so regular that the inherent resilience of socio-ecological systems is breached, or *in situ* adaptation options fail and people make use of migration as an adaptation option in a manner that will fundamentally alter the form migration is taking?

It is argued here that just as there is a spectrum of migration, from voluntary to forced, there is a range of thresholds or tipping points after which fundamental changes to migration patterns could be expected. For most voluntary migrants, the change to their socio-ecological systems is likely to influence their decision to move before it becomes critical, and climate change impacts are unlikely to fundamentally alter existing patterns of migration in the short-term, except to increase the scale of movement.

Climate change impact that leads to thresholds of involuntary or forced migration, or in fact, *displacement,* is likely to lead to a more significant reordering of migration patterns. Put differently, gradual environmental change is likely to lead to a lack of long-term planning and ineffective adaptation, and rehabilitation measures will weaken the *in situ* adaptive capacity of the affected groups. This could, in turn, result in thresholds of (maximum) tolerance being met, leading to a shift over time from linear changes to nonlinear changes in migration patterns. Similarly, in relation to environmental hazards, nonlinear changes may result from a significant increase in the recurrence or impact of hazards, or the perceptions of those hazards.

[6] A linear manner means that it will add to existing movement types in existing migration channels or networks. Nonlinear will lead to new types or channels and scales of immigration once thresholds or tipping points of climate change are surpassed.

Already, migration is clearly and extensively used as an important part of adaptation to respond to massive changes in economic, environmental, and political contexts across Asia and the Pacific. There is no reason to believe that climate change adaptations will differ significantly from these.

However, in general, it is not the poorest of the poor who will move. They lack the resources to fund the risk and to gather the information about land networks to potential destinations, and therefore to anticipate or adapt to environmental deterioration through migration. To move successfully, they would need external assistance.

Hence, it is argued here that mobility as part of an adaptation response is more likely an option in communities with a history of movement and active migration networks. It is possible to think of networks involving a series of established channels or corridors of migration linking origin areas with a single, or multiple destinations. These same corridors would be the channels that the majority of environmental migrants are likely to follow.

Most experience in the region in planning and operationalizing resettlement of displaced people are within nations, with occasional examples of work by the United Nations High Commissioner for Refugees (UNHCR) across international borders. In fact, the majority of migration still occurs within national boundaries, with considerably greater barriers for people, especially poor, low-skilled people, aiming to cross international borders.

The emphasis of policy in Asia and the Pacific has been on constraint, policing, and exclusion, rather than migration management. These barriers are likely to be even more significant to environmental migrants in the future, unless changes are made. Yet, there is an increasing body of evidence that suggests migration can be beneficial to both regional stability and socioeconomic development in origin and settlement areas, given an appropriate policy. In fact, international migration is increasingly seen improving the lot of destination and origin countries, and the migrants themselves.

Chapter 3: Migration in Asia and the Pacific

Chapter 2 pointed out that climate change needs to be conceptualized as an additional factor driving migration, adding to an array of existing drivers. As Barnett and Webber (2009, 17) have maintained: "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."

It is therefore important to establish the existing patterns of migration in the region before projecting the future impact of climate change. One of the most striking demographic trends in recent decades has been the increase in the level and complexity of migration—within and between countries, temporary and permanent.

We will consider each of the main subregions in Asia and the Pacific separately, but there are a number of trends which are universal:

- 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. As a result, levels of mobility *within* and *between* nations have increased exponentially.
- Mobility of women has increased such that in many emigration flows, they are more numerous than men.
- Movement (both internal and international) has increasingly been directed toward urban areas, especially to the large cities.
- There has been an increase of both permanent and temporary mobility.

In 1950, for example, only 16.8% of the population (230 million) was urban, reaching 38.6% (1.45 billion) by 2005. Over the same period, the rural population doubled from 1.14 billion to 2.31 billion. But while the rural population will peak at 2.33 billion in 2015 and thereafter begin to decline, the urban population will grow to 1.84 billion in 2015, to 2.48 billion in 2030 and to 3.23 billion in 2050 (United Nations 2008).

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.

It should be noted that the region is predominantly one of emigration: of the 30 countries with the most migrants in other countries, nearly half are in Asia and the Pacific while only 3 of the 30 largest destination countries for international migrants (Brunei Darussalam, Samoa, and Singapore) are in Asia or the Pacific (World Bank 2008a, 2–3).

Yet, despite the increase in the scale of internal and international migration, measurement has not kept up. While the majority of Asian countries asked a question on internal migration during the population censuses of 2000 (with exceptions in Kazakhstan, Myanmar, and Nepal), even where the question was asked, the censuses failed to detect most short-distance movement, non-permanent movement and much rural to urban movement. Very few countries have the means to estimate current let alone future internal migration patterns.

Information on international migration is even sparser (Huguet 2008). No censuses in the region ask a direct question on emigration. Similarly, border control statistics are very poor (Hugo 2006a). 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 non-permanent flows.

Meanwhile, even though the global discussion on climate change and migration has been focused on international migration, the fact is that most environmentally induced migration in the past involved movement within countries (Hugo 1996). The majority of climate change-related mobility will also be within countries.

The review and analysis of current human mobility across different subregions revealed several key points:

- Massive growth in megacities in coastal areas significantly increases the population exposed to the risks posed by climate change.
- Previous forced displacements are an important guide to future climate change migration, as they are predominantly rural- and agriculture-based and there is a time lag between the planning and the actual movement of people.
- Temporary, cyclical, and permanent rural-urban flows are creating strong rural-urban links. Across the region, such migration is generated by real and perceived inequality of opportunity, and increasing impoverishment in rural areas. But in contrast to East and Southeast Asia, urbanization in South and Central Asia is still relatively low, meaning there is still considerable scope for it.
- Similarly, for many populations, large international diasporas establish networks and contacts for future mobility.

