

# ASSESSING VULNERABILITIES AND RESPONSES TO ENVIRONMENTAL CHANGES IN CAMBODIA

COUNTRY REPORT



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# ASSESSING VULNERABILITIES AND RESPONSES TO ENVIRONMENTAL CHANGES IN CAMBODIA

COUNTRY REPORT

**Edited by**

Guénolé Oudry, Dr Kimchoeun Pak, and Chou Chea





# FOREWORD

Cambodia regularly experiences almost all types of natural hazards, including floods, droughts, heavy storms, riverbanks collapses, fire incidents and epidemics affecting people and their assets repeatedly, almost every year, and putting the country's economy at high risk. Between 1996 and 2013, the National Committee for Disaster Management (NCDM) recorded no less than 7,800 disaster events. In 2011, major floods hit 18 out of 24 provinces, affecting more than 1.77 million people, approximately 13 per cent of the country population and leading to the evacuation of 52,000 households. In 2013, floods hit 20 out of the country's 24 provinces, affecting 377,354 households and forcing 31,314 households to evacuate to safer areas. Over the same period of time, increased occurrence of severe droughts had devastating effects on the livelihood of rural communities. Climate change is anticipated to increase the frequency, intensity and severity of extreme natural events, which could turn into far worse disasters, with considerable impact on human lives, agriculture, health, economy, education, rural and urban infrastructures, and private properties.

Over the last twenty years, migration became one of the most important transformational changes in Cambodian society. On one hand, steady urbanization has been fueled by continued inflows of migrants from rural centres, reshaping the spatial distribution of the Cambodian population within the country. On the other hand, it is now estimated that 8 to 10 per cent of the national labour force is engaged in cross-border migration, predominantly to Thailand, and primarily for the purpose of income diversification at a household level.

Establishing clear linkages between human mobility, natural disasters and climate change remain highly complex and in many cases, direct causal links might be impossible to maintain. The decision to migrate originates from a number of factors. Environmental stressors can act as the primary factor or one of many secondary push factors for migration. However, given Cambodia's dependence on natural resources, its exposure and sensitivity to climate change, and its relatively limited adaptive capacity, increasing pressure on the lives and livelihood of rural communities caused by the intensification of environmental degradation, natural disasters and climate change are expected to escalate the current trend of high rural to urban migration and international migration in the coming years.

The case of Cambodia is by no means unique. Increasingly, attention is being devoted to the human mobility, environment and climate nexus, resulting in substantial policy development that incorporates a migration component. Of particular interest is the Sendai Framework for Disaster Risk Reduction 2015 – 2030 which emphasizes the need to improve displacement management at the global, regional and national levels. The Paris agreement under the United Nations Framework Convention on Climate Change represents another key step towards the inclusion of migration and human mobility into the global and regional adaptation frameworks.

The study "Assessing Vulnerabilities and Responses to Environmental Changes in Cambodia", funded by the IOM Development Fund, has been conducted jointly by the NCDM and the International Organization for Migration (IOM), with the involvement of the Ministry of Environment (MoE), the Ministry of Women's Affairs (MoWA) and the National Committee for Subnational Democratic Development (NCDD). The report builds on the existing evidence on the environment-climate change-migration nexus in Cambodia, and is complemented by active field surveys carried out in the Tonle Sap Great Lake area in 2015, to identify and document potential ways for Cambodia to address the growing threat of environmental induced migration. By doing so, NCDM and IOM seek to support a greater understanding on this issue and to contribute to Cambodia's efforts to address natural disaster management, environment degradation and climate change in an integrated manner.



**Dr Leul A. Mekonnen**

Chief of Mission

International Organization for Migration



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Project Coordinator

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## ACRONYMS

<b>AADMER:</b> ASEAN Agreement on Disaster and Emergency Responses	<b>MRD:</b> Ministry of Rural development
<b>ADB:</b> Asian Development Bank	<b>MTOSB:</b> Manpower Training and Overseas Sending Board
<b>AHA Centre:</b> ASEAN Coordinating Centre for Humanitarian Assistance on disaster management	<b>NAPA:</b> National Adaptation Plan of Action
<b>CBDRM:</b> Community Based Disaster Risk Management	<b>NCCC:</b> National Climate Change Committee
<b>CCAP:</b> Climate Change Action Plan	<b>NCDD-S:</b> National Committee for Subnational Democratic Development
<b>CCCSP:</b> Cambodia Climate Change Strategic Plan	<b>NCDM:</b> National Committee for Disaster Management
<b>CDRI:</b> Cambodia Development Research Institute	<b>NEA:</b> National Employment Agency
<b>CGIAR:</b> Consortium of International Agricultural Research Centres	<b>NELM:</b> New Economics of Labour Migration
<b>CRC:</b> Cambodian Red Cross	<b>NEP:</b> National Employment Policy
<b>CSES:</b> Cambodia Socioeconomic Census	<b>NESDB:</b> National Economic and Social Development Board
<b>FAO:</b> Food and Agriculture Organization	<b>NIS:</b> National Institute of Statistics
<b>FDI:</b> Foreign Direct Investment	<b>NPP:</b> National Population Policy
<b>GDP:</b> Gross Domestic Product	<b>NPRS:</b> National Poverty Reduction Strategy
<b>GMS:</b> Greater Mekong Subregion	<b>NSPS:</b> National Social Protection Strategy
<b>HFA:</b> Hyogo Framework of Action	<b>NTFP:</b> Non-timber Forest Products
<b>IDMC:</b> Internal Displacement Monitoring Centre	<b>ODA:</b> Overseas Development Aid
<b>IFAD:</b> International Fund for Agricultural Development	<b>PPP:</b> Purchasing Power Parity
<b>ILO:</b> International Labour Organization	<b>PRA:</b> Participatory Rural Appraisal
<b>IOM:</b> International Organization for Migration	<b>RGCG:</b> Royal Government of Cambodia
<b>IPCC:</b> Intergovernmental Panel on Climate Change	<b>SLA:</b> Sustainable Livelihood Approach
<b>JITCO:</b> Japan International Training Cooperation Organization	<b>SNA:</b> Subnational administrations
<b>LMP:</b> Labour Migration Policy	<b>SNAP-DRR:</b> Strategic National Action Plan for Disaster Risk Reduction
<b>MAFF:</b> Ministry of Agriculture, Forestry and Fisheries	<b>UNCDF:</b> United Nations Capital Development Fund
<b>MIME:</b> Ministry of Industry, Mine and Energy	<b>UNDP:</b> United Nations Development Programme
<b>MRC:</b> Mekong River Commission	<b>UNDESA:</b> United Nations Department of Economic and Social Affairs
<b>MoE:</b> Ministry of Environment	<b>UNEP:</b> United Nations Environment Programme
<b>MoEYS:</b> Ministry of Education, Youth and Sport	<b>UNFCCC:</b> United Nations Framework Convention on Climate Change
<b>MoFAIC:</b> Ministry of Foreign Affairs and International Cooperation	<b>USAID:</b> United States Agency for International Development
<b>Mol:</b> Ministry of Interior	<b>WFP:</b> World Food Programme
<b>MoLVT:</b> Ministry of Labour and Vocational Training	<b>WB:</b> World Bank
<b>MoP:</b> Ministry of Planning	<b>ZEF:</b> Zentrum für Entwicklungsforschung
<b>MPWT:</b> Ministry of Public Works and Transport	
<b>MoWA:</b> Ministry of Women's Affairs	
<b>MoWRAM:</b> Ministry of Water Resources and Meteorology	



## EXECUTIVE SUMMARY

## BACKGROUND AND CONTEXT

Nowadays, the Mekong region is being reshaped by increasingly complex and diverse population movements, and Cambodia is no exception to this. Over the last fifteen years, domestic and cross-border migration was one of the most significant transformational changes in Cambodian society and set to continue. Demographic and social transformations, steady urbanization, structural changes in land use and land management, improved spatial connectivity and regional economic integration are all, and will undoubtedly continue, to spur inward and outward migration in all its forms.

The Cambodian population is largely rural, and currently there are an estimated 2,565 million rural households out of the estimated total of 3,261 million households. (MoP, 2015). However, urban population has grown without interruption since 1962, from 10.3 per cent of the total, to 19.5 per cent in 2008, and to 29 per cent in 2014 (MoP, 2015). The impacts associated with high rates of rural to urban migration may be considered, from an environmental perspective, under two interrelated angles. On one hand, continuing migration to urban centres fueled by steady growth of the industrial and tertiary sectors and unplanned settlement, is putting pressure on already inadequate urban infrastructures and services. On the other, the literature indicates that despite large number migrating out of rural areas, this does not necessarily ease access to productive assets and natural resources for those left behind.

Rural to rural migration also occurs, usually driven by facilitated access to natural resources, land and cleared forest areas. As the rural population increases, scarce income earning opportunities within rural communities encourages further conversion of forests to farming plots. Based on current trends, continued population growth could lead to further degradation of fragile ecosystems, reduce the carrying capacities of the host environments, increase existing vulnerabilities and further reducing resilience in rural communities (MoE, 2009; IOM, 2009; USAID, 2014).

Many Cambodians have sought to overcome domestic socioeconomic challenges by migrating outside of Cambodia for work. Between 2010 and 2013, the Cambodia – Thailand corridor became the 9th most important migration stream globally. As of 2013, the Department of Economic and Social Affairs of the United Nations (UNDESA) estimated there were 750,109 Cambodian migrants in Thailand (UNDESA, 2013). The majority of Cambodian migrants enter in Thailand illegally, with less than 10 per cent migrating through regular channels, increasing migrants' exposure to exploitation and abuse, and posing challenges to border management systems and the sovereignty of Thailand. The number of Cambodian workers migrating to Malaysia has also increased, from 10,165 in 2008 to 33,707 in 2011, with female domestic workers accounting for more than 80 per cent of those numbers (ILO, 2013). The Republic of Korea is another common destination with 34,805 Cambodian workers migrating under the Employment Permit System (EPS) as of May 2014, 82.5 per cent of whom were men (MoLVT, 2014).

Although remittances are a crucial component of migration, consistent data are scarce and further research is needed to measure the effective impact of migration on the socioeconomic development of the sending communities, and by extension, the potential contribution of migration to post-disaster recovery and climate change adaptation. At the macro level, estimates range from USD 200 million (WB, 2007) to USD 353 million per annum (UNDP, 2009). However, the extent to which cash and in-kind remittances contribute to poverty reduction in communities of origin, has been diversely evaluated. In addition, as labour migration involves those of working age, out-migration can lead to a lack of local labour supply, increase social fragmentation, socioeconomic disparities, and adversely alter the adaptive capacities of the communities of origin.

## SECTION 1: THE ENVIRONMENT, CLIMATE CHANGE AND MIGRATION NEXUS: KEY CHALLENGES

Cambodia experiences almost all types of hydro-meteorological hazards such as floods, droughts, heavy storms (or typhoon), fire incidents and epidemics (NCDM, 2013). In this respect, the country's National Poverty Reduction Strategy (NPRS) explicitly identifies natural disasters, particularly flood and drought, as critical factors that have, and continue to increase socioeconomic vulnerabilities of the rural households.

Although the impact of climate change will fluctuate in different parts of the country, projections indicate that in the long run, it will intensify Cambodia's exposure to increased sudden onset events (cyclones, storms, lightening, riverine and flash floods, landslides); and slow onset disasters (changes in hydrology, droughts, changes in rainfall patterns, loss of biodiversity, soil fertility, deforestation, increase in mean temperature and sea-level rise). With Cambodia's predominantly rural population being largely dependent on natural resources and the provision of ecosystem services, rural communities are considered to be highly sensitive to climate change (UNDP, 2011a; USAID, 2014). Cambodia's vulnerability to climate change is compounded by its populations' limited capacity to adapt to the shocks that these anticipated changes will generate (ADB, 2009; Yusuf and Francisco, 2009; ACIAR, 2009), due to its lack of human, financial and material resources, technology and infrastructure.

Migration has long been identified as a central strategy for reducing a household's vulnerability to environmental risks and economic shocks, such as crop failures or loss of productive assets, by offering income generation alternatives. In combination with a diverse range of autonomous (changes in crop-calendar, use of new seed variety, change of diet and daily consumption, borrowing money, purchase of food on credit, sell off assets, reduction of expenditures on health care) or planned measures (infrastructure development, disaster management, promotion of small and medium enterprises and local jobs), migration has been widely recognized as both as a passive and defensive, and an active response to a degrading environment.

Climate change as a driver or trigger of migration, is but one of several factors shaping population movement, and as such its relative importance remains open to

debate. When the non-linear, multidirectional and multifaceted nature of migration is considered with conjunction with climate change, direct causation appears methodologically difficult to establish, particularly in the context of slow onset processes.

As a result, there is currently an absence of a universally agreed definition of what an "environmental migrant" is, and therefore it is impossible to reliably forecast the number of people who will migrate as a result of environmental and climate changes. Yet, whereas disentangling environmental migration flows and the broader flows of socioeconomic migrants remains challenging from both a theoretical and empirical perspective, improved data collection and research methodologies can help towards better understanding the migration dynamics in a climate sensitive environment, and to some extent, assist in refining predictions.

### SUDDEN ONSET DISASTERS, DISPLACEMENT AND MIGRATION: EXISTING EVIDENCE

#### A. CYCLONES, STORMS

Tropical cyclones might not be as common as floods and droughts, but are the most costly meteorological disasters affecting South-East Asia. Storm surges and strong winds, and the resultant flooding and landslides cause agricultural loss, injuries and fatalities, and damage of private and public infrastructures. As Cambodia is predominantly lowland plains and plateaus, it is likely to experience increasing episodes of storm related events, especially in low-lying areas such as the extensive floodplains surrounding Tonle Sap Lake (USAID, 2014).

There are still knowledge gaps in understanding the connection between intense weather events and migration. However, if evidence shows that shortterm displacement occurs as an immediate response, and that migration for the purpose of labour is already utilized as a recovery option, further research is needed to capture the extent to which such temporary and reactive decisions can result in permanent migration, and so contribute further to migration out of rural areas. The form migration triggered by severe weather events

takes, and its contribution to sustainable recovery and community resilience, as a complement to disaster risk reduction programs, infrastructure development, and livelihood strengthening has yet to be investigated.

## B. FLOODS

There is a growing body of literature on mobility patterns in flood-prone areas in Cambodia regarding (a) the structural interdependence between flood regimes and rural livelihoods, shaping household food and economic security strategies and adjustments; and (b) the increasing role of temporary and permanent migration as a key response to a changing socioeconomic context.

First, the research has documented the extent to which the annual flood cycle, in particular around the Tonle Sap Lake, determines the productivity of this unique ecosystem and influences household food and economy security strategies (Heinonen, 2006; Keskinen, 2006; Middleton, Un and Thabchumpon, 2013). In this respect, from a broad perspective, short term and seasonal out-migration patterns from flood-prone areas are intrinsically linked to the annual flood regime and its variations. Such migration flows, by nature, tend to be hardly dissociable from economic migration flows.

Second, in times of flooding, the proportion of households opting for non-agricultural adaptive strategies exceeds those who rely on agricultural adaptation strategies. As agricultural adaptation strategies often require financial and material resources that are, in most cases, out of reach of rural poor, affected households increasingly resort to credit, sale of assets, reliance on wage labour, or migration (Diepart, 2015). The prevalence of non-agricultural adaptation means is further sustained by the absence of effective crop insurance, institutionalized government security nets, or affordable and secure credit system (CDRI, 2007), resulting in continued indebtedness, growing landlessness, and credit constraints when faced with other crises. The adaptive mechanisms adopted by the rural households, do not reduce vulnerability, but reinforce it.