- Most rural frontiers that might have settled large numbers of new migrants have already been settled in Asia and the Pacific. People are instead increasingly settling in areas exposed to significant environmental risks such as storm surges, floods, and droughts.
- Conflict has periodically been an important cause of population movement, but movements have been primarily contained within the countries of Asia and the Pacific. Where refugee migration has been established, people primarily move along corridors established by original refugee flows.
- Of the world's regions, the Pacific is most dependent on the flow of remittances from migrants.

Elements encouraging migration in Asia and the Pacific include:

- Labor market segmentation due to the structural needs of the economies, which creates a demand for labor migrants in particular.
- A highly developed and self-perpetuating immigration industry.
- Social networks that link origin and destination countries become key elements in sustaining and enhancing population flows.

Although the available data and empirical studies are limited in quality and scope, examples from the PRC, Southeast Asia, Bangladesh, and the Pacific provide important insights into the forms that environmental migration may take.

As made clear by the tsunami of December 2004 in the Indian Ocean, environmental hazards have already caused significant displacement—estimates suggest between 1 million and 2 million were forced from their homes—although most moved nearby or at least within their own countries. Flooding in the PRC also displaces thousands of people annually, while internal and international migration in Bangladesh can be partly attributed to environmental impacts (predominantly flooding and river bank erosion, storm surges, cyclones, and droughts). It is projected that climate change impacts in Bangladesh will significantly exacerbate these environmental drivers of migration. In the Pacific, too, cyclones have caused entire island communities to migrate to New Zealand (although the movements were largely temporary and people returned once conditions improved).

Major development projects also provide examples of forced migration. The Three Gorges Project produced the world's largest planned human displacement and resettlement, involving the relocation of over 1.33 million people over a 16-year period to 2008.

Environmental degradation has been used to support state-led migration initiatives, which provide important lessons. In the PRC, environmental migration is being used as an explicit state policy to help people defined as impoverished to leave predominantly rural, ecologically fragile areas to resettle. Agricultural production and water withdrawal in the fragile zones are seen as insufficient to sustain local and downstream populations, and these areas are seen as increasingly vulnerable to climate change. Inhabitants of the zones are mostly poor, ethnic minorities, and state-led migration is largely involuntary. In this case vital government responsibilities include:

- devising resettlement policies and plans;
- determining which households need to be displaced;
- selecting resettlement communities;
- providing basic infrastructure;
- motivating migrants to move out;
- organizing removals; and
- helping migrants become involved in new communities.

Chapter 4: Identifying Hot Spots of Climate Change Impact

The Asia and Pacific region is among the world's most prone to environmental hazard. Of the top 15 countries at highest risk of experiencing three or more hazards, eight are in the region. As will be shown in this chapter, a strong correlation exists between the areas currently at most risk of such hazards and those at greatest risk of being most influenced by climate change.

The region is vulnerable to several climate change impacts. In "hot spot" areas, impact will be greater in scope and intensity. These areas are defined here as "specific areas or regions that may be at relatively high risk of adverse impact from one or more natural hazards [as a] result [of] climate change." To identify hot spots, impacts due to changes in climatic conditions have been categorized as primary, secondary, and tertiary.

Regional hot spots have been identified by four different impacts:

- coastal vulnerability due to sea-level rise (including inundation and storm surges);
- cyclones;
- riparian flooding; and
- water stress.

Four types of regions are especially vulnerable to the impact of climate change including:

- low-lying coastal areas;
- deltaic regions, which often are the region's most densely populated rural and urban centers (such as the Mekong);
- low-lying small island states (such as those in the Pacific); and
- semi-arid or low-humidity regions (mostly in Central Asia).

Northeast Asia

Northeast Asia mainly comprises the PRC; Democratic People's Republic of Korea; Taipei,China; Hong Kong, China; Japan; and Korea.

Much of the discussion in the main study concentrates on the PRC, a demographic giant which already experiences significant environmental hazards (largely associated with flooding in densely populated plains regions, but also coastal flooding, major water stress in the west, cyclones, coastal flooding and other problems) and where many people live in the low elevation coastal zone, leaving them vulnerable to sea level rise, especially if associated with cyclones.

The northeast plains are vulnerable, as are coastal cities such as Tianjin, Shanghai, Shenzhen, Guangzhou, and Haikou.

Flooding is a climate change-induced hazard that has constantly threatened the PRC's socioeconomic stability. Floods occur primarily on several major rivers (the Yangtze, Pearl, Huai, Yellow, Hai, Liao, and Songhua). Warming temperatures, increasing rainfall, deforestation, and the resulting soil erosion and urbanization are important factors leading to widespread flooding. In addition, cyclones are the largest natural hazard hitting coastal regions in the PRC, with an extensive area of southeastern PRC likely to be at risk of more frequent cyclones as a result of climate change.

Several other parts of Northeast Asia are subject to multiple hazards such as coastal inundation due to sea-level rise. The City of Guangzhou, coastal Seoul, and southern Honshu in Japan are some of the areas likely to be at high risk from sea-level rise.

Other impacts likely to affect Northeast Asia include drying in western PRC due to melting glaciers across the Tibet Autonomous Region and decreasing precipitation in northern PRC and the Sichuan basin. Drought leads to land degradation and thus reduces land productivity. Some important regions in the PRC that have suffered droughts since the 1950s and where deserts will continue to spread include the lower reaches of the Yellow River, the northwest, southwest and the north.

South and Central Asia

Like East Asia, South Asia is densely populated and likely to be significantly affected by projected climate change. Sea-level rise poses a high threat to areas along the Bay of Bengal and the Arabian Sea, including the deltaic areas of the Ganges–Brahmaputra, the Mahanadi, Godvari, Krishna, and the Indus rivers. In addition, Bangladesh, parts of India (such as West Bengal, coastal areas along Chennai and Mumbai) and southern Pakistan (coastal Karachi) are prone to large coastal flooding and cyclones. The report highlights the presence of both linear and nonlinear changes in natural resource availability across the region due to a strong interplay of several climate change impacts such as sea-level rise, drought, freshwater salinization, cyclones, and others.

Of the regions above, Bangladesh remains at a very high risk, not only due to its geographic location, but also due to a very young, poor population that depends primarily on agriculture for daily subsistence. Regular flooding, storm surges, and landlessness are recurrent environmental hazards threatening socioeconomic and environmental sustainability. The poor

are often most vulnerable and lack suitable adaptive capacities to successfully address climate change impacts.

Of great significance to this study, the effective sea level along the Bangladesh coast has been rising due to the interactive effects of global increases in sea level and the subsidence of the Ganges delta region (Mirza *et al.,* 2001; McGranahan *et al.,* 2007; Karim and Mimura, 2008). McGranahan *et al,* defining the Low Elevation Coastal Zone as 10 meters above mean sea level, calculate that 40% of land area and 46% of the population is within this zone. Rising seas will have enormous implications for Bangladesh.

Several megacities in South Asia, including Dhaka, Kolkata, Mumbai, Chennai, and Karachi are also at high risk of sea-level rise, more frequent cyclonic activity, and greater saltwater intrusion. River and local flooding are expected to increase across the Himalayas, northern Pakistan, northern India, Nepal, and Bangladesh.

In Central Asia, increasing desertification is the most serious climate change impact. The shrinking of the Aral Sea and its two most significant feeder rivers, Amu Darya and Syr Darya, is widely reported. Widespread salinization, inefficient water management practices, land degradation, heat stress, desertification, and increasing aridity are crucial issues that impede social, cultural, and economic well-being of local populations, exacerbating vulnerability to climate change-induced modifications in the local and regional environment.

Southeast Asia

In Southeast Asia, several climate change hot spots have been identified in parts of Indonesia, the Philippines, Thailand, and Viet Nam. Sea-level rise and storm surges are a great concern for low-lying deltas including those along the Mekong, Red, and Irrawaddy rivers. This, in turn, also threatens social and economic stability across several densely populated urban centers such as Ho Chi Minh City, Metro Manila, Jakarta, and Bangkok. The report further highlights the already serious threat of cyclones in the Philippines, Viet Nam, and Lao People's Democratic Republic, and that further climatic change may lead to more intense cyclones. Increasing water stress in the region, primarily due to freshwater salinization and urbanization, is also looked at.

The Pacific

Low-lying islands and island states will be extremely vulnerable to sea-level rise, high intensity cyclones, and storm surges.[7] With warmer seas, more intense cyclones could start to form a pattern in the region. In addition, drying is expected to increase in the southwestern Pacific.

Papua New Guinea, which is the region's largest country, is expected to see both flash flooding across the highlands and coastal flooding along the south coast. Further, sea-water intrusion on several small islands is polluting fragile fresh water lenses. Salinization of these lenses by rising sea levels calls for the greatest concern. In the Fiji Islands and New Caledonia, several coastal areas on the two main islands are subject to inundation due to sea-level rise. The Fiji Island's capital city of Suva and various atolls are particularly vulnerable to coastal inundation. Further, widespread coastal inundation is predicted for the main island of Kiribati, with a five-meter rise in sea level.

[7] The report divides the Pacific states into three cultural subregions: Melanesia, Micronesia, and Polynesia.

Chapter 5: Potential Impact of Climate Change on Migration Patterns

This chapter builds on the previous chapter to project the potential impact and patterns of population mobility in the identified hot spots. Changes to migration patterns due to climate change might take various forms, but are likely to principally involve an increase in the push forces (those at origin) that lead to emigration pressures. They are likely to manifest themselves through three main processes:

- increasing risk of environmental hazards and associated socio-ecological events;
- changing resource conditions in linear and nonlinear trends through time, which alter access and effective use of natural resources; and
- perceptions of risk of impacts of climate change, irrespective of real experiences.

Although the authors of this study have consistently argued that it is neither possible nor responsible to predict migration numbers due to changes in climatic conditions with satisfactory precision, they nevertheless

- Project the populations of the hot spots identified in Chapter 4 for 2020, 2030, and 2050, which will be at greater risk of influence from climate change.
- Assess the potential impact of climate change on the livelihoods of these residents.
- Develop scenarios of possible migration patterns and levels in 2020, 2030, and 2050 on the basis of existing migration systems in the areas, taking into account the modeled impacts of climate change.
- Based on the above, produce some indication of the potential scale of permanent and temporary migration that could be involved.

Climate Change Impact on Migration in Northeast Asia

Considerations of climate change in this region focus particularly on the People's Republic of China (PRC) not only because of its large population but also because of the relatively high degree of vulnerability of many of its citizens living in hot spots. Several of the PRC’s megacities are located in the coastal and inner valley areas that are vulnerable to coastal and riparian flooding and inundation. The growth of "at risk" urban populations in the PRC over the next half century is projected to be more than one and a half times, despite the low overall growth of the national population during that period. In Japan, the number of urban areas at risk will decrease over the period, reflecting the already shrinking Japanese population due to low fertility and

restrictive immigration policy. For similar reasons, only limited urban growth is anticipated in Korea.

Turning to rural populations, for each country in the region except Mongolia, the rural populations living in hot spots will decline substantially. In Northeast Asia, most of the growth in the population residing in hot spots over the next five decades will be in the PRC and most of it will be in urban areas. The mean rate of sea-level rise in coastal areas of the PRC over the last 50 years was recorded at 2.5 milimeter per year, just over the average rate of the global sea-level rise. Further sea-level rise will result in several additional natural hazards, including inundation of large marshlands, coastal erosion and saltwater intrusion, and storm surges. Unless prevention facilities and plans are carefully prepared, the annual economic losses due to various hazards associated with sea-level rise are anticipated to be more than CNY100 billion in the first 50 years of the 21st century.