Although the literature shows that migration is neither the first, nor the preferred, option for rural households (Khleang, 2013; Bylander, 2013), repeated serious flood events do lead to distress migration. In addition, increases in food prices, economic recessions pertaining to the commercialization of agricultural production, greater incidence of conflicts due to accrued pressure on declining natural resources, and socioeconomic

shocks resulting from increased frequency of abnormal flood events, foster transitory food insecurity and at a later stage chronic food insecurity, resulting from the adoption of negative coping and adaptation mechanisms. A number of studies suggest that the movement away from agricultural adaptation by both migrant and non-migrant households, reinforces the perception of the environment as being an unsuitable space for income diversification and investment. In this respect, migration isn't understood to be a direct response to an environmental shock, but an expression of a widespread belief that the rural environment, both economic and natural, is unreliable (Bylander, 2013).

## SLOW ONSET DISASTERS, DISPLACEMENT AND MIGRATION: EXISTING EVIDENCE

### A. CHANGES IN HYDROLOGY / DROUGHTS

The direct and indirect effects of drought can be compared to those associated with flooding. Low agricultural yield due to extended drought augment indebtedness of families, contribute to widespread food shortages, reduce income due to decrease demand for wage labour, and these negative effects are compounded by restricted access to credit, insurance schemes, and limited access to health care.

Autonomous coping mechanisms are diverse, but local adaptive capacities remain limited. They generally include first stage adjustments and insurance schemes, such as re-planting, changes in cropping and planting techniques, reduction of food and water consumption, borrowing money, sale of assets and livestock, temporary migration, and at a later stage, sale of productive assets, loan taking and distress migration.

Drought, like flooding, is anticipated to impact on poor households and is likely to lead to an increase in the number of poor households, due to the adoption of negative coping strategies (Diepart, 2015). Yet, as of now, sound data on migration induced by drought remain scarce and more research is needed. In contrast to floods, cyclones or storms, the slow onset nature of droughts makes it difficult to get an in-depth understanding of coping strategies, including migration, as they are likely to evolve over time (Perch-Nielsen, 2008).

## B. DEFORESTATION, LAND DEGRADATION AND SOIL EROSION

The Royal Government of Cambodia recognizes land degradation as one of the most severe environmental issues contributing to the vulnerability of agriculture and rural communities. Poor rural households use similar coping strategies as for drought, turning to alternative means of livelihoods in face of natural resource depletion, land degradation and soil erosion (CDRI, 2011b, 2007). Yet, despite this, statistical evidence of migration induced by environmental degradation remains limited, and little attention has been paid to the positive role migration can play in land rehabilitation, through productive investment and skills transfer.

## C. TEMPERATURES AND CHANGES IN RAINFALL PATTERNS

Climate Change may lead to higher temperatures which will affect the water cycle, bringing shifts in the timing, duration and intensity of rainfall patterns and seasons, changing the hydrology of major rivers and tributaries as well as groundwater recharge, and consequently altering the quantity, quality, availability and distribution of water (ICEM/MRC, 2010). All of these anticipated changes have implications for agriculture and food production, as well as for human health and wellbeing (UNDP, 2011a). Such changes in weather patterns are stressing an environment already characterized by unpredictable weather and disasters.

## D. SEA-LEVEL RISE, COASTAL EROSION AND SALINIZATION

Predictions of sea-level rise (SLR) remain uncertain. The direct effects of SLR include increased flood frequencies, erosion, inundation, rising water tables, salt water intrusion and biological impacts (Klein and Nicholls, 1998). Indirect effects of SLR include loss of land, damage to and loss of roads, private properties, factories, public infrastructure. The impact of sea-level rise on migration is not well documented, and while migration is a very plausible response to loss of land, protection responses such as constraining development in susceptible areas through enforced regulations, planned modification of land use and management, eco-system protection can prevent forced migration.

## CONCLUSIONS

In the context of a fragile environment, migration is neither the first nor the preferred adaptive strategic option, but is becoming a more common phenomenon with the frequent onset of natural disasters, and can take many forms:

- Over the last ten years migration has become a central element for rural households, allowing them to diversify income, secure additional sources of income to supplement agricultural activity when faced with soil degradation and erratic rainfall;
- Migration can act as an adaptive strategy for dealing with seasonality and external influences such as fluctuating market pressures, or irregular flood regimes and weather patterns;
- Migration can act as a means of coping with shocks and crises associated with loss of crops, with health shocks, loss of land and indebtedness (UNDP, 2010), and also contributes to disaster recovery;
- Migration can be permanent or temporary, to surrounding rural areas, to urban areas, or to another country;
- Migration tends to be selective and in most cases, a few members of a family migrate and send back remittances to support those left behind;
- When vulnerable households utilize migration to cope with environmental stress, it takes the form of an emergency response that creates conditions of debt and increased vulnerability, rather than reducing them;
- It is predicted that the consequences of climate change in Cambodia will particularly affect the poorest people as they are more vulnerable and least able to adapt. As a result they will be rendered even poorer. Yet, it is not generally the poorest people who migrate, as migration demands resources (Castles 2000; de Haan 2000; Skeldon 2002). In this respect, non-migration can, to a certain extent, be associated with increased vulnerability to environmental risks (McLeman and Hunter, 2010; Black et al., 2013). Such pressure on the most vulnerable households' livelihood can lead to the emergence of trapped population and constitute a threat to human security.

## SECTION 2: POLICY REVIEW AND ANALYSIS

The complex relationships between environmental change - particularly climate change, migration, and adaptation has been drawing increased attention from researchers and policy makers, with a growing body of literature emerging on the topic over the past two

decades. Increasingly, human mobility phenomena, including migration, are moving onto the global Disaster Risk Reduction, Disaster Risk Management, Climate Change Adaptation and Mitigation policy frameworks. However, this trend has rarely been translated into national relevant policies and strategic plans for Cambodia.

By reviewing Cambodia's current national development frameworks, the second section of this report considers existing policy materials to outline ways through which development challenges brought about by disaster risk management, environmental degradation, climate change and migration have been addressed, and to pinpoint existing connections or possible synergies between them. The areas of environmental degradation, climate change and migration are development challenges addressed in various policy documents, some of which are cross-cutting, and others sectoral specific. However, there has been little discussion on the relationship between natural disasters, environmental degradation, climate change and migration.

Hypothetically, the key explanations for such a gap in the debate may be due to (a) a lack of robust evidence due to methodological constraints, (b) the absence of an accepted definition of the term "environmental migrant", (c) a lack of primary data on migration flows within and outside Cambodia, (d) the limited multidisciplinary approach in research and policy development in the areas of disaster risk management and climate change adaptation, and (e) the limited coordination in policy formulation across sectors.

While there is no one national policy that explicitly refers to the relationship between disaster risk reduction, displacement and migration on one hand, and on environment, climate change and migration on the other, many policies refer to different pieces of the puzzle. For example, climate change policies tend to focus on livelihood adaptation of the affected population within their own communities; and migration policies emphasize rural to urban and outward migration, within the working age population. Similarly, some macro policies such as the National Population Policy (NPP) and the National Social Protection Strategy (NSPS) recognize the need to make an explicit link between demographic dynamics, the environment and climate change, along with other issues such as urbanization and rural livelihood diversification.

The literature provides directions, as well as insights into

lessons learnt from other countries, such as integrating migration into national policies. For example, migration could be integrated into the National Adaptation Plan (NAP) by reducing pressure of migration, averting displacement and considering the option of planned relocation where necessary, and by turning migration into an adaptation strategy (IOM, 2008; IOM, 2012; UNU, 2014). In order to complement integration, the literature suggests building capacity by (a) enhancing knowledge and improving data collection, (b) strengthening policy, institutional, administrative and legal frameworks, and (c) reinforcing operational and technical capacities.

Applying this capacity building framework into the case of Cambodia, this report puts forward the following recommendations:

**Enhancing knowledge and improving data collection:**

The literature proposes several ideas, but this report focuses on developing a clear understanding of the conceptual connections between natural disaster, the environment, climate change and migration among key stakeholders. This is seen as a crucial first step, given the complex nature of the relationships involved. Such a conceptual connection would need to be supported by empirical evidence so that relevant policymakers can be sensitized to the significance of the issues.

**Strengthening policy, institutional, administrative and legal frameworks:**

Based on evidence, a policy discussion should be initiated between relevant agencies including: the National Committee for Disaster Management (NCDM), the Ministry of Environment (MoE), the Ministry of Labour and Vocational Training (MoLVT), the Ministry of Planning (MoP), and the Ministry of Interior (MoI). On one level, these agencies can focus on issues directly under their jurisdictions, while on another, other relevant issues such as urban development, social protection for vulnerable groups left behind in climate change affected areas, diversification of rural livelihood, also need to be factored in. Given the multidimensionality of the phenomenon, policy coherence on climate migration is critical.

**Reinforcing operational and technical capacities:**

Once a policy is prepared, a set of actions should be proposed. For this step, the report proposes that (a) the MoLVT be invited to prepare the CCSP and CCAPs (as nine other relevant ministries and agencies have done) and (b) migration, as a cross-cutting issues, be integrated into existing DRR frameworks, Climate Change Strategic Plans, and Climate Change Action Plans.

**Reduce pressure on climate sensitive areas by supporting local context based initiatives:** This will support livelihood diversification schemes, climate resilient infrastructure development, and to minimize instances of forced or distress environmental induced migration.

**Facilitate temporary and circular migration schemes through protective, accessible and affordable legal migration channels:** Such mechanisms should be built on current and projected labour market dynamics and mismatches between sending and destination areas (either internal or cross-border).

**Harness the potential benefits of labour migration in socioeconomic terms:** This can be achieved through improved access to formal remittance channels, facilitated investments on disaster risk reduction and climate adaptation in the communities of origin, as well as through skills transfer.

**Planned relocation of communities:** This is a viable option in cases of irreversible damage in accordance with population's rights, socioeconomic needs and aspirations.

### SECTION 3: CASE STUDY

Climate change and climate variability have assumed importance in the global development agenda within the last three decades, and their relationship with livelihood and migration has become an important issue.

The study has been developed to empirically explore the linkages between climate change, the environment, livelihood, and migration in Cambodia. The goal of the present study is to enhance the overall knowledge on this complex nexus with a view to promote the inclusion of migration dimension into Cambodia's further Subnational adaptation strategies.

The specific research questions of the study are:

1. To what extent current and projected climate trends, climate variability and environmental changes contribute to shaping the livelihood dynamics of Cambodia's rural population?
2. How do Cambodia's rural communities tend to respond to those changes in livelihood dynamics?
3. In what circumstances migration appears as a viable option of responses within such dynamics?
4. What are the observable forms, profiles and outcomes characterizing such migration patterns?

This report presents findings from an empirical field study in the fishing and the agricultural zones of the Tonle Sap Basin. The study applied both quantitative and qualitative methods, blended with secondary sources, to assess the above-mentioned links. The quantitative data has been collected through a structured questionnaire survey involving 302 households. Participatory research methods such as focus group discussions (FGD) as well as multi-stakeholder workshops at the provincial level have been employed to develop a deeper understanding of the local people's vulnerability to environmental changes and in particular to climate variability.

### Climate pattern and climate variability

The analysis reveals that both the fishing villages and the agricultural villages have been experiencing the changes in climate and environment around them. Respondents in the fishing villages reported being exposed to increased frequency of heavy rains and severe floods (over 90%), which are usually followed by strong abrupt winds, increased frequency and duration of drought (72%), significant increase of heat (51%), changes in rainfall patterns, and increased dangerous lightning. Similarly, respondents in the agricultural villages reported being exposed to increased frequency of extreme weather events such as river and flash floods (over 80%), droughts (over 60%), and strong abrupt winds (over one-third), shift in duration and timing of dry season (drier and longer); shift in rainfall pattern (greater variability and less predictability); and increased temperature.

Since climate plays a significant role for the livelihoods of both the fishing and the agricultural villages, such changes disturb the seasonal production cycle of the people and threaten their livelihood. Farmers, particularly those with small land-holding, have difficulty coping with the changes in rainfall patterns as their food production is further declining, while the already weakened livelihoods of the fishermen are facing an additional challenge due to changes in climatic behaviour.

### Livelihood

The findings presented show that people in the fishing villages perceived the impact of climate change and climate variability to be most clearly seen in the domain of physical asset such as the destruction of houses, boats, and fishing equipment (72%) and the decline in

fish production due to the increased heat (around 70%), whereas people in the agricultural villages perceived the impact of climate change to be apparent in the domain of fish production (more than 80%), crop production (almost 60%), decreased livestock production due to animal diseases from heat (one-thirds of the respondents), decreased financial asset (around 30%), and damage to houses.

Obviously, livelihoods in both the fishing and the agricultural villages of the Tonle Sap Basin are highly sensitive to changing climatic patterns, and most of the households, particularly those in the fishing villages and those poor farmers of the agricultural zone, do not have adequate capacity to cope with these changes and overcome their negative effects. While more affluent farmers with a lot of land can cope with erratic changes in climatic pattern, the extremely poor to the lower-middle class ones are particularly sensitive and they usually opt for negative coping strategies when their livelihood was threatened such as opting for less expensive food (meaning, non-protein based), limiting their food consumption, or reducing their food intake.

### **Migration**

Migration has been more common in the agricultural villages than in the fishing villages. People in the agricultural villages started to migrate since early 1990s, while those in the fishing villages just started to migrate 15 years ago. Different from the fishing zone, migration in the agricultural villages is seen as a reasonable way to earn additional income to support the ever-increasing size of the families. The main destination for those in the agricultural zone is Thailand (over two-third of the household respondents), while that in the fishing zone is Phnom Penh. There is a particularly high migration rate for women (60%) in the fishing villages, compared to only around 40 per cent in the agricultural villages.

Taken both the fishing and agricultural zones together, the findings revealed that the most common reasons for migration in both fishing and agricultural villages are:

1. Decline in crop, fish, and livestock fish production for consumption and sale
2. Unemployment
3. Unpredictable timing of the seasons and/or changes in rainfall pattern
4. Severe dry spells/prolonged and frequent droughts, abnormal heat
5. Floods and strong abrupt winds
6. Pests

These data further revealed that climatic variables such as the changes in rainfall pattern, severe dry spells and abnormal heat, floods and the strong abrupt winds affects people's agricultural production (i.e., fish, crops, and livestock); thus, their livelihood. Although most people would like to stay in their homes, an increase in seasonal outmigration in both zones is highly likely, especially for those in the fishing zone. Overall, the study shows links between climatic variables, livelihood, and migration, but such relationships are very nuanced and require careful further analysis.

 INTRODUCTION

Cambodia is located in South-East Asia and exhibits a tropical monsoon climate characterized by strong dry and wet seasons. The major geographical features of the country are the large Tonle Sap Lake, the Bassac River and the Mekong River system. Recent climate change trends observed throughout the country point to an increase in frequency and intensity of extreme weather events, an increase in mean temperature, alterations in the timing and duration of the seasons, and sea-level rise. Cambodia's vulnerability to climate change is further exacerbated by its post-civil war situation and structural development challenges, and with approximately 80 per cent of its population living in rural areas, the country largely depends upon natural resources for food and income. Increasing pressure on the livelihood of rural communities caused by the intensification of climate-related natural disasters, environmental degradation and climate change is likely to increase the current trend of migration out of rural areas, in the coming years.