By 2050, 10 million people, who mainly live in the western regions of the PRC, are likely to be displaced. Half of them live in ecologically fragile regions or in other regions, which lack the basic conditions required to adequately support people's livelihoods. In Sichuan (the province with the richest hydroelectric resources in the PRC) alone, the total number of reservoir settlers will be 1.4 million by 2020. The ongoing South-to-North Water Diversion Project (planned to be completed by 2050) will produce some 0.4 million migrants. Poverty undermines individual and household capacity to cope with the impacts of climate change and thus affects their ability to sustain livelihoods. This indicates that the PRC could continue to experience large-scale displacement of people from the rural areas. Environmental migration is used by the government as an efficient adaptive measure to rehabilitate the deteriorated environment, and to lift millions of rural people out of poverty.

Many of the hot spots in coastal and river valley areas are currently important destination areas for rural-urban migrants. Hence, any migration response to climate change impacts in such areas would involve reversing existing migration trends, which are channeling migrants, especially those from rural areas, into the cities located in the deltas and valleys of the major rivers. The PRC's megacities are the most at risk in the East Asian region. The cities of Japan, Korea, and Taipei,China have somewhat smaller numbers at risk.

Climate Change Impact on Migration in Southeast Asia

Coastal flooding poses the greatest climate change-induced risk, with around a third of the Southeast Asian population living in areas considered to be at risk of coastal flooding and its

associated impacts. These populations are especially concentrated in Indonesia, Myanmar, Philippines, Thailand, and Viet Nam, mainly in Jakarta, Manila, Ho Chi Minh City, and Bangkok, which are located in low-lying coastal areas. The Mekong delta will be particularly impacted; qualitative studies have already highlighted that environmental factors remain an important element of migration in the region. Considering that the local population continues to remain socioeconomically dependent on agriculture, lack of alternative livelihoods combined with increasing sea-level rise risk may eventually lead to large-scale population displacement across the region.

A large number of Southeast Asians live in areas likely to be affected by cyclones. Indonesia, Myanmar, the Philippines, Thailand, and Viet Nam are especially at risk. This further threatens significant displacement of population on a temporary or permanent basis. Densely populated western Java is also at high risk, as are the eastern coasts of Viet Nam and Cambodia. Flood risk is also significant in the north and central areas of Thailand and similarly, more people may wish to leave hazardous areas given more frequent, extreme rainfall.

It is in this context that the existing corridor across Thailand—as one of the major channels for migration—will be extremely sensitive to additional migration arising from climate change. Although migration from the region remains primarily driven by socioeconomic and not environmental factors, continual degradation of the environment and the livelihoods dependent on it could trigger widespread internal and international migration along established social networks. The strong networks maintained between the countries would mean that any climate change-induced outmigration would see more movement along the corridor. One significant nonlinear change to migration patterns may occur as a result of increasing flood and/or sea-level rise risk in Bangkok. There is the potential that 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 sections of the city, leading to a fundamental change in its role as a destination for internal Thai immigrants and a stopover point for future international migrants.

Climate Change Impact on Migration in South Asia

South Asia suffers high levels of poverty, poor governance, and projections of significant further population growth in all but Sri Lanka, with more than a doubling projected in Nepal and Pakistan. As such, it represents a major focus of global concern about climate change and migration.

In India, for example, Rosegrant *et al.* (2009) show that climate change could cause a decline of around 20 million metric tons (25%) in rice production and over 30 million metric tons in wheat (30%) over 2000–2050. Clearly, this could create significant pressure for rural to urban migration, both permanent and temporary.

Many people in India also live in areas likely to experience greater riparian flooding and water stress, while a significant number will be affected by coastal flooding. Substantial parts of Mumbai, with around 12 million people, are below sea level and already the city is subject to flooding.

Indeed, climate change represents an important potential brake on recent rapid economic growth in India. As a vast nation with complex patterns of internal mobility, permanent and temporary, recent rapid economic growth has been accompanied by a significant redistribution of population, especially from rural to urban areas. This would be especially exacerbated by the impact 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 Organization for Economic Co-operation and Development (OECD) countries.

Bangladesh also figures prominently in global discussions of climate change given its millions of poor living in the deltaic region and already subject to severe environmental hazard. Myers (2001b) argues that sea level rise caused by global warming, coupled with an increase in inland floods (from melting Himalayan glaciers) could cause "environmental displacement" in India of 20 million and 26 million in Bangladesh through 2050.

The country is already at high risk of severe or catastrophic environmental hazards, with flood risk from sea surges, river flow and local rainfall events, and interactions between all three, a primary concern.

Moreover, increasingly migration is being used within Bangladesh as a coping mechanism in the face of environmental and economic challenges (Afsar 2005; Alam 2003; Samaddar 1999; Siddiqui 2005). In particular, international labor migration of unskilled workers has increased substantially in recent years. Siddiqui (2009) notes that 40% of migrant workers originate from only 5 of 64 districts (Dhaka, Chittagong, Comilla, Tangail and Brahmanbaria), all in the south of the country. These areas are especially prone to flooding and environmental events. It is clear that environmental factors are working with economic forces to cause migration.

Climate Change Impact on Migration in Central Asia

The concept of environment-induced displacement is not new in Central Asia. Central Asia 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 due to severe environmental crisis in the Aral Sea region alone (Small, van der Meer, and Upshur 2001). Associated with environmental degradation, Central Asia experienced a multi-year drought beginning in the late 1990s (Glantz 2005). This, in turn, led to widespread unemployment in Karakalpakstan, a downstream autonomous region in Uzbekistan. It is believed that during the drought period between 1999 and 2001, about 273,000 people (about 20% of the region's total population) migrated to Kazakhstan and to the Russian Federation in search of better economic opportunities (Glantz 2005). Continued poverty and ineffective governance further adds to the vulnerability of local populations to environmental disasters such as drought, loss of agricultural productivity, and resulting food insecurity. A study conducted by Medecins Sans Frontieres in Karakalpakstan found that 48.8% of respondents wanted to migrate due to poor environmental conditions—almost half of them wanted to move out of the Aral Sea region as a result of loss of livelihood opportunities and weak institutional support (Small, van der Meer, and Upshur 2001).