The Intergovernmental Panel on Climate Change (IPCC) categorized the Lower Mekong Subregion as one of the most sensitive areas to climate change in the world. The intensification of sudden onset climate events have been evident in Cambodia, with floods in 2000, 2002 and more recently in 2011 and 2013, alongside consecutive droughts in 2001, 2002 and 2003. Sudden onset natural calamities and slow onset processes of climate change and environmental degradation act as additional stressors on the socioeconomic situation of rural communities as they affect the assets of the most vulnerable households. Migration has been one autonomous response strategy to overcome these economic challenges.

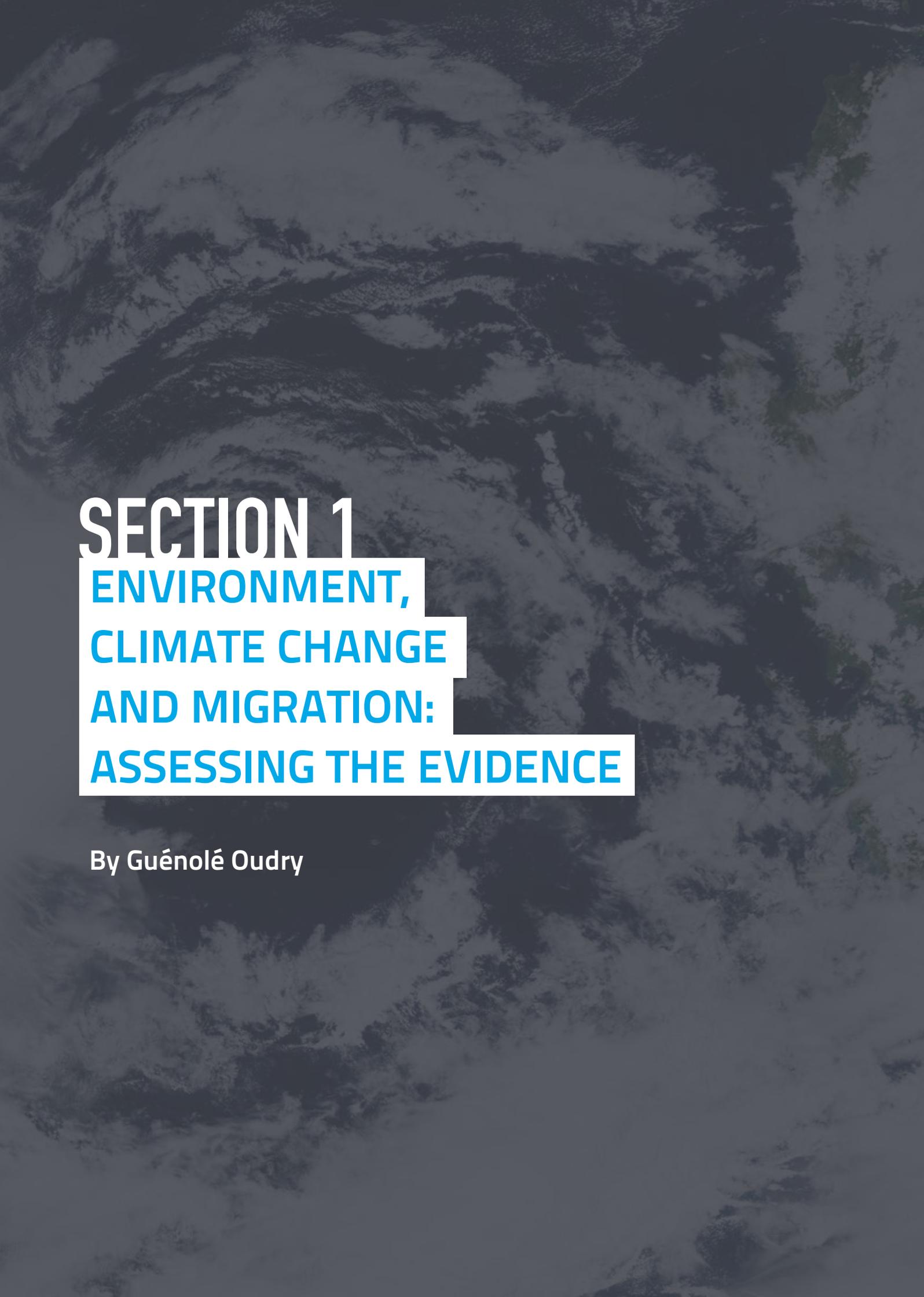
Recognizing the vulnerability of communities to the effects of natural disasters, in both rural and urban settings, and the likelihood of their increased occurrence in Cambodia, the Royal Government of Cambodia (RGC), under the coordination of the National Committee for Disaster Management (NCDM), has worked to improve and streamline disaster response and mitigation efforts and mechanisms, notably through the recent adoption of the Disaster Management Law (2015) and a revised National Contingency Plan (2015). The RGC has concurrently addressed the challenges posed by climate change on the overall development of the country by taking a wide range of measures over the last decade. Key milestones include the adoption of the National Adaptation Program of Action (NAPA) in 2006 and the establishment of the National Climate Change Committee (NCCC), chaired by the Prime Minister. A number of key sector-based policies and action plans have been developed since then, although most are infrastructure based and tend to overlook the intricate dynamics between extreme climate-related events, environmental degradation, climate change and human mobility. While a number of studies have been conducted to measure the impact of natural disasters in Cambodia in terms of losses and damage, or to assess future vulnerability in the context of a changing climate, few have been directed towards the identification of emerging environmentally-induced migration patterns.

In this context, the Report "Assessing Vulnerabilities and Responses to Environmental Changes in Cambodia" implemented primarily in partnership with the NCDM and the Ministry of Environment (MoE), aimed to enhancing policymakers' knowledge on the relationship between climate change and migration, with a view to promoting the integration of migration into the national adaptation strategies.

The project aims to reach this goal by conducting a comprehensive review of existing literature, on-going initiatives (Section 1: Assessing the Evidence) and policy framework relating to disaster management, climate change and migration in Cambodia (Section 2: Policy Review and Analysis), and building on existing reports produced by the RGC, development partners, civil society organizations, academics and independent experts. In Section 3 it aims to generate empirical data from two ecologically vulnerable pilot regions, to provide evidence of the nexus between the environment, climate change and migration. The case studies will assess the effects of environmental changes on household livelihoods and agriculture and in turn, how these factors influence out-migration flows (Section 3: Case Study).

The project, notwithstanding certain limitations, is the first comprehensive assessment of the interaction between the environment, climate change and migration in Cambodia and aims to provide a reference tool for development practitioners, government agencies, and civil society stakeholders.



An aerial photograph of a dense forest with a prominent white path or road winding through it. The image is dark and serves as a background for the text.

# SECTION 1

**ENVIRONMENT,  
CLIMATE CHANGE  
AND MIGRATION:  
ASSESSING THE EVIDENCE**

By Guénolé Oudry

## INTRODUCTION

Development challenges and opportunities brought about by already observed environmental changes on one hand, and unprecedented records of migration flows on the other, have both drawn increasing attention from researchers and policy makers in Cambodia over the last 15 years.

In 2011, Cambodia was classified as the second most affected by extreme weather events, with a Gross Domestic Product (GDP) loss estimated at 3.1 per cent (Harmeling and Eckstein, 2012), and was ranked as the 9th and 6th most vulnerable country to climate change in the World Risk Index 2011 and the Maplecroft Climate Change Vulnerability Index 2012, respectively (UNDP, 2012b). In global assessments, the Mekong basin has been classified as one of the river basins that will feel the effects of climate change most severely (AIT-UNEP RRC.AP, 2010).

It was estimated that without action, the damage to Cambodia's GDP as a result of climate change would reach about 3.5 per cent per year, by the time temperatures increased by 2°C. In IPCC scenario, this was expected to happen by 2050, if emissions are not reduced. Historically, the key causes of damages and losses are drought and floods in agriculture (1.42 per cent of GDP); increased outbreaks of climate sensitive diseases (0.85 per cent of GDP); increased degradation of infrastructure, including roads, irrigation and rural water supply (0.71 per cent of GDP); and flood damage to urban infrastructure (0.25 per cent of GDP) (Climate Change Financing Framework, 2014).

At the community level, in spite of uncertainty in the magnitude of the predicted environmental and climate changes, as well as anticipated regional disparities, there will be considerable impact on rural households' livelihood dynamics, especially on those relying on rain-fed agriculture, inland fisheries, or non-timber forests products (NTFP). An expanding body of literature directly or indirectly associates increased incidences of natural disasters, as well as already observed slow onset processes of environmental degradation and natural resource depletion, to growing out-migration, for the purpose of labour and income diversification.

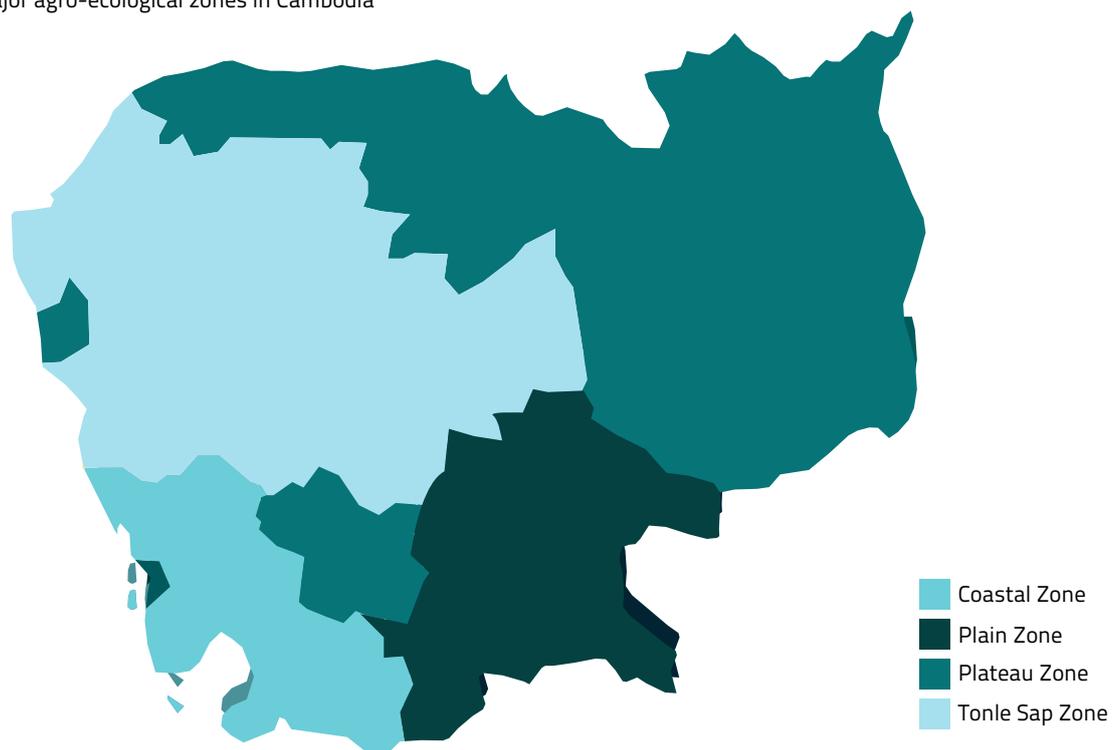
Migration is a large scale nationwide phenomenon in Cambodia. In 2008, about 3.6 million of Cambodian citizens (26.5 per cent of the total population) were categorized as internal migrants. Among them, about 40 per cent were rural to urban, or urban to urban migrants (MoP, 2009). Official data show an unprecedented surge in cross-border migration, for the most part through irregular channels. Current demographic and social transformations, steady urbanization, structural changes in land use and land management, improved spatial connectivity and regional economic integration already, and will undoubtedly continue to, spur mobility in all its forms, being permanent, seasonal, temporary, within or outside the country. However, the extent to which migration flows predominantly driven by environmental stressors can be distinguished from economically-driven mobility patterns remains unclear at methodological, practical and policy levels.

## 1.1 BACKGROUND AND CONTEXT

### 1.1.1. LOCATION

Located on the south-western part of the Indochina peninsula, between 10° to 15° north latitude and from 102° to 108° east longitude, Cambodia covers 181,035 square km (176,515 square km of land and 4,520 square km of water areas), is bordered by Thailand to the west and north, Laos to the north, Viet Nam to the east and south, with a 443-kilometre coastline along the Gulf of Thailand to the southwest. Cambodia is a low lying country. Its highest point, the Phnom Oral, culminates at 1,810 m. A network of river channels, levees and river basins stretches across the entire lowlands. The principal inland water bodies are the Mekong River, which supplies surface water to the eastern part of the country, the Tonle Sap Lake and the Tonle Bassac River which supply the central and western parts. Almost 86 per cent of Cambodia's territory lies within the Mekong River Basin, including the Tonle Sap Basin (with 12 tributary sub-basins), the Sekong, Sesan and Srepok Rivers ('3S') basin of the north-east, and the Cambodian Mekong delta. The country is administratively divided into 24 provinces and one municipality, 158 districts, 8 khans, 26 cities, 1,621 communes (Sangkat), and 14, 073 urban or rural villages.

Figure 1: Four major agro-ecological zones in Cambodia



Cambodia is made of four distinctive ecological zones: (a) the Plains region, which stretches from Phnom Penh to the Viet Nam border, and includes the Mekong and Bassac floodplains; (b) the coastal zone; (c) the Tonle Sap Great Lake and (d) the Plateau/mountain zone which covers the upper stretches of the Mekong River and its tributaries as well as upland areas. (UNDP, 2011a)

### 1.1.2. CLIMATE

Cambodia has a tropical climate, with a six-month wet season and a six-month dry season. The south-west monsoon corresponds with the rainy season which goes from mid-May to mid-September / early October. The north-east monsoon brings dry, cooler air and stretches from November to March. The hottest days are concentrated in April, until early May.

### 1.1.3 DEMOGRAPHY

The first ever national census conducted in 1962 indicated the population of Cambodia at an estimated 5.7 million people. Its population had increased by about 0.86 million by 1980, before seeing a sharp increase following the fall of the Khmer Rouge, from approximately 6.6 million (1980) to 11.4 million inhabitants (1998). During the following ten years (1998–2008), the decadal growth rate was a staggering 16.66 per cent or an annual exponential growth rate of 1.54 per cent (MoP, 2008). According to the latest Cambodia Socio Economic Survey (CSES), the Cambodian population grew to 15,184 million in 2014, and the population density was estimated to be 82 per square kilometre, an increase of 7 points since the 2008 Census (MoP, 2015). Yet population geographic distribution remains relatively unbalanced, with roughly 52 per cent of the population in the Plains Region, 30 per cent in the Tonle Sap Plains, 7 per cent in coastal areas, and the remaining 11 per cent in the Plateau/Mountain Region (CDRI, 2011a).

The demographic dynamics of Cambodia favor high rates of migration, with 33 per cent of Cambodian's between the ages of 15 and 29 in 2010, as compared to an average of 27 per cent in other parts of Southeast Asia. Cambodia also has 32 per cent of its population under the age 15 and fewer older aged persons. Only 9 per cent of the population are 55 and older, as compared to an average of 12 per cent in other parts of Southeast Asia (MoP, 2012). In 2014, the total working age population was estimated to be 10,001,000, while the economically active population, or actual labour force, is about 8,259,000 people (MoP, 2015).