Spoor (1998: 423) observes that "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." Despite such a complex relationship between environmental degradation, demographic, and climatic changes, there is a clear lack of empirical research on it, particularly in the Aral Sea Basin. This severely limits Central Asia's national and local capacities to establish timely adaptive mechanisms to address changes in the region's climatic conditions (Glantz 2005).

A large proportion of the region's population is living in areas at high risk of increased water stress due to climate change. Population growth in hot spots in each Central Asian country indicates that, except for Kazakhstan, almost all of the population in the region is living in areas at risk of climate change impact. The impact is almost entirely due to increased water stress as a result of reduced rainfall and runoff. It is difficult to see anything other than an increase in migration in the region as climate change adds to economic, social, and political pressures.

Impacts on Migration in the Pacific

The Pacific region faces some significant challenges as a result of anticipated impacts of climate change, especially rising sea levels, cyclones, droughts, and storm surges. Low-lying atolls and coral islands have drawn global attention to the potential devastating impacts on small nations like Tuvalu and Kiribati. The situation is exacerbated by two factors. First, the region is facing a demographic crisis with continuing high population growth rates, especially in the Melanesian subregion. The bulk of the population growth will be in Melanesia, which also has 87.5% of the total Pacific population, while Papua New Guinea is demographically expected to increase from 6.5 million currently to 10 million in 2050 when it will have 58% of the Pacific population. However, significant growth is also anticipated in other larger countries such as the Solomon Islands and Vanuatu. An important dimension of the projected populations is the anticipated "youth bulge" over the next two decades in which past high levels of fertility have meant that large numbers of children will be entering the young adult age groups. This is the most mobile age group so that the youth bulge will lead to a substantial increase in the numbers of migrants moving within the region (Bedford and Hugo 2009).

Chapter 6: Policy Considerations and Recommendations

This report has demonstrated that, under the most scientifically robust projections, climate change is likely to add to population movement in Asia and the Pacific. In this final chapter we argue that while the scale and scope of these anticipated migrations are significant, it is possible to cope with them through migration management, international cooperation, development assistance mechanisms, good governance, well planned resettlement schemes, and sound economic development policy. This will only be the case, however, if there is urgency in putting in place the necessary institutions and mechanisms. It also must be reiterated that migration is only one of a number of responses to address the impacts of climate change, and policy development therefore needs to be undertaken with the knowledge that there are other ways of adapting to or mitigating the effects of climate change.

Migration strategies in response to climate change are of two types:

- Migration out of areas influenced by climate change on a *temporary* or *permanent* basis, which can enhance the capacity of those left behind to adapt to climate change.
- In extreme cases where climate change makes it impossible for communities to remain in their home areas, displacement migration and resettlement elsewhere offers a last resort.

Policy has an important role to play if these responses are to provide effective and workable solutions. A few points need to be stressed in this policy discussion:

- Displacement patterns could incur massive additional economic, social, political, and environmental costs unless they are carefully planned for.
- Without careful planning, only the well-off will be able to use migration as a mechanism to cope.
- Preparing for climate change involves important national and subnational policy components, but international and regional cooperation and action are crucial.

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

One of the distinctions which can be drawn is the need for the development of new and effective systems of governance and policy mechanisms that can cope with: (i) the sudden onset of cataclysmic events which destroy or rapidly change livelihoods or displace population 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 non-mobility based strategies can be initiated to adapt. But the institutions and strategies needed often differ.

One of the challenges here is the need to convince policy makers to take action on both. There is a considerable body of experience with disaster response, refugees, and internally displaced persons (as defined by the UNHCR). This is relevant to responding to *sudden* climate change induced impacts. 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 a certain degree of urgency given the existence of a substantial body of relevant experience and the extreme nature of sudden changes.

On the other hand more long-term, incremental impacts have relatively less immediacy so there is the danger that action on them will be deferred by policy makers. Policy makers must recognize that while the full impact of these incremental processes will not be evident for several decades, the interventions needed to offset or ameliorate them are often of a very large scale and will therefore need to be put into operation over decades. The crucial point is that the need for action on hazards and the long-term processes is urgent.

It is also important when framing policies for climate change related migration to avoid separating internal migration responses to climate change from international migration responses, since the two are often strongly linked (Skeldon 2006). They will be dealt with separately below, however, because there are also some important differences between them.

While it has long been recognized that migration has been beneficial to most migrants and to the economies of most communities they move to, the prevailing view has been that the areas of origin suffer negative consequences because of the selective loss of their best human capital. However, the last decade has seen a shift in the dominant paradigm regarding migration and development. In the past outmigration and emigration from areas has been seen very much in terms of ‘brain drain’ whereby the loss of human capital in origin areas was seen as inevitably diminishing development potential. But there is an increasing emphasis in recent times on the positive impacts of migration on origin communities through the remittances sent back, the return of migrants bringing back 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.

Migration as Adaptation to Climate Change Impacts

Although Asia and the Pacific has experienced vast mobility for several decades now, climate-induced changes in natural resource conditions will accentuate existing mobility patterns in unprecedented ways. Migration has enabled several communities to improve their livelihood opportunities and facilitate their upward mobility, and in the process, has benefited origin and destination countries in a number of ways. Both internal and international migration across Asia and the Pacific has made significant contribution—particularly through remittances —to the development of various economies in the region. Several countries are among the largest recipients of remittances worldwide (for example, the People's Republic of China, India, and the Philippines). In the context of climate change, remittances can help

- supplement household incomes in areas where climatic changes have reduced productivity in the local area;
- provide emergency support at times of increased incidence of severe climatic events; and
- increase long-term local capacity to adapt to climate change impacts by contributing to the development of *in situ* adaptation strategies.

Based on the above observations, this study recommends that appropriate migration-related governance mechanisms be developed that not only facilitate the process of migration with minimal cost and encourage a safe transfer of remittances, but also provide for effective use of these remittances.

On international migration, several policy initiatives need to be considered to ensure that the benefits of migration are divided equitably across places of origin and/or destination and between migrants and their families. While international migration will not on its own provide a solution to the impact of climate change in hot spots, migration in combination with other adaptive strategies can certainly help identify improved livelihood opportunities for communities across Asia and the Pacific.

Poor governance often results in significant undocumented migration and lack of protection and subsequent exploitation of migrant workers. It is in this context that the study suggests the need to

- improve governance of temporary migration systems in the region and adapt best practice models in the recruitment, deployment, work experience, and return of labor migrants;

- build capacity in the whole area of development and operationalize labor migration policy;
- facilitate cooperation between authorities at both origin and destination ends of the migration process;
- encourage the development of diaspora communities in places of destination to strengthen strong links with communities of origin;
- improve migration data collection systems; and
- encourage conceptual change among policymakers to recognize the positive effects of migration in places of origin.

While international migration continues to be important for policy making, internal migration remains a significant concern in its scope, particularly for larger countries in Asia and the Pacific. Much internal labor migration in Asia and the Pacific is directed toward large cities, a trend that is likely to continue and lead to greater urbanization and declining rural populations. Not only does migration from rural to urban areas provide alternate livelihoods to people from rural areas disturbed by changes in environmental conditions, but it also remains fundamental to the sustainability of cities in view of their slow annual population growth.

The report, therefore, suggests a wide range of policies, which may facilitate the movement and comfortable settlement of migrants from rural areas to urban centers. These policies are not only necessary for those migrants who have already established social networks but also for those communities where there has not been a strong tradition of migration to cities. The study also highlights the need to undertake spatial planning with a view to encourage the development of semi-urban centers to divert urbanization pressures from several already stressed coastal metropolitan areas. Although these changes will not come about in the short-term, there is an urgency to begin the planning process immediately to achieve these spatial redistributions gradually and successfully.

Resettlement of Entire Communities: A Last Resort?

Despite the lack of sufficient and robust knowledge in the area of climate change impacts and migration, the study clearly establishes that the numbers of people displaced temporarily by sudden extreme events and permanently by the degradation or destruction of their living environment will increase substantially. Displacements will be both sudden (due to extreme events such as cyclones) and gradual (due to changes in resource conditions over time, such

as desertification). Both kinds of climate change impacts will most severely affect those communities that are already disadvantaged and are highly at risk due to lack of socioeconomic adaptive capacities to address climate-related hazards and overexploitation of natural resources.

In case of the eventual loss of livelihood opportunities, particularly for rural communities (such as those associated with landlessness, homelessness, food and social insecurity, and socioeconomic marginalization), permanent resettlement will be inevitable. By drawing together past resettlement experiences, this study suggests the development of initiatives that are properly funded, coordinated, and integrated. These will include the following:

- Comprehensive integration of disaster preparedness and climate change–associated population displacement strategies through well-coordinated planning efforts across various temporal and spatial scales;
- Provision for retraining migrant workers to meet the needs of the "new" local labor markets in destination areas to expedite their socioeconomic integration;
- Exploring scenarios that identify related sociocultural complexities which international resettlement (such as for regions in the Pacific) will require;
- Facilitating effective delivery of assistance provided by the international community to regions in distress; and
- Enhancing the set of disaster response strategies established by the United Nations to address climate change–induced migration challenges. This will comprise building up appropriate capacity to facilitate disaster preparedness, managing large numbers of sudden evacuees, and organizing their temporary accommodation and eventual permanent resettlement.

International Cooperation on Climate Change Migration

Effective institutions are still extremely limited and weak governance of international mobility restricts full realization of development gains from migration to and from the region. To better address the challenges around migration governance, the study suggests that while nation states will be primarily responsible for identifying the communities that will be impacted by climate change hazards, the role played by the international community in the process remains significant. According to the principle of "common but differentiated responsibilities," the international community, especially the developed nations, will need to facilitate the transfer of

appropriate technical, institutional, management, and financial resources to nations and communities likely to experience climate change-induced migration.

Effective management of migration, therefore, calls for international cooperation: bilateral, regional, and multilateral. Organizations such as the Asia-Pacific Economic Cooperation (APEC), Association of Southeast Asian Nations (ASEAN), and South Asian Association for Regional Cooperation (SAARC) may provide cooperation on migration issues including data collection and management on migrant recruitment, settlement, and remittance flows. Although there has been little or no regional cooperation on international migration in Asia and the Pacific, the last few years have seen a definite trend toward a greater readiness to discuss migration issues in regional international forums. The study proposes the establishment of a regional consultative process on climate change–induced migration and, while generally it proposes strengthening existing institutions rather than creating new ones, it does argue in favor of a specialized agency to develop a comprehensive and effective mechanism of dealing with climate change migrants in the region.

Furthermore, there is a need to set up a regional fund that can help develop strategies for climate change adaptation—including internal and international migration and *in situ*—across the region. The majority of funds will be provided by high-income countries and will include transfer of resources to developing regions in Asia and the Pacific to address climate change impacts on local and regional communities.