Table 1: Overview of Cambodia demographic composition

<b>NATIONALITY</b>	Cambodian(s), Khmer.
<b>POPULATION</b>	15,184 million (MoP, 2015).
<b>WORKING AGE POPULATION (15-64 YEARS)</b>	10,001,000 (MoP, 2015).
<b>ESTIMATED LABOUR FORCE (ECONOMICALLY ACTIVE)</b>	8,259,000 (MoP, 2015).
<b>UNEMPLOYMENT RATE</b>	0.1 per cent (MoP, 2015).
<b>POPULATION BELOW POVERTY LINE</b>	30.1 per cent (2007)
<b>LIFE EXPECTANCY AT BIRTH, TOTAL POPULATION</b>	62.1 years
<b>AVG. ANNUAL GROWTH RATE (2008-2014)</b>	1.79 per cent (MoP, 2015)
<b>ETHNIC GROUPS</b>	Khmer 90%, Vietnamese 5%, Chinese 1%, other 4%, small numbers of hill tribes, Cham, and Lao.
<b>LANGUAGES</b>	Khmer (official) 95%, French, English
<b>LITERACY</b>	75.1% (male approx. 85%; female approx. 64%).
<b>RELIGIONS</b>	Theravada Buddhism 95%; Islam; animism; Christian

### 1.1.4. ECONOMY

Over the last 12 years, Cambodia grew at a remarkable and steady pace. The GDP growth rate in the period 2003–2008 averaged 10 per cent per year, with a record annual rate of growth of 13.3 per cent in 2005. Between 2008 and 2013, the annual growth rate averaged 6.7 per cent (RGC, Rectangular Strategy, 2013). The national economy is structured on a contracted base of four sectors, namely: (i) agriculture, (ii) garment manufacture, (iii) tourism and (iv) construction.

#### AGRICULTURE, FISHERY & FORESTRY, LIVESTOCK

Rice production and fisheries are the foundation of rural livelihoods. Rice is grown by more than 67 per cent to 70 per cent of the rural population (CDRI, 2011a), occupies 80 per cent of the total cropping area, and accounts for 70 per cent of overall crop production. The cultivated area has expanded over the last three decades from around 1.5 million hectares in 1980 to 2.79 million hectares in 2010. Rice production has increased from less than 2 million tons in 1980 to 8.25 million tons in 2010 (MAFF, 2011). However, yields per hectare remain the lowest in Asia (CGIAR, 2013). Dry season rice farming constitutes only about 14 per cent of total rice cultivation even though dry season yields are higher (CDRI, 2011a). With over 80 per cent rain-fed agriculture, Cambodian agriculture heavily depends on weather and rainfall (MAFF, 2011). According to UNDP projections, revenues generated by the agricultural sector are expected to continue to increase, but a large part of the value will be created by crops other than rice, as well as meat, and, quite likely, biofuel (UNDP, 2011a). In all scenarios, any impacts on the rice sector, as a result of environmental and climate changes, as well as infrastructure development projects, will come with numerous consequences for Cambodia (UNDP, 2011a).

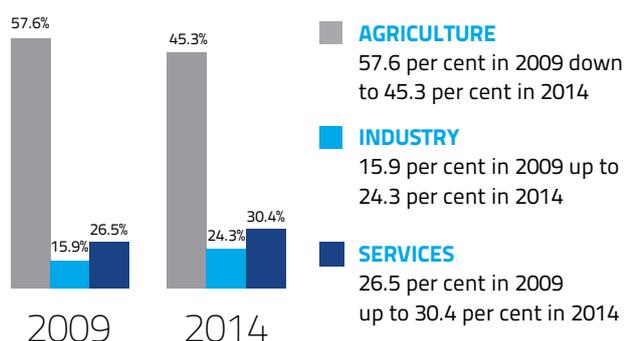
Cambodia is the fourth-largest inland fisheries producer in the world (MRC 2004) and the sector provides income and livelihood to 46 per cent of the total population. Inland fisheries exceeds 10 per cent of GDP and represents 25.2 per cent of agricultural sector activities (UNDP, 2011a). Fish and other aquatic animals contribute to 80 per cent of animal protein in the characteristic Cambodian diet (CGIAR, 2013). However, evidence shows a decline in the Mekong capture fishery and changes in fish catches. If exacerbated, such trends would be disastrous as many households have few other livelihood opportunities (USAID, 2014).

Forest derived income represent another key component of rural livelihoods. More than 80 per cent of Cambodians rely on fuelwood and around 8 per cent on charcoal for cooking (MoP, 2011). Forests predominantly consist of Moist lowland evergreen forest, semi-evergreen forest and deciduous forest. A unique flooded forest is found along the shores of the Tonle Sap Lake and upper part of the Mekong River. Mangroves are found along the coast. Forest resources have, however, been seriously degraded. From the 1980s to 1990s, the rate of deforestation was estimated at around 2 per cent (200,000 hectares per year), declining to 0.8 per cent from 2002 to 2006 (75,000 hectares per year). In 2008 forest cover was reported at 59 per cent, but this fell significantly in just one year, to 57.59 per cent in 2010 (FAO, 2010).

Most households benefit from livestock farming as a source of livelihood or savings. Production remains largely small-scale, and its contribution to total agricultural production has remained largely static, providing only 15.3 per cent of total agricultural production in 2009 (MAFF, 2010). Critical issues associated to the livestock sub-sector include a lack of disease and infection control, weak veterinary services, subsequent high rates of mortality and morbidity, small animal size due to poor nutrition (Tong, 2009; UNDP, 2011a; CDRI, 2011a).

Vulnerability of the agricultural sector in Cambodia is compounded by limited access to productive assets, including land. Landlessness and fragile land tenure arrangements are recognized issues in Cambodia, predominantly in sensitive ecological zones such as the Plateau - Mountain and the Tonle Sap Great Lake. According to a joint MoP - WFP survey in 2013 in the Tonle Sap zone, 10 per cent of the landholders own nearly 45 per cent of the total farmed land. 40 per cent of the landholders did not have title deeds, which constrains

Table 2: Occupation of Cambodian labour force (MoP, 2015)



their access to credit (MoP and WFP, 2013). Countrywide, more than 60 per cent of farmers live on less than one hectare, which is considered as the threshold to meet the rice requirements of a family of five (UNDP, 2011a). Population growth coupled with market consolidation continue to put additional pressure on land and rural productive assets. Weak access to support services and agricultural inputs, unavailability of reliable market and crop information (UNDP, 2011b), increased exposure to price shocks due to increased commercialization and environmental degradation (USAID, 2014) constitute additional constraints for small-scale farmers.

### THE GARMENT MANUFACTURING SECTOR

The sector employs more than 320,000 people and contributes between 85 per cent (RGC, 2014) and 88 per cent of Cambodia's exports (World Bank, 2012).

### THE TOURISM INDUSTRY

The tourism and hospitality sector has continued to grow rapidly, with foreign arrivals increasing from 2 million in 2008 to 3.58 million in 2012 and 4.5 million in 2014 (World Bank, 2015). Tourism directly generated USD 1,912 million in 2011 and approximately USD 2,210 million in 2012, and helped earn more than USD 3 billion through indirect impact. In 2012, tourism sector created around 350,000 direct jobs and several thousand indirect jobs (RGC, 2014). Lastly, the construction makes one of the fourth key pillars of Cambodia's economy.

Table 3: Gross Domestic Product by sector (MoP, 2012; World Bank, 2013)

#### AGRICULTURE, FISHERY & FORESTRY, LIVESTOCK

45 per cent in 1995 down to 26% in 2012

#### INDUSTRY

(Mining, manufacturing, Food, Beverages & Tobacco, Textile, Wearing Apparel & Footwear, Wood, Paper & Publishing, Rubber Manufacturing, Other Manufacturing, Electricity, Gas & Water, Construction)

15 per cent in 1995 up to 28 per cent in 2012

#### SERVICES

(Trade, hotels and restaurants, Transport & Communications, finance, public administration, Real Estate & Business, other services)

35 per cent in 1995 up to 38 per cent in 2012

#### TAXES

4 per cent in 1995 to 7 per cent in 2012 (2012. RGC. Rectangular Strategy. est. and World Bank. 2013)

### 1.1.5. POVERTY

Data from the RGC and international organizations indicate that national growth brought with her a sharp reduction of poverty. According to the revised official poverty lines adopted by the Ministry of Planning (MoP) in 2013,<sup>1</sup> poverty rates fell dramatically from 47.8 per cent of the total population living below the poverty line in 2007, to 22.9 per cent in 2009. However, this steady pace in poverty reduction slowed after 2009. In 2011, the poverty rate went down to 19.8 per cent and 18.9 per cent in 2012. The World Bank (WB), using a slightly different approach<sup>2</sup> corroborated these findings, and showed a reduction in poverty from 50.1 per cent in 2007 down to 20.5 per cent in 2011 (WB, 2013). A similar reduction in extreme poverty is equally observable using the international poverty line of USD 1.25 per person per day expressed in purchasing power parity (PPP) dollars. In 2011, 10 per cent of the population lived on less than USD 1.25 per day, down from 31 per cent in 2007. Despite such progresses, poverty throughout the country remains of great concern. In 2011, 41 per cent of the population relied on less than USD 2 per day, while almost 72 per cent lived on less than USD 3 per day (ADB, 2014).

The vulnerability of the Cambodian population to chronic and transient poverty remains high. According to ADB statistics, in 2007 28.5 per cent of the Cambodian population fell between the USD 1.25 and USD 2.00 per day poverty lines. In addition, poverty is overwhelmingly concentrated in rural areas. In 2004, about 89 per cent of poor households were found in rural areas, against 91 per cent in 2011 (ADB, 2014). Unsurprisingly, rural areas are much more affected by food insecurity<sup>3</sup> than urban areas, as it is estimated that 90 per cent of the food insecure households currently live in rural areas (CDRI 2008; WFP, 2013).

As ecosystem services provide the fundamental basis of the rural poor's livelihood and subsistence strategies, any threats to these systems, as a result of demographic changes, economic shocks due to natural disasters, slow onset processes of degradation, infrastructure development projects, are anticipated to have profound impact on the rural communities. In this respect, rural out-migration, in the context of a changing environment, has most of the time, been analyzed as a negative outcome of living with exacerbated environmental stressors, livelihood and poverty (See Section 2, Key challenges).

### 1.1.6. MIGRATION

#### A. MIGRANT CHARACTERISTICS

Migration has transformed Cambodian society with people moving from rural areas. According to the 1998 Population Census, 31.5 per cent of the Cambodian population were migrants, with rural to rural migrants representing less than two-thirds of total internal migrants in the country. The 2008 Census showed a decrease in migrants to 26.52 per cent. The main reason for this decline appears to relate to a reduction in the number of Cambodian citizens with previous residence outside Cambodia, as compared to the previous decade (MoP, 2012), as well as a surge in cross-border mobility, phenomenon which is only marginally captured by the National Population Census methodology. Nationwide surveys are largely corroborated by sampled surveys and targeted field research suggesting that labour migration became, over the years, the third main source of income after farming and fishing in rural areas (CDRI, 2007). For example, in a survey conducted among 1,000 Phnom Penh migrants and 4,500 rural households under the Cambodian Rural – Urban Migration Project (CRUMP) in 2011, UNFPA and the MoP visited 375 villages with populations ranging from 174 to 4,612 residents. Collected data indicate that over 90 per cent of the surveyed villages lost, on average, 4 per cent of their population in a single year (MoP, 2012).

Three types of migration streams commonly prevail in the literature: (a) rural-urban migration; (b) rural-rural migration and (c) cross-border migration. However, their respective magnitude is subject to:

- The definition of migration referred to by development actors and governments;
- The understanding of who is "migrant" within the communities. This varies according to the time spent out of the community of origin and the distance traveled, the reasons behind the migration decision and the degree of interactions between the migrant and those left behind;
- Changes in the classification of "urban" or "rural" areas;
- The fact that within a single migration experience, one individual may experience one or more migration status.

<sup>1</sup> The government's revisions to the poverty lines promulgated by the MoP in 2013 encompasses (i) a food poverty line based on 2,200 calories per person per day; (ii) a nonfood component estimated separately for Phnom Penh (daily USD 1.53 Per Capita), other urban (daily USD 1.05 per capita), and rural areas (daily USD 0.84 per capita); (iii) no imputed expenditures (such as for housing); and (iv) a token allowance for the cost of safe water (MOP 2013).

<sup>2</sup> The main difference between the methodology used by the RGC and the WB lies in the share of the food component in the overall line. In the government poverty lines, the non-food component is larger for Phnom Penh and other urban area than the one used by the WB.



### Rural-urban migration and urbanization

Migration from rural areas to urban centres is fueled by steady growth of the industrial and tertiary sectors. However, the unplanned settlement outside the main levee of Phnom Penh is putting further pressure on already inadequate urban infrastructure and services, and on existing wastewater infrastructure and natural drainage systems, which has served as the traditional environmental safeguard against floods. Since early 2000, sections of flood protection sleeves have been occupied by squatters, many of them migrants, restricting water flows and creating sanitation problems (World Bank, 2003; MoE, 2009). Rising water levels and heavier rainfall as a result of climate change have intensified such stress, leading to frequent flooding and an unhealthy environment in the cities. In addition, in expanding urban areas, existing social safety nets and services are not able to absorb all newcomers, constraining the expected positive outcomes of migration on the migrant households' welfare.

### Rural – rural migration

Internal and seasonal rural to rural migration occurs frequently, leading to land conversion to large scale agricultural production, a trend which is in line with the broader commercialization process of agricultural sector throughout the country (Diepart, 2015). As the rural population increases, a lack of income earning opportunities encourages the conversion of forests and wetlands into farming plots, the clearing of freshwater floodplain forests and the demand for fuel-wood has caused unsustainable harvesting of the flooded forest, resulting in the degradation or loss of flooded forest habitat (MoE, 2009). Agriculture adjacent to forest areas leads to incursion of invasive species into protected ecosystems (IOM, 2009; USAID, 2014). Encroachment of agricultural land on forest areas as a result of informal land tenure, partly driven by migration is a major cause of unsustainable use of forested lands (IOM, 2009; USAID, 2014). In the National Strategic Development Plan 2014 - 2018 (NSDP) 2014 – 2018, the RGC recognizes that, in spite of significant achievements in the field of natural resources management, the MoE faces two major challenges, firstly the lack of means to manage natural protected areas, and secondly the influx of migrants into natural protected areas.

<sup>3</sup> The quoted WFP report refers to the definition developed at the World Food Summit in 1996, where food security was defined to exist when 'All people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life'. Measuring food security can be drawn upon three distinct but highly interconnected dimensions of food security can simplify this complexity, namely

1. Food availability, which is the amount of food physically available to a household (micro level) or at the national level (macro);

2. Food access, which is the physical (e.g. road network, market) and economic (e.g. own production, exchange, purchase) ability of a household to acquire adequate amounts of food; and

3. Food utilization, which is the intra-household use of the food accessible and the individual's ability to absorb and use nutrients (e.g. function of health status). WFP. 2013

<sup>4</sup> Definition: For the purpose of this analysis a migrant refers to a person who has moved to the place of enumeration from another village (or another country) which was the person's last previous residence.

## Emigration

Government official data point to a surge in intra-regional migration in recent years, primarily to Thailand, Malaysia, Korea and Japan.

### Thailand

Migration from Cambodia to Thailand is likely to continue to increase over the coming years. The first official statistics released in 2004 indicated that 104,789 Cambodian migrants were provided with temporary work permits in Thailand (Huget, Punpung, 2005). As of October 2005, this number reached 182,007, 68 per cent of whom were male migrants (Maltoni, 2006). In 2010, the Ministry of Labour and Vocational Training (MoLVT) estimated the number of Cambodian migrants in Thailand at 350,400 (MoLVT, 2010). In 2013, the Department of Economic and Social Affairs of the United Nations estimated the total number of Cambodian migrants in Thailand at 750,109 people. As of November 2014, it was estimated that roughly 0.9 million Cambodian nationals were established in Thailand, under a range of different status, although all temporary, as reflected in the table below.

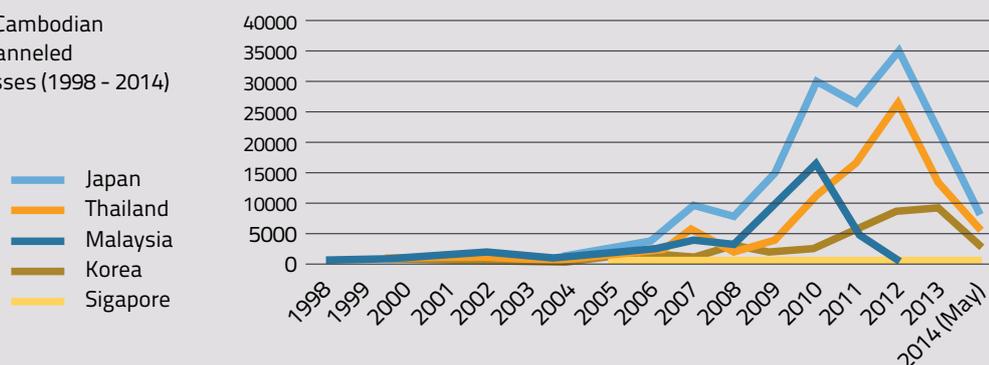
Table 4: Cambodia, Myanmar and Lao migrants in Thailand, 2014.

Source: NV and MoU (Office of Foreign Workers Administration, November 2014); OSSC (Department of Local Administration, November 2014).

Type of Migration	Total	Myanmar	Lao PDR	Cambodia
<b>Grand Total</b>	<b>2,867,617</b>	<b>1,710,936</b>	<b>268,696</b>	<b>887,985</b>
Male	1,637,432	1,025,548	163,076	448,807
Female	1,230,185	685,388	105,620	439,178
% of women	42.9	40.1	39.3	49.5
Dependents				42,609
<b>NV Total</b>	<b>1,084,978</b>	<b>946,946</b>	<b>33,013</b>	<b>105,019</b>
Male	680,792	597,980	18,899	63,913
Female	404,186	348,966	14,114	41,106
<b>OSSC Total</b>	<b>1,533,675</b>	<b>623,648</b>	<b>213,689</b>	<b>696,338</b>
Male	809,736	342,006	132,487	334,242
Female	723,939	280,642	81,202	362,096

In Cambodia, overseas employment is one of the various ways to address domestic problems such as lack of income-generating opportunities, low incomes, and lagging social development. Wage differentials attract prospective migrants. A key determinant for the sustained demand for foreign workers in Thailand lies in the declining number of persons in the younger working ages: the Thai population in the age groups of 15-24 years and 15-39 years is declining by 1.2 per cent a year. Thus, the population of entry to the labour force is falling by an annual average of 109,000 persons between 2010 and 2020, while that aged 15-39 years is declining by an average of 288,000 persons a year. Given that the overall economy grew steadily up to the year 2013, it would be expected that the declining number of persons entering labour force age will be compensated for by the employment of foreign migrant workers (IOM, 2014a). Overall, Thailand dependence on foreign human capital will continue. It has been projected by the National Economic and Social Development Board of Thailand that an additional 3.6 million unskilled migrants will be needed by 2021, plus 0.6 million skilled foreign workers (NESDB, 2014).

Table 5: Number of Cambodian migrant workers channeled through MoU processes (1998 - 2014)



The increasing waves of migration has been made possible by a general upgrading in transportation infrastructure and improved access to information and communication means. These improvements first facilitate people mobility and connectivity within province and country, but more recently, they have also helped connecting people to nearby countries, especially Thailand. These infrastructure improvements are expected to accelerate in the coming years, which means that people will be even more mobile, both within and beyond the borders (Pak, 2015).

The majority of the migrants from Cambodia currently enter in Thailand non-regularly, with less than 10 per cent migrated through regular channels established under the Memorandum of Understanding (MOU) between the two countries (2006), a situation to which the Government of Thailand tends to respond through ad hoc initiatives for temporary registration. The total cost of legally sending a migrant worker to Thailand is approximately USD 700. In comparison, an irregular migrant would typically pay USD 100 to be smuggled into Thailand and would not have to wait long to travel (IOM, 2014a). Given their precarious administrative status, a significant proportion of migrant workers and their dependents are found to be at greater risk of exploitation, especially in fishing, agriculture, and domestic work. Women make up approximately half of the overall migrant population<sup>5</sup> in Thailand, a large proportion of them tend to concentrate in specific sectors such as domestic work, care-giving related sectors, or other private services. Such sectors are recognized as unskilled or low-skilled and fall under informal status, placing the bulk of women migrants out of the scope of existing protective schemes and safety nets associated to formal employment.

### Malaysia

The Cambodian and Malaysian Government's signed a labour export agreement in 1997, and 6,628 Cambodians migrated between 1998 and 2006, through regular channels. This number increased from 10,165 in 2008, to 30,197 in 2010 and 33,707 in 2011, more than 80 per cent of whom were female domestic workers (ILO, 2013). Reported incidences of mistreatment of Cambodian domestic workers led to a suspension of the Memorandum of Understanding in 2011, but this is expected to resume in early 2016.

### Gulf States and Middle East

As a means to diversify the number of destination countries, the RGC signed a MoU with Qatar in 2011 and is engaged in discussions with the Kingdom of Saudi Arabia, Kuwait and Lebanon to send construction and domestic workers. However, as of December 2015, no movement of workers using regular channels to these countries have been recorded.

### Korea, Japan, Singapore

The MoU between Cambodia and the Republic of Korea came into force in 2003. The Manpower Training and Overseas Sending Board (MTOsB), a public employment agency tasked with recruiting, training, and sending Cambodian workers, has sent 34,805 migrants to the Republic of Korea under the Employment Permit System (EPS) since May 2014, 82.5 per cent of whom were men (MoLVT, 2014).

From 2007 to mid-2014, 407 Cambodians, 65 per cent of whom were male, were sent to Japan by private recruitment agencies and non-governmental organizations (NGOs) under the Japan International Training Cooperation Organization (JITCO) programme (MoLVT, 2014).

In 2012, Cambodia piloted the sending of 111 domestic workers in the Republic of Singapore in 2013.

<sup>5</sup> As of November 2014; women migrants in Thailand constituted 42.9% of the overall migrant population. Source: Office of Foreign Workers Administration (MoU Migrants), Department of Local Administration (OSSC), quoted from the SDC funded Scoping Study Report on 'Enhancing contribution of labor migration in Mekong region to poverty reduction'

## Immigration

Official data pertaining to the number of foreign nationals in Cambodia are scarce, but in 2013, 37,225 Vietnamese, 31,472 Thai, 1,550 Chinese, 281 French and 265 Lao migrants were registered as living in Cambodia (United Nations, Department of Economic and Social Affairs, 2013).

### B. IMPACT OF MIGRATION

The potential of migration to positively impact upon socioeconomic conditions, in both countries of origin and destination occur through the transfer of remittances, the exchange of knowledge and skills, promoting access to health services and education, and development of rural communities in countries of origin. However, these positive impacts have not been realized to the extent possible.

Although remittances are a crucial component of migration, consistent data remain scarce. At the macro level, the World Bank estimated the annual inwards remittance at USD 200 million in 2005 and USD 298 million in 2006, 4.1 per cent of the GDP (WB, 2007). IFAD showed that inward remittance flows reached USD 559 million in 2006, or about 7.8 per cent of GDP (Maltoni, 2010). The UNDP Human Development Report 2009 evaluated the figure to be USD 353 million per annum. In 2010, the World Bank estimated that Cambodian migrants sent home about USD 364 million in remittances. According to the RGC, more than 100,000 legal overseas workers sent more than USD 200 million in remittances in 2011 (RGC, 2014). The same year, in comparison, net foreign direct investment (FDI) inflows were USD 0.8 billion, and net overseas development aid (ODA) received USD 0.7 billion.

At the household level, a 2007 ILO study revealed that the median amount sent home by Cambodian workers in Thailand was USD 27 per month (THB 20,000). Approximately 40 per cent of the surveyed migrant workers in Thailand reported that remittances were the main source of income for their families to meet daily expenses, cover health care, and purchase household equipment (ILO, 2007). According to ADB (ADB, 2014), income from remittances and transfers increased by 25 per cent between 2004 and 2009. Existing literature indicates that remittances vary according to the socioeconomic background of the sending household, and the level

of education and sex of the migrant, the destination country as well as the sector of employment. A World Bank study found that the average amount received by non-poor households was about three times higher than the average received by poor households (World Bank, 2014). Migrants tend to be more educated than non-migrants, and a direct relationship between level of education and amount of remittance is apparent. Women migrants tend to earn less money, but are more likely than men to remit money to their families, and they remit a larger per cent of their total earnings, on average, 20 per cent more than men. While garment workers remit an average of USD 25 per month, construction workers, small business owners, and service/entertainment workers remit substantially lower amounts than the average (MoP, 2012).

Evidence of the extent to which cash and in-kind remittances contribute to poverty reduction varies. Kimsun (2012), using Cambodian Socioeconomic Survey data, showed that inward remittances reduce the severity of poverty among rural communities, with international migration having a greater impact than internal migration. On the other hand, the World Bank (WB, 2014), using the same dataset, found that migration had almost no effect on poverty reduction and estimated that migration accounted for only 0.5 per cent of poverty reduction. In a survey conducted in the northwest province of Stung Treng, the Centre for Development Research of the University of Bonn (Zentrum für Entwicklungsforschung, ZEF, 2015) estimated that remittance transfers contributed about USD 288 Purchasing Power Parity (PPP) per year to the income of rural households, representing about 5 per cent of total yearly household income and 9 per cent of total yearly household consumption. However, statistics do not show tangible variations between the welfare indicators of migrant and non-migrant households (ZEF, 2015).

### C. IMPACT OF MIGRATION ON SOCIAL DEVELOPMENT

Males and females below the age of 24 years are those migrating more frequently. However, as indicated above, there are significant differences in destination between genders. Women primarily migrate to urban areas within Cambodia and men to rural areas (47% to rural Cambodia and 32% to rural Thailand). Men are often more mobile, and so better able to migrate when weather events affect their livelihood activities. Women, on the other hand, are often required to remain in the family home to care for children and other relatives. The migration destination is most likely a reflection of the types of jobs that are available (MoP, 2012). The significant number of young women in Cambodia's garment sector has changed the demographic profile of many communities, impacted the marriage prospects of young men and women, and increased the income of an estimated 9 per cent of Cambodian households. Women also migrate to work in domestic work, tourism, and the sex industry; travel across the border to work in Thailand in construction, domestic work, agricultural production and the garment sector; and migrate to countries such as Malaysia and Korea, mostly as domestic workers.

Those with a higher education tend to move to Phnom Penh, while the lower educated tend to move to international destinations. (MoP, 2012). Yet, the share of migrants who hold secondary or higher education is two times higher compared to non-migrants.

The medium term outlook is one of continued demographic destabilization of rural areas as able-bodied young men and women migrate from villages, while those who are old, very young, and/or destitute, are left behind to tend the farms (CDRI, 2007). The phenomenon of children left behind by a parent is an emerging social issue, with 20 per cent of migrants to Phnom Penh leaving children to live elsewhere, overwhelmingly with grandparents (MoP, 2012; ADB, 2014).



## 1.2 KEY CHALLENGES

### ENVIRONMENTAL CHANGE AND MIGRATION

Although migration patterns tend to be primarily understood through their economic dimensions either at the micro or macro levels (Neoclassical Economics model, the New Economics of Labour Migration, Dual Labour Market Theory, World Systems Theory), recent research suggest that environment-related stresses and shocks, including extreme weather events and the gradual processes of environmental degradation, can be a direct or indirect cause of short or longer term mobility (El-Hinnawi, 1985; Myers, 1993; Döös, 1997; Lonergan, 1998; McLeman and Smit 2006; Perch-Nielsen et al. 2008; Kniveton et al. 2008; Jäger et al. 2009).

Labour migration has long been identified as a central strategy for reducing vulnerability to emerging sources of stress (Adger et al. 2007; Tacoli, 2009; Gemenne, 2010; Banerjee, Gerlitz and Kniveton 2013). In this respect, in combination with a diverse range of autonomous (changes in crop-calendar, use of new seed variety, change of diet and daily consumption, borrowing money, purchase of food on credit, sell off assets, reduction of expenditures on health care) or planned measures (infrastructure development, disaster management, promotion of small and medium enterprises and local jobs) migration has been categorized as a response to a degrading environment.

As set out above, demographic changes caused by out-migration can alter adaptive capacity. Migration for the purpose of labour predominantly involves

the working age population, which can lead to the deprivation of the local labour supply, accelerate social fragmentation processes, or increased socioeconomic disparities, adversely affecting the adaptive capacities of the communities of origin (Faist and Schade, 2013).

Environmental change has been identified as one driver of migration, and its relative importance remains open to debate (Castles, 2002; Jäger et al., 2009). Different factors including disasters, development projects, environment degradation, market changes, governance, poverty, lack of social cohesion and conflict act together and may increase the vulnerability of people and work as triggers for migration (Black, Kniveton et al. 2011; Black, Kniveton and Verker Schmidt, 2013).

Because of the non-linear, multidirectional and multifaceted nature of migration, a direct causal nexus with climate change appears methodologically difficult to establish (Black et al. 2011; Hugo 2011; Warner 2011, ADB 2013, IPCC 2015, IOM 2008). As such, identifying environmental factors as the sole cause of migration may never prove possible (Piguet, 2011). In the absence of a universally agreed definition of what an "environmental migrant" is, it is impossible to reliably forecast the number of people who will migrate as a result of slow onset environmental degradation. However, methodologies, such as statistical inference, sample surveys of migrant motivations and behaviour, modeling techniques, and historical analogs, can help towards refining predictions (IOM, 2015).

#### Environmentally displaced person

"Persons who are displaced within their country of habitual residence or who have crossed an international border and for whom environmental degradation, deterioration or destruction is a major cause of their displacement, although not necessarily the sole one. This term is used as a less controversial alternative to environmental refugee or climate refugee (in the case of those displaced across an international border) that have no legal basis or *raison d'être* in international law, to refer to a category of environmental migrants whose movement is of a clearly forced nature" (IOM, 2011:34).

#### Environmental change

"Changes in the physical and biogeochemical environment, over a large scale, either caused naturally or influenced by human activities" (Foresight, 2011), either through fast onset or slow onset events. As ecosystem services and exposure to hazard are important drivers of migration, "global environmental change will affect the risk calculations involved in moving and people's decisions to stay or move from their settlements" (ibid). Environmental change thus affects the environmental drivers of migration (Foresight, 2011). Environmental change includes both environmental degradation and climate change.