Recommendations

Short-term:

1. Improve the Empirical Basis for Policy and Planning
    - Strengthen data collection and management
        - The 2010 round of population censuses presents a timely opportunity to profile mobility
    - Build more robust modeling of climate-induced migration at subregional and national levels
    - Case Studies—develop or adopt best practice
        - The PRC's community adaptation practices (Pacific and Southeast Asia)
        - New Zealand's Regional Seasonal Employer program
        - Bilateral and regional agreements survey

2. Capacity Development
    - *Capacity building* in the development and operationalization of labor migration policy in both origin and destination countries
    - Improve governance of migration systems to discourage excessive rent taking and other forms of exploitation
    - Build capacity in disaster preparedness, managing evacuation of large numbers of people displaced by sudden events, organizing their accommodation in temporary settlement and ensuring eventual repatriation or resettlement

3. Strengthen Institutional Mechanisms
    - Strengthen existing mechanisms for environmental migration—integrating international responses in coordination, improving relocation services, including documentation, access issues (health, water and sanitation, education, housing) and dispute settlement
    - Comprehensively integrate disaster preparedness and climate change strategies within existing mechanisms in both international and national disaster preparedness, response and management

Medium-term:

4. Financing
    - Create or expand a *regional fund* responding to impacts of climate change across the region, including both *in situ* and mobility responses, the bulk of funding coming from the high income countries
    - determine access and allocation
5. Addressing the International Migration Regime
    - Address the need for an international or regional regime that can take responsibility for, facilitate and protect migrants in a holistic way
    - Bilateral negotiation and agreement may be a useful first step in achieving better migration outcomes
    - Support regional consultative processes on migration (RCPs)
        - participants may include governments, international organizations and, in some cases, non-government organization (NGOs)
        - structure is either thematically oriented, such as trafficking in persons and labour migration, or based on the common geography shared by the participating States
        - substantive focus is flexible, responding to the changing needs of the participating States
        - process is informal and marked by the absence of binding obligations (non-binding declarations, recommendations, plans of action or guidelines for Government action)

Long-term:

6. Migration as a Development and Protection Strategy: Labor Market Interventions
    - Identify skills or attributes of local workers that are in-demand in international labor markets
    - Provide appropriate training to potential migrants
    - Identify suitable destination labor markets: labor market matching
    - Develop efficient transport linkage between origin and destination to facilitate cheap travel
    - Establish a program at destination involving employers, unions, government, international development assistance agencies as well as migration/labour officials

- Ensure efficient remittance systems in place
- Negotiate agreements between origin and destination countries on elements of best practice in labor migration
- Ensure regulation of agents and other private sector elements involved.

7. Spatial planning: Migration as Adaptation—Settlement Planning
    - Establish transmigration points
    - Establish sub-regional cooperation, especially for the Pacific
    - Develop resettlement services (both social and economic, including better employment opportunities and improved health and education systems)
    - Learn from past resettlement experience

Conclusion

While there is great uncertainty in the understanding of projected patterns of both climate change and migration in Asia and the Pacific, there can be no doubt that the impacts of climate change will add to already increasing levels and the complexity of population mobility in the region. It not possible to be specific about the scale and scope of those impacts, but they will be significant.

This study concludes that it is possible to not only cope with these changes but also to harness population mobility to reduce poverty and enhance economic and social development in the region. To do this, there will be a need for major improvements in many areas—more effective migration management, strengthening governance, developing appropriate funding mechanisms to facilitate adaption to climate change, enhancing international cooperation on climate change issues, expanding and improving development assistance mechanisms, and developing sound economic development policy and practice throughout the region. Moreover, these changes are urgent for two reasons: (i) some of the impacts are already in evidence, and (ii) because the changes required involve substantial institutional, structural, and cultural change, it will take considerable lead time to successfully effect these changes. Many of the impacts of climate change are likely to be most severely felt several decades into the future. To avoid the poverty and suffering that could arise from inaction, and to help reduce inequality and improve the general well-being of Asia and the Pacific residents, multi-level policy interventions are required now.

Reference

Asian Development Bank (ADB), 2009b. The Economics of Climate Change in Southeast Asia: A Regional Review, Asian Development Bank, Manila.

Barnett, J. and Webber, M., 2009. Accommodating Migration to Promote Adaptation to Climate Change. A Policy Brief prepared for the Secretariat of the Swedish Commission on Climate Change and Development and the World Bank Report 2010 Team.

Bedford, R. and Hugo, G., 2009. Population Movement in the Pacific: Review and Prospect. Progress Report on a Joint Study for Australian Department of Immigration and Citizenship and New Zealand Department of Labour, presented at Australian and New Zealand Immigration Forum, Canberra, 30 July.

Biermann, F. and Boas, I., 2007. Preparing for a Warmer World. Towards a Global Governance System to Protect Climate Refugees, Global Governance Project, Amsterdam, http://www.glogov.org/images/doc/WP33.pdf.

Black, R., 2001. Environmental Refugees: Myth or Reality?, in New Issues in Refugee Research, Working Paper No. 34, United Nations High Commissioner for Refugees (UNHCR), Geneva.

Christian Aid, 2007. Human Tide: The Real Migration Crisis, May.

Connell, J., 2003. Migration in Pacific Island Countries and Territories. Migration Patterns and Policies in the Asian and Pacific Region. Asian Population Studies Series No. 160, United Nations Economic and Social Commission for Asia and the Pacific, Bangkok.

Cruz, R.V., Harasawa, H., Lal, M., Wu, S., Anokhin, Y., Punsalmaa, B., Honda, Y., Jafari, M., Li, C. and Huu Ninh, N., 2007. Asia. Climate Change 2007: Impacts, Adaptation and Vulnerability, in M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds.), Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, pp. 469-506.

Ganges and Brahmaputra River Mouth Area, Water Resources, 33, pp. 353-373.

Glantz, M.H., 2005. Water, Climate, and Development Issues in the Amu Darya Basin, Mitigation and Adaptation Strategies for Global Change, 10, pp. 23-50.

Hugo, G.J., 1996. Environmental Concerns and International Migration, International Migration Review, 30, 1, pp. 105-131

Hugo, G.J., 2006a. Improving Statistics on International Migration in Asia, International Statistical Review, 74, 3, pp. 335-355.