#### Environmental degradation

"The reduction of the capacity of the environment to meet social and ecological objectives and needs. Degradation of the environment can alter the frequency and intensity of natural hazards and increase the vulnerability of communities. The types of human-induced degradation are varied and include land misuse, soil erosion and loss, desertification, wildland fires, loss of biodiversity, deforestation, mangrove destruction, land, water and air pollution, climate change, sea-level rise and ozone depletion" (UNISDR, 2009)

## CLIMATE CHANGE AND MIGRATION

Climate related natural hazards have always affected societies and would continue to do so without climate change. Yet climate change is expected to lead to migration in different ways, through:

- a. Changes in the location, frequency and/or intensity of the natural hazards, which may lead to higher risk of humanitarian emergencies and increased population movements;
- b. Increased warming and climate variability effecting agricultural production, health, food security and water availability, and exacerbating pre-existing vulnerabilities;
- c. Rising sea levels and coastal flooding that make affected areas less productive or inhabitable;
- d. Increased competition over natural resources, with the potential to spur tensions, conflicts and ultimately lead to displacement (IOM, 2009, 2011).

Assessing the future impact of climate change on communities meets methodological and theoretical obstacles. Whereas uncertainties remains about the local impacts of climate change, even less predictable are communities' responses to climate change, and among them, migration (ADB, 2013). Further complexities arise from the fact that most migration is predominantly internal, and the absence of border crossing poses additional statistical obstacles. In addition, cross-border migration depends on national migration policies, which in turn are almost impossible to foresee. The mass return of an estimated 250,000 migrants Cambodian migrants, mostly undocumented, in the aftermath of the Coup in Thailand in June 2014, followed by a series of measures facilitating their return back to Thailand, has illustrated the extent to which governance and labour migration management policies between countries give the pulse of cross-border migration streams

The following chapter aims to bring together existing data and evidence on the environment, climate change and migration nexus in Cambodia. Each subsection starts with an overview of the scale of existing and projected environmental threats, and analyzes their past, current or projected impact on population mobility and distribution.

Cambodia experiences almost all types of hydro-meteorological hazards such as floods, drought, heavy storms (or typhoon), fire incidents and epidemics (NCDM, 2013). Cambodia is at high economic risk from multiple natural hazards, which affect people and their assets almost every year (RGC, 2011a; RGC, 2010a). In 2003, the NCDM and the UN World Food Program (WFP) identified 260 and 293 communes in Cambodia as prone to floods and drought respectively, accounting for approximately one-third of the total number of communes in the country (SNAP 2008 – 2013).

In 2014, the Internal Displacement Monitoring Centre (IDMC) ranked Cambodia 11<sup>th</sup> in relative number of displaced persons (proportion of displaced persons against to whole country population) and 12<sup>th</sup> in terms of absolute numbers (IDMC, 2015). Between 1996 and 2013, 2,050 people lost their lives as a result of natural disasters, including floods (53%), lightning (36%), fires (4%), storms (3%), and epidemic (1.7%). In the same period of time, the most frequent type of recorded hazard was flood (43%), followed by fires (18%); drought (15%), storms (15%); lightning (8%); pest outbreak (1.3%); epidemic (0.6%) and river bank collapse (0.5%) (NCDM, 2013). In this respect, Cambodia's National Poverty Reduction Strategy (NPRS) explicitly identifies natural disasters, particularly flood and drought, as critical factors that have, and continue to, increase the socioeconomic vulnerabilities of the rural poor, including placing a disproportionate burden of coping with the effects of disasters on women.

### Climate change, definition

"A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to other natural climate variability that has been observed over comparable time periods" (UN Framework Convention on Climate Change, 1992. Article 1).



With regard to climate change, Cambodia is ranked as one of the most vulnerable countries in the world. Cambodia's vulnerability to climate change is due to its exposure to environmental stresses (magnitude, frequency, duration, extent of sudden and slow onset disasters), sensitivity (population density, population distribution, narrow-based economy, low productive rain-fed agriculture systems, limited crop diversification, unsustainable use of common property resources, including forestry and fisheries), and weak adaptive capacity (UNDP, 2011a).

Although the impact of climate change will vary in different parts of country, projections indicate that in the long run it will intensify Cambodia's exposure to increased incidence of sudden onset events (cyclones, storms, lightning, riverine and flash floods, landslides), and slow onset disasters (changes in hydrology, droughts, changes in rainfall patterns, loss of biodiversity, soil fertility, deforestation, increase in mean temperature and sea-level rise). With 80 per cent of the population in rural areas and largely dependent on natural resources, the provisions of ecosystem services, the future of small-scale agriculture, of water and natural resources, the well-being, education and health of this group is considered highly sensitive to climate variations. This may impact on the overall development of the country (UNDP, 2011a; USAID, 2014). Lastly, Cambodia's vulnerability to climate change is compounded by its the limited capacity to adapt to the shocks that such anticipated change would generate (ADB, 2009; Yusuf and Francisco, 2009; ACIAR, 2009).

## 1.2.1 SUDDEN ONSET-DISASTERS

### A. CYCLONE, STORMS

#### Exposure

Tropical cyclones might not be as common as floods and droughts, but are the most costly meteorological disasters affecting South-east Asia. On average, 27 tropical cyclones hit this region each year (WB, 2013). Being dominated by lowland plains and plateaus, it is anticipated that Cambodia will experience an increase in frequency of storms resulting in more flooding and related costs, especially in low-lying areas surrounding the Tonle Sap Lake. (USAID, 2014).

Storm surges, strong winds and landslides associated with flooding can cause agricultural losses, injuries and fatalities, damage and destruction of private and public infrastructures. Official data suggests that storms are the first cause of damaged and destroyed houses in Cambodia (51%); followed by floods (41%); and fire (7%). In 2013, 9,946 houses were reportedly damaged or destroyed, due to storms Battambang (39,000 persons affected since 1996), Kompong Cham (13,322) and Takeo (13,098) provinces are the most exposed to storms (NCDM, 2013). In September 2009, the estimated total loss and damage caused by Typhoon Ketsana, one of the most damaging typhoon in recent times, which hit 14 out of 24 provinces, was about USD 132 million. The typhoon affected 180,000 households, killed 43 people and injured 67 people (RGC, 2013).

Existing literature tends to exclude the direct and indirect effects of cyclones and storms on mobility patterns in Cambodia. Studies conducted worldwide recognize that extreme weather events cause short distance displacements, in most cases, on a short term basis, ranging from a few days to a few weeks (Quarantelli, 1982; Perch-Nielsen, 2004). Similarly, the review of data available didn't find any records of longer term protracted displacement as a result of intensive climatic events in Cambodia. However, resultant livelihood impacts resulting from crops destruction, loss of productive assets, absence of insurance and exhaustion of safety nets, do seem to influence migration patterns. For example, in the aftermath of typhoon Ketsana 2009, anecdotal evidence found that members of cyclone-affected communities were "forced" to migrate to cope with agricultural and private property loss. A UNDP post-disaster survey in the province of Kompong Thom found that villagers opted for a temporary change of labour (collection and selling of non-timber forest products, fishing, and agricultural labour) in the immediate vicinity, or further away. In one village, only 10 out of 42 families stayed back, while the rest migrated in search of jobs (UNDP, 2011a).

### Analysis

There are still knowledge gaps in understanding the connections between intensive weather events and migration. If evidence shows that short term displacement occurs as an immediate response, and that migration for the purpose of labour, including rural to rural, rural to urban and cross-border migration, is already being adopted as a recovery option, further research is needed to capture the extent to which a temporary and reactive decision can turn into permanent migration and contribute to the distribution of the rural population.

## B. FLOODS

### Exposure

Flooding is not a new phenomenon for Cambodian rural communities, who have long coped and taken advantage of the beneficial effects of floods, such as soil moisture improvement, higher fertility for agriculture, recharge of ground and surface water, ecological benefits for fisheries, and through adjusted agriculture and fishing practices (Keskinen, 2006, 2008; UNDP, 2011a; Diepart, 2015). Indeed, floods are the most frequent environmental impact faced by rural communities in Cambodia.

Climate change is expected to increase the amount and frequency of intense precipitation events, including excessive rainfall and flooding. Major flooding events have occurred in the last 52 years approximately every five years, in 1961, 1966, 1978, 1984, 1991, 1996, 2000, 2001, 2002 and 2011 (NCDM, 2013).

There are two major flood types in Cambodia. Seasonal flood, characterized by slow but steady rise in water levels lasting several days, resulting from cumulative rainfall in the upper catchments throughout the rainy season. Seasonal floods are said to be aggravated when combined with heavy rains around the Tonle Sap Lake, or when heavy rains coincide with tropical depressions and storms. In contrast, flash floods result from repeated rainfall in mountainous areas flowing into the streams and tributaries of the Mekong River, are much more sudden and last only a few days.

The direct effects of flooding include:

- ▶ Injuries and fatalities: In 2000, 347 people lost their lives, 80 per cent of them were children. 250 and 168 people died in 2011 and 2013 respectively (NCDM, 2013).
- ▶ Crops destruction: Among all type of natural disasters, floods have the largest impact on paddy rice fields. From 1996 to 2013, floods had damaged 1,695, 969 hectares of paddy rice fields, representing 67 per cent of the total loss over the period (NCDM, 2013).
- ▶ Loss of livestock: In 2011, two thirds of affected livestock owners lost stock as a direct result of the September–October floods (FAO-WFP, 2012).
- ▶ Sewage spread and stagnant water, leading to the contamination of drinking water and the expansion of breeding sites for insect vectors.
- ▶ Loss of houses: in 2000, 300,000 homes were flooded (NCDM, 2013).
- ▶ Public infrastructure destruction: Between 1996 and 2013, 1,769 kilometres of rural roads has been deteriorated; 2,454 kilometres of national, provincial, and town roads destroyed. Flood is also the primary impactful climate event affecting health facilities (191 hospitals and health centres affected between 1996 and 2013) and education services (2,950 schools affected between 1996 and 2013). In 2000, damage to infrastructure was estimated at USD 150 million. The 2011 floods caused an estimated loss at 630 million USD (NCDM, 2013).

Indirectly, flooding increases the prevalence of vector and water borne diseases, including cholera and dysentery, malaria and yellow fever. Additional indirect effects include a sharp reduction of work opportunities and reduced income, loss of land through river bank erosion. In 2000, CDRI presented to the National Assembly the indirect outcomes of the devastating flood of 2000. These included erosion of savings, declining health, deterioration of capital assets, increased indebtedness, increased reliance on natural resources, increased land sales and landlessness, deepening poverty, and increased rural-urban migration.

In a post-flood relief and recovery survey (2011), UNICEF suggested that in the areas of the Plains and Tonle Sap ecological zones, nearly 1 in 10 households (64,000 households) were displaced from their home for at least one night as a direct result of the floods. Among these households, 19,600 were displaced outside of their home communities. UNICEF survey findings indicated that the floods predominantly displaced the poorest households, with nearly 20 per cent of the poorest households living in these areas forced from their homes compared to just one per cent of the richest households. However, the survey indicate that floods did not prompt any large-scale protracted displacement.

Looking at incidence of longer term migration, the same assessment found that approximately 10 per cent of households had a member migrate out since the floods, and 57 per cent of these respondents cited floods as the main reason for migration. The poorest households were considerably more likely to have had a member migrate out compared to the wealthiest households (9% and 4%, respectively).

UNDP conducted a livelihood recovery needs assessment in the provinces of Prey Veng, Kratie and Siem Reap in the aftermath of the 2011 floods. The assessment indicates a 60 to 66 per cent decrease in the incomes of affected households. To cope with the crisis, 40 per cent of the affected households relied on credit to purchase agricultural inputs for re-planting, although a slice of the loans were spent on food consumption. Many people, particularly in Prey Veng and Siem Reap, have resorted to labour migration, with 51 per cent of the respondents in Siem Reap citing migration as one source of income prior to the floods, paddy rice 80 per cent and fisheries 43 per cent. Migration was ranked as the second most frequent

coping strategy (57%), after borrowing money (58%), and agricultural adaptation strategies such as planting fast yield dry rice or receding rice (57%).

### Analysis

Over the last ten years, mobility patterns in Cambodian flood-prone areas has generated a growing body of literature building evidence on (a) the structural interdependence between flood regimes and rural livelihoods, shaping household food and economic security strategies and adjustments; and (b) on the increasing role of temporary and permanent migration as a key response to a changing economic context, population growth, increasingly intensive resource use and competition for access to land and natural productive assets, lack of work in rural areas, persistent poverty, household indebtedness, resources depletion and environmental degradation.

First, research has documented the extent to which annual flood cycle, in particular around the Tonle Sap Lake, determines the productivity of this unique ecosystem, and by doing so, influences peoples food and economy security strategies (Heinonen, 2006; Keskinen, 2006; Middleton, Un and Thabchumpon, 2013). A number of studies have established how decreased magnitude and duration of floods in the Tonle Sap floodplains affect fish catch and production, tend to encourage household members to migrate to diversify household income and reduce vulnerability. Inversely, high or prolonged flood, resulting in greater fish catch and bigger fish, increases the need for local labour force and the potential for a higher income, diminishing incentives for migration, (Middleton, Un and Thabchumpon, 2013; Khleang, 2013).

Flood regimes directly impact agricultural production and farming practices, although in different ways. In years of regular flooding, relatively high demands for labour tend to reduce the need for migration. Irregular flooding, however, makes agriculture more problematic. While high floods shorten the duration of the farming season, low floods affects agricultural productivity through water shortage and increased pest incidence.

Early flooding, if unexpected, carries high risks of crops damages and destruction, creating a greater incentive for the diversification of household income (Heinonen, 2006; Middleton, Un and Thabchumpon, 2013; Khleang, 2013). In this respect, from a broad perspective, short term and seasonal out-

migration patterns from flood-prone areas are intrinsically linked to the annual flood regime and its variations. Such migration flows, by nature, tend to be hardly dissociable from regular economic migration flows.

Looking at the socioeconomic determinants that shape a households' adaptation response to exceptional and regular flooding in the Sangkae River watershed in Battambang province, Doch, Diepart and Heng shown that adaptive capacity varies between households according to their food security status and income portfolio. In times of flooding, the proportion of households opting for non-agricultural strategies (51%) significantly exceeds those who rely on at least one agricultural response (23.9%). The remaining third did not report any adaptation means. As farming is becoming increasingly capital intensive, and since agricultural adaptation strategies often require financial and material resources that are in most instances out of reach of the country's poorest people, affected households increasingly resort to credit (32%), sales of assets (28%), reliance on wage labour (13%), or migration (7%) as an adaptation mechanism. By doing so, households tend to move further away from the system that has been affected. This movement translates either in the mobility of labour (to non-farm, wage and migration related activity), the mobility of capital (decapitalization and reinvestment in self-employed small trade activity), or the mobility of landownership (occurring through market-based land concentration). The study concludes that these adaptive mechanisms, adopted by the majority of rural communities, do not reduce vulnerability but reinforce it (Diepart, 2015).

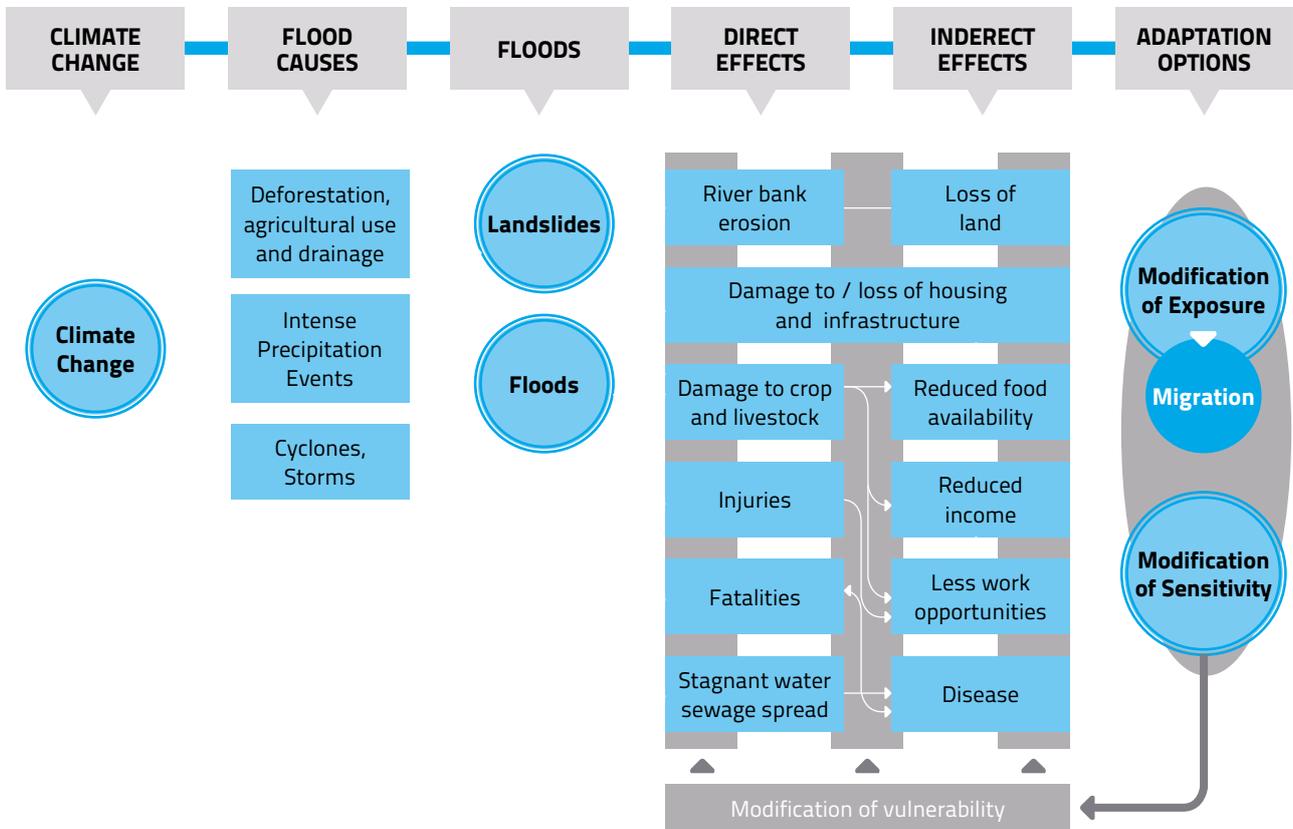
The prevalence of non-agricultural adaptation means over agricultural adaptation means is further sustained by the lack of effective crop insurance or institutionalized government security nets, and the absence of an affordable credit system which produces an insecure and expensive credit market (CDRI, 2007). This results in continued indebtedness, growing landlessness and constraining households' access to credit when faced with other crises (Tong, 2009; UNDP, 2011a). In this context, crop destruction caused by floods tends to create new patterns of chain reactions that affect other livelihood activities which depend on crop production, especially wage labour. By affecting livestock, which are an important investment and means of savings for farmers, by carrying risks of vector and water borne diseases outbreak, to which rural households have limited resilience to, recurrent

flooding brings additional pressures that could become unmanageable to many rural households (CARD, 2011).

In this respect, although the literature shows that migration is neither the first nor the preferred option for rural households (Khleang, 2013; Bylander, 2013), increased serious floods may lead to more distress migration. In addition to increased exposure to global food price rises or economic recessions pertaining to the commercialization of agricultural production, greater incidence of conflicts due to accrued pressure on declining natural resources, socioeconomic shocks resulting from increased frequency of abnormal flood events may foster transitory food insecurity and at a later stage chronic food insecurity, due to the adoption of negative coping and adaptation mechanisms (decapitalization, loss of productive assets).

As opposed to forced or distress migration, a number of studies also suggest that this movement away from agricultural adaptation means, within migrants and non-migrant households, relates to the dominant perception of the environment as an unsuitable space for small scale entrepreneurship, diversification and investment. In this respect, when migration occurs, it is not a direct response to an environmental shock, but rather the materialization of a growing belief that the rural environment, both economic and natural, is unreliable (Bylander, 2013).

Figure 2: Conceptual model of the influence of climate change on migration through flooding  
 Developed by Sabine L. Perch-Nielsen and Michèle B. Bättig & Dieter Imboden, 2008.



## 1.2.2 SLOW ONSET DISASTERS

### A. CHANGES IN HYDROLOGY / DROUGHTS

#### Exposure

Water shortages are a common phenomenon in Cambodia. According to the Ministry of Water Resources and Meteorology (MoWRAM), 81 per cent of rural households experience water shortages for agricultural use, and 54 per cent suffer water shortages for personal use. However, due to climate change, it is anticipated that Cambodia will face greater instances of short and prolonged meteorological, hydrological and agricultural droughts. Consecutive droughts occurred in several parts of the country in 2001, 2002 and 2003 (NCDM, 2013). Like floods, droughts are reported throughout the country, but Kompong Speu, Kampot, Takeo and Siem Reap are the most drought-prone provinces (NCDM, 2013).

Drought does not cause human life loss like other disasters, but abnormal water shortages directly lead to crop and other plant decline, reduction or loss of land, biological and/or economic productivity, and death of livestock. Between 1987 and 2007 alone, damage caused by drought was estimated at USD 138 million. Similarly to floods, droughts cause indirect effects such as reduced work opportunities, reduced income and food availability, and to a lesser extent increased rates of water-related disease mortality and morbidity.

#### Analysis

The effect of the reduction of crop yields due to drought can be compared to the effects described in the cases of flooding. Low agricultural yield due to extended drought augment the indebtedness of families, contribute to widespread food shortages, reduce income due to decrease demand for wage labour, such negative effects being compounded by a restricted access to credit, insurance schemes, and limited access to health care. It is important to add that successive occurrence of floods and droughts have been increasingly observed throughout the country, in particular in Prey Veng, Kandal, Kampong Cham, Svay Rieng Banteay Meanchey and Kampong Speu provinces (SNAP – DRR 2008 – 2013).

Autonomous coping mechanisms are diverse, but local adaptive capacities remain limited. It includes first stage adjustments and insurances schemes such as re-planting, changes in cropping and planting techniques, reduction of food and water consumption, borrowing money, sale of assets and livestock; temporary migration, and at a later stage, sale of productive assets, loan taking and distress migration.

Similarly to floods, agricultural adaptation measures require modifications in agricultural practices. The expansion of irrigation systems, water harvesting and storage systems, the adoption of drought resilient crop varieties and husbandry techniques, and the diversification of farming and livelihood systems all require significant upfront capital. These processes tend to exclude those who cannot afford to engage in more intensive agriculture. The emergence of wage labour and migration for the purpose of labour appears to be one of the only options left to a growing segment of the population (Diepart, 2015).

Evidently, the impacts of drought are a result of the interaction of a physical impact and human vulnerability. It is clear that drought will specifically impact on poor and food-insecure households and may increase their number due to the adoption of negative coping strategies. Yet, as of now, sound data on migration induced by drought in Cambodia remain critically scarce and more is needed. Indeed, in contrast to floods, cyclones or storms, the slow onset nature of droughts makes difficult to get an in-depth understanding of coping strategies, including migration, as they are likely to evolve over time. However, the impact of droughts are undoubtedly worse on women due to their socio-cultural and economic status within the family and the community. In times of drought, a women's workload increases sharply due to the scarcity of water, the loss of male employment in the agricultural sector and their subsequent migration within or outside in search of work, and the potential spread of water-related diseases, or the loss of livestock (Oxfam, 2008).

### B. DEFORESTATION, LAND DEGRADATION AND SOIL EROSION

The RGC recognizes land degradation as one of the most severe environmental issues contributing to the vulnerability of rural communities. In addition to the natural process of land degradation, resulting from

floods, drought, soil Moisture and nutrient depletion, human-induced land degradation activities such as mono-cropping, unsustainable farming, reliance on chemical fertilizer, the continued depletion of forest cover, and mining, is threatening the agriculture production in Cambodia. This will impact on its mid to long term food security and supply (MAFF, 2012).

Other underlying factors of risk and vulnerability include physical, social, economic and environmental dynamics, development works which disregard DRR and CCA concepts, unplanned patterns of human settlement and land use, and inadequate irrigation systems and water conservation measures, particularly in the face of drought. (SNAP, 2008-2013).

As a result of natural resource depletion, the poor are resorting to alternative livelihoods, in or outside Cambodia (CDRI, 2007; 2011b). Yet, statistical evidence of migration induced by environmental degradation remains scarce. The MoP and UNFPA, however, under the CRUMP project, found a clear correlation between soil erosion processes and high rates of out-migration. Pests, natural disaster and poor harvests are also related to greater out-migration trends.

Table 6: Rates of out-migration by reported agricultural problems (MoP, 2012)

Agricultural problem	Yes	No
Soil loss through erosion	57.0	41.4
Pests, like insects, on crops	48.9	41.3
Natural disaster	50.3	47.3
Harvest is worse than normal	51.6	47.4

### C. TEMPERATURES AND CHANGES IN RAINFALL PATTERNS

For Cambodia, and much of the Lower Mekong Basin, the most important climate variables relate to changes in hydrology of the Mekong River, its tributaries and floodplains, and the Tonle Sap Lake (UNDP, 2011a). Climate Change may lead to higher temperatures and this affect the water cycle, bringing shifts in the timing, duration and intensity of rainfall patterns and seasons (more frequent drought spells and prolonged dry seasons; delayed rainy seasons with intense rainfall and flash floods; dry season river flow decreases, wet season flow increases), changing the hydrology of major rivers and tributaries as well as groundwater

recharge, and consequently altering the quantity, quality, availability and distribution of water (ICEM/MRC, 2010). All of these anticipated changes will have implications for agriculture and food production as well as human health and wellbeing (UNDP, 2011a).

A number of climate change trends in Cambodia have already been observed. The average number of cold nights per year has decreased, and the average frequency of hot days has increased (WB, 2011). Varying degrees in temperature have been proposed to occur by the end of the century, and the exact figure is dependent on the model used and the level of anticipated greenhouse gas emissions. The Mekong River Commission (MRC) calculated that the average temperature in Cambodia increased by 0.8°C from 1960 to 2005; the rate of increase per decade was about 0.20 to 0.23°C in the dry season and 0.13 to 0.16°C in the wet season (ICEM/MRC 2010). Based on these estimates, it is projected that the mean temperature will have risen by 0.3 to 0.6°C by 2025, 0.7 to 2.7°C by 2060 and 1.4 to 4.3°C by 2090 (CDRI, 2011a). Under the high emissions scenario, the rate of temperature increase will be at least 2°C, and possibly as high as 2.5°C, by the end of the century (UNDP, 2011a). Other studies suggest temperatures will increase from 0.7°C to 2.7°C by the 2060s (McSweeney et al 2008). Rates of change in temperature are anticipated to be highest in the 3S catchments where increases of 2°C to 3°C can be reached before 2050 and up to 5°C by the end of the century (USAID, 2014).

Changes in weather patterns are stressing an environment already characterized by unpredictable weather and disasters, changes in the timing and extent of rainfall, and the delayed and less predictable onset of the wet season after a longer dry season will affect traditional cropping practices, impact on livelihood productivity, especially for rice and threaten food insecurity (MoE, 2010; UNDP, 2011a; USAID, 2014). Estimates indicated that rice yields will decrease under both high and low emission scenarios, and will continue to decrease within a range of 70 – 20 per cent of the current production, based on different seasons and scenarios (UNDP, 2011a).

The effects of climate change on some fish species remain uncertain but may be, in some instances, equally severe, especially for those species that require higher water quality conditions. The already observed decline in fish resources has been aggravated by the effects of climate change, and if they continue would have a

disastrous impact on communities who have relied on these seasonal resources. Un (2011) described a growing trend of cross-border migration to Thailand among subsistence fishers from Battambang province, due to a continued decline in fish resources, leaving migration as a primary strategy to support livelihoods (Chantavanich, Middleton and Ito (eds.), 2013).

#### D. SEA-LEVEL RISE, COASTAL EROSION AND SALINIZATION

Predictions of sea-level rise (SLR) remain extremely uncertain. According to the Cambodia's draft Second National Communication, sea levels are predicted to rise by 1 metre, leading to the permanent inundation of some 25,000 ha of coastal zone by 2060. Of this area, 47 per cent (11,832 ha) is mangrove and 42 per cent (10,509 ha) wetland. Low-lying areas, including settlements and commercial areas, beach resorts, seaports and coastal fisheries, could be submerged or

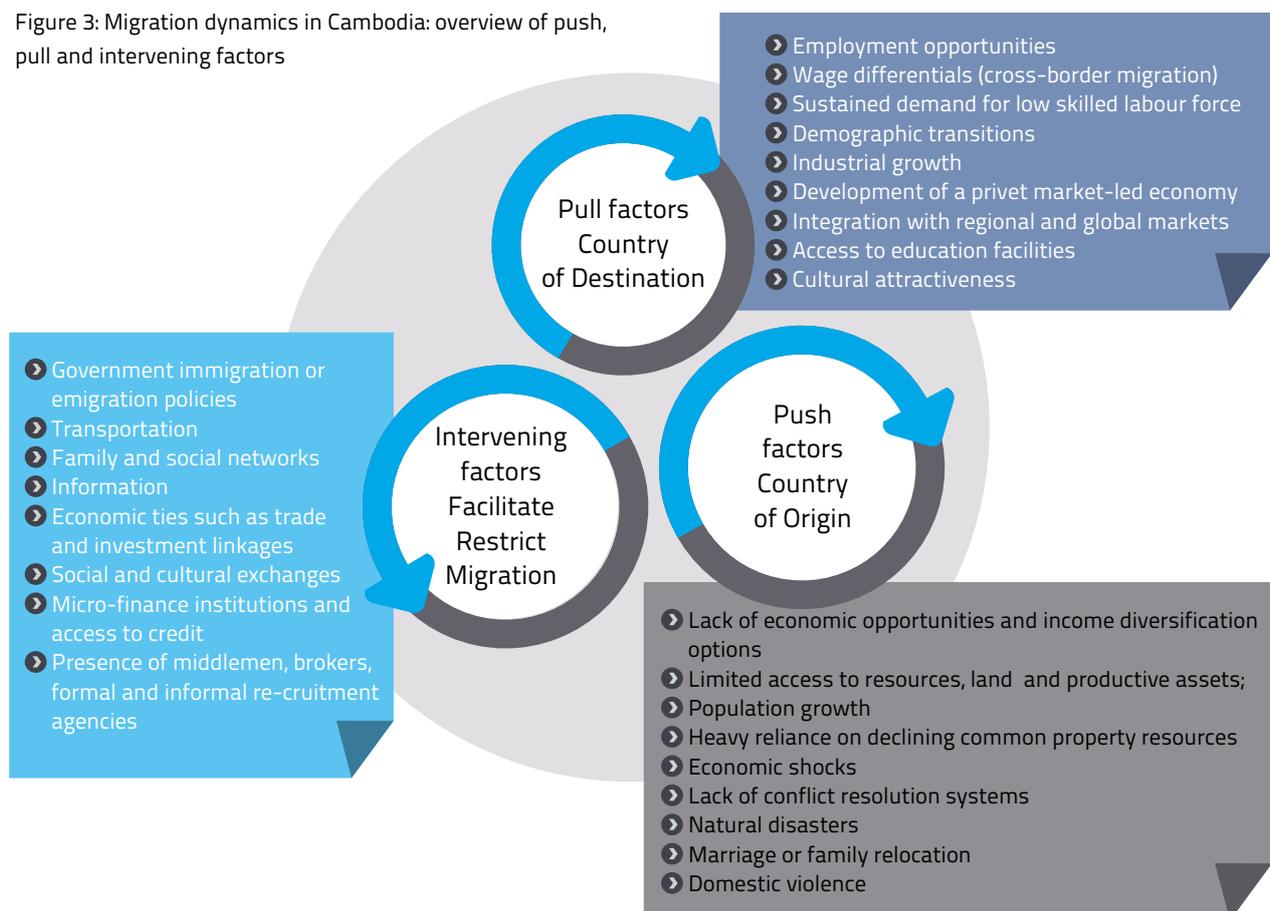
affected by high tides, with significant socioeconomic implications (MoE, 2010). The direct effects of sea-level rise include increased flood frequencies, erosion, inundation, rising water tables, salt water intrusion and biological effects (Klein & Nicholls, 1998). Indirect effects include, loss of land, damage to and/or loss of roads, private properties, factories, and public infrastructure. Increased salt water intrusion will impact on agriculture, fisheries and access to safe drinking water for both surface and ground fresh water. The degradation of mangrove ecosystems and coastal erosion will further intensify climate change vulnerability.