Huguet, J.W. (ed.), 2008. Asian and Pacific Migration Journal, Special Issue: international Migration Data and Sources in Asia, 17, 3-4.

In Situ Agro biodiversity Conservation for Regional Development in Nepal, GeoJournal, 62, pp. 27-39.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. IPCC, Geneva.

Intergovernmental Panel on Climate Change (IPCC), 2007a. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability, Summary for Policy Makers. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, February 2007, IPCC, Brussels.

Intergovernmental Panel on Climate Change (IPCC), 2007b. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (S. Solomon, D. Qin, M. Manning, Z. Chen, M.Marquis, K.B. Averyt, M Tignor and H.L. Miller [eds.]), Cambridge University Press, Cambridge, 996 pp.

Intergovernmental Panel on Climate Change (IPCC), 2007c. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson [eds.]), Cambridge University Press, Cambridge, 976 pp.

International Organization for Migration (IOM), 2007. Discussion Note: Migration and the Environment, http://www.iom/int/jahia/webdav/site/myjahiasite/shared/shared/mainsite/microsites/IDM/workshops/evolving_global_economy/2728112007/MC_INF_288_EN.pdf.

Karim, M.F. and Mimura, N., 2008. Impacts of Climate Change and Sea-Level Rise on Cyclonic Storm Surge Floods in Bangladesh, Global Environmental Change, 18, pp. 490-500.

McGranahan, G., Balk, D. and Anderson, B., 2007. The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones, Environment and Urbanization, 19, 1, pp. 17-37.

Meehl, G.A., Stocker, T.F., Collins, W.D., Friedlingstein, P., Gaye, A.T., Gregory, J.M., Kitoh, A., Knutti, R., Murphy, J.M., Noda, A., Raper, S.C.B., Watterson, I.G., Weaver, A.J. and Zhao, Z.C., 2007. Global Climate Projections, in S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.), Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Milesi, C., Hashimoto, H., Running, S.W. and Nemani, R.R., 2005. Climate Variability, Vegetation Productivity and People at Risk, Global and Planetary Change, 47, pp. 221-231.

Mirza, M.M.Q., Warrick, R.A., Ericksen, N.J. and Kenny, G.J., 2001. Are Floods Getting Worse in the Ganges, Brahmaputra and Meghna Basins?, Environmental Hazards, 3, pp. 37-48.

Office of the United Nations High Commissioner for Refugees/International Organization for Migration (UNHCR/IOM), 1996. Environmentally-Induced Population Displacements and Environmental Impacts Resulting from Mass Migrations, in International Symposium on Environmentally Induced Population Displacements and Environmental Impacts Resulting from Mass Migrations, Chavannes-de-Bogis, Switzerland IOM, http://www.helid.desastres.net/?e=d-000who--000--1-0--010---4----0--0-10l--11en-5000---50-packa-0---01131-000-110utfZz-8-0-0&a=d&cl=CL567&d=Jwho09e.

Office of the United Nations High Commissioner for Refugees (UNHCR), 2002. Environmental Migrants and Refugees, Refugees, No. 127, http://www.unhcr.org/publ/PUBL/3d3fecb24.pdf.

Office of the United Nations High Commissioner for Refugees (UNHCR), 2006. The State of the World's Refugees, http://www.unhcr.org/cgi-bin/texis/vtz/template?page=publ&src=static/sowr2006/toceng.htm.

Pilarczyk K.W. and Nuoi N.S. (2005) Experience and practices on flood control in Vietnam. International Water International 30: 114-122.

Preston, B.L., Suppiah, R., Macadam, I. And Bathols, J., 2006. Climate Change in the Asia/Pacific Region: A Consultancy Report Prepared for the Climate Change and Development Roundtable, Commonwealth Science and Industry Research Organization (CSIRO), Australia.

Skeldon, R., 2006. Interlinkages Between Internal and International Migration and Development in the Asian Region, Population, Space and Place, 12, pp. 15-30.

Small, I., van der Meer, J. and Upshur, R.E.G., 2001. Acting on an Environmental Health Disaster: The Case of the Aral Sea, Environmental Health Perspectives, 109, 6, pp. 547-549.

Spoor, M., 1998. The Aral Seal Basin Crisis: Transition and Environment in Former Soviet Central Asia, Development and Change, 29, pp. 409-435.

Stern, N., 2006. Stern Review on the Economics of Climate Change, HM Treasury, London.

Tropical Cyclones and Storm Surges, Water, Air, and Soil Pollution, 92, pp. 171-179.

United Nations, 2008. World Urbanization Prospects: The 2007 Revision, Highlights, United Nations, New York.

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), 2008a. 2008 ESCAP Population Data Sheet, UNESCAP, Bangkok.

United Nations Framework Convention on Climate Change (UNFCCC), 2007. Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries, UNFCCC Secretariat, Bonn, http://unfccc.int/files/essential_background/backgroundpublications_htmlpdf/application/txt/pub_07_impacts.pdf.

United Nations High Commission for Refugees (UNHCR), 2007. 2006 Global Trends: Refugees, Asylum-Seekers, Returnees, Internally Displaced and Stateless Persons, UNHCR, Geneva. United Nations High Commission for Refugees (UNHCR), 2008. Climate Change, Natural Disasters and Human Displacement: A UNHCR Perspective, UNHCR, Geneva.

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

Climate Change and Migration in Asia and the Pacific: Executive Summary

Climate change will influence patterns of migration and human settlements—increasing migration in already highly populated areas in Asia and the Pacific. The climate change and migration study was done in cooperation with researchers at the University of Adelaide. The study discusses how climate change is likely to influence population displacement, migration, and settlement patterns and examines how this will impact development in five subregions of Asia and the Pacific.

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 substantially 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.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org

Printed in the Philippines