The impact of sea-level rise on migration is not well documented. While migration is a very plausible response, protection responses such as constraining development in susceptible areas through enforced regulations, planned modification of land use and management, ecosystem protection may prevent forced migration.

## Conclusion

Being a widespread phenomenon throughout the country, human mobility, primarily rural out-migration has gained a growing interest among local authorities, development partners, academics, decision and policy makers. Migration is commonly understood as a result of the interactions between a series of push, pull and intervening factors.

Figure 3: Migration dynamics in Cambodia: overview of push, pull and intervening factors



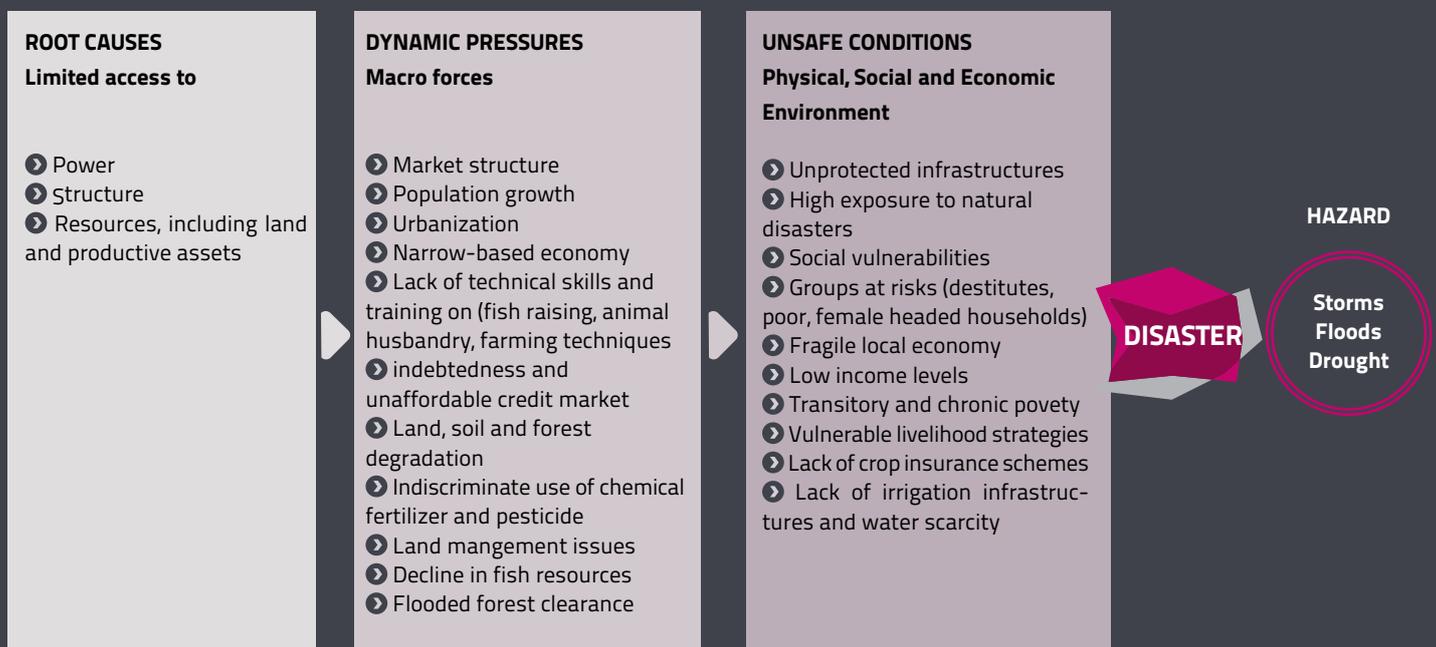


Yet, in Cambodia, local livelihood and employment conditions are considered to be the main determinants of migration. Push factors, according to the literature review, are currently more important in the migration decision process (Heinonen 2006, 2009, Keskinen, 2010).

The vulnerability of Cambodian rural household to socioeconomic shocks, including natural disasters are generally associated with

- the limited asset base and savings of poor households;
- the underdevelopment of financial markets for savings, borrowing or insurance;
- the lack of livelihood diversification in many rural households and communities;
- heavy reliance on common property resources when access to or productivity of these resources is in decline; and
- a lack of rule of law and guaranteed access to justice in conflicts between the poor and more powerful actors. (WB, 2006, CDRI, 2007).

The diagram below expands on this analysis using the progression of vulnerability from root causes, through dynamic pressures, to unsafe conditions that, together with the hazard as trigger, lead to disaster (Perch Nielsen, adapted from Blaikie et al., 1994).



**In the context of a fragile environment, migration is neither the first nor the preferred option, but, the literature suggests migration becomes more common with frequent onset of natural disasters, as one of the responding adaptive strategies to environment and climate change, which can take many forms:**

- ▶ Migration can act as an adaptive strategy for dealing with seasonality and external influences such as fluctuating market pressures or irregular flood regime and weather patterns;
- ▶ Migration has, over the last ten years, become a central element in the household production systems, as a mechanism for diversifying household activities and securing additional sources of income to supplement agricultural activity, and diversifying livelihood when faced with soil degradation and erratic rainfall;
- ▶ Migration can be a means of coping with shocks and crises associated with loss of crops, dealing with health shocks, and loss of land and indebtedness (UNDP, 2010) and contribute to helping in disaster recovery;
- ▶ Movement out can be permanent or temporary, to surrounding rural areas, to urban areas, or to another country;
- ▶ Migration tends to be selective and in most cases, a few of members of a family migrate and send back remittances to support those left behind;
- ▶ When the most vulnerable households resort to migration to cope with environmental stress, migration is an emergency response that creates conditions of debt and increased vulnerability, rather than reducing them;
- ▶ Finally, it is predicted that the consequences of climate change will affect the poorest people, as they are more vulnerable and least able to adapt, and are likely to be rendered even poorer. However, there is an emerging consensus that it is not the poorest people who migrate overseas because international migration is an expensive, and demands resources for the journey and for crossing of border (Castles, 2000; de Haan, 2000; Skeldon, 2002). In this respect, non-migration can be to some extent associated with even further vulnerability to environmental risks (McLeman and Hunter, 2010; Black et al., 2013). As migration requires resources, increased pressure on the most vulnerable households' livelihood can lead to the emergence of trapped population.

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# SECTION 2

## Policy Review

# Migration, the Environment and Climate Change in Cambodia

By Kimchoeun PAK

## POLICY REVIEW AND ANALYSIS

### ▶ INTRODUCTION

Climate-related natural hazards have always affected societies and would continue to do so, even without climate change. However, climate change is expected to change the location, frequency and intensity of such natural hazards. The complex relationships between environmental change, (particularly climate change), migration and adaptation have been drawing increasing attention from researchers and policy makers. A growing body of literature has emerged on this topics over the past two decades and as a result human mobility, including migration, has moved onto the global policy agenda.<sup>7</sup>

Migration can be viewed as an adaptive response to natural disasters and climatic events, and it is in this context that migration is linked to climate change. To this extent, adaptive capacity is defined as "the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damage, to take advantages of opportunities, or to cope with the consequences" (IPCC, 2007). Migration is increasingly becoming recognized as one possible adaptive strategy, but currently remains overshadowed by the contrary view of migration as a failure to adapt.

Climate change and migration are cross-cutting issues, and in order to fully understand them in a Cambodian context, this study has reviewed the national legal and policy frameworks to identify synergies between them. A broad approach has been taken, focusing on national socioeconomic development, disaster risk reduction and resilience strategies, climate change adaptation and mitigation plans, migration management policies and relevant sectoral development plans with implications on human mobility, such as displacement due to infrastructure projects, and poverty reduction strategies. This review considered existing policy materials to identify whether there is a link between development challenges brought about by disaster risks, environmental degradation or climate change and migration and whether this has previously been addressed.

While some research and policy provisions were found on topic, it appears that a focused discussion of the interaction between climate change and migration has not been undertaken to date. There may be a variety of reasons for this, such as a lack of evidence due to methodological limitations, as well as a lack of understanding about how the two interact at a conceptual and empirical level, or a limited multidisciplinary approach in current research and policy debates around climate change, or perhaps due to limited coordination in the development of policy across sectors.

To substantiate the above claim, the following sections will discuss in more details the overview and gaps in:

- ▶ Macro development policies such as the National Strategic Development Plan (NSDP) and the Rectangular Strategy III;
- ▶ Key policies and plans relating specifically specifically to natural disaster management;
- ▶ Key policies and plans relating specifically to climate change;
- ▶ Key policies and plans relating to migration; and
- ▶ Other relevant policies and plans.

The section details the results from key informant interviews conducted to collect supplementary information and confirm key findings from the desk reviews. Finally, it concludes and provides recommendations for next step.

<sup>7</sup> Those advocates include the Advisory Group on Climate Change and Human Mobility made up of The United Nations' High Commissioner for Refugees (UNHCR), the International Organization for Migration (IOM), the United Nations University Institute for Environment and Human Security (UNU-EHS), the United Nations Development Program (UNDP), the Norwegian Refugee Council/Internal Displacement Monitoring Centre (NRC/IDMC), Refugees International, the Centre for International Relations Studies de Sciences Po (Sciences Po-CERI), and the Arab Network for Environment and Development (RAED).

## 2.1 NATIONAL DEVELOPMENT AND POVERTY REDUCTION STRATEGIES

### THE RECTANGULAR STRATEGY III, THE NSDP (2014-2018)

The Rectangular Strategy III sets the policy framework for the Royal Government of Cambodia, and the NSDP lays out the plans, costs and indicators by which the policy goals are measured. The main goals of the Rectangular Strategy III include: (a) ensuring 7 per cent annual economic growth; (b) creating more jobs for youth through private sector promotion; (c) protecting the environment; and (d) strengthening good governance at both national and subnational levels.

Rectangular Strategy III refers to the impact of climate change in Rectangle I (agricultural development), Rectangle II (infrastructure development), and Rectangle IV (human resource capacity development). However the Rectangular Strategy III and the NSDP refers to climate change generally, leaving the details to be covered by more specific policies, such as the National Policy on Green Development (2013 – 2030), the Industrial Development Policy (IDP), various agricultural and water resource management policies, and the Climate Change Strategic Plan (CCSP). These policies are discussed in more detail in later sections of this report.

In the newly adopted NSDP 2014 – 2018, unlike the previous one, climate change is not only mentioned, but recognized as one of the key priority development areas.

Initial observations from the documentation surrounding the Rectangular Strategy III and the NSDP indicate that climate change is viewed as a phenomenon related to agriculture, irrigation development, infrastructure development and natural disaster response. There is a strong focus on disaster management, with recognition given to the importance of response to floods and droughts, and their impact on crops, loss of life and the effect on the economy. In order to reduce the vulnerability of people, especially the poor, to the effects of natural disasters, the NSDP has developed the Strategic National Action Plan for Disaster Risk Reduction (SNAP 2014 – 2019). The Government has given the National Committee for Disaster Management (NCDM) the task of coordinating and implementing the

national action plan. No link, either direct or indirect is made between environmental degradation, natural disaster management, climate change and migration.

Migration is, however, a consideration in other priority areas such as private sector development and employment (Rectangle III), as well as in lower-level policies such as the National Employment Policy (NEP) and the Labour Migration Policy. In this way, migration is presented in rather negative terms, with the inference being that migration should be discouraged. For example:

*"Encouraging investments in rural areas that will contribute to the development of the rural economy, reduce the gap between urban and rural areas, and improve the living standards of people as well as reduce migration from rural to urban areas and to foreign countries to seek jobs (Rectangular strategy, 2014, Rectangle III: Private Sector Development and Employment, priority number 2)."*

### THE NATIONAL SOCIAL PROTECTION STRATEGY (NSPS)

The aim of the NSPS (2011) is to complement the NSPD, the Rectangular Strategy III and accompanying sectoral policies that indirectly or directly involve social protection. Social protection aims at reducing poverty and vulnerability at the individual, household and community level, while at the same time promoting human development. Social protection interventions include social insurance, labour market policies, social safety nets and social welfare services.

Social protection policies explicitly recognize that, because a large majority of Cambodian people rely on fishing and agriculture for their livelihood, natural disasters and climate change create increased vulnerability, health shocks and resultant economic crisis. Floods and droughts are among the most damaging events for rural households, and climate change is likely to heighten their severity. Although some regions in Cambodia are relatively shielded from climate hazards, the NSPS recognizes that almost all provinces are considered vulnerable to the impacts of climate change owing to low adaptive capacity resulting from financial, technological, infrastructural and institutional constraints.

The seasonality of labour requirements in farming means that those in rural households, especially those with little or no land, are obliged to find off-farm employment in the slack agricultural season to supplement the family income. Given the limited availability of non-farm employment within the community, households increasingly rely on income from unskilled wage employment in urban areas, or seasonal labour in neighbouring countries, such as Thailand and Viet Nam.

To discourage seasonal migration, the NSPS sets out a number of objectives, two of which are relevant to this review. The first, part of its disaster management plan, is to ensure the poor and vulnerable receive support to meet their basic needs, including food, sanitation, water and shelter in times of emergency and/or crisis. Organizations such as the Cambodian Red Cross (CRC), the National Committee for Disaster Management (NCDM) and subnational administrations (SNAs) are considered instrumental here.

The second is to ensure that the working-age poor and vulnerable benefit from work opportunities to secure income, food and livelihoods, while contributing to the creation of sustainable physical and social infrastructure assets. This review argues that this is relevant to migration in that, based on recent studies (Pak, 2015; UNDP, 2015) as young people migrate, older people whose physical conditions cannot meet the demand of labour intensive work remain, but they can, if properly supported perform less labour intensive income generating activities, such as raising animal or running small businesses. Such options offer a diversification strategy for poor households, especially those living in climate-affected areas.

## 2.2 POLICIES AND PLANS RELATED SPECIFICALLY TO MIGRATION

The RGC has developed a number of migration management policies. It adopted its first National Policy on Labour Migration in 2010, and this was updated for the period 2014–2018. Strategic provisions related to migration management were included in the National Population Policy (2015) as well as the National Employment Policy (2014–2018). In addition to this, the RGC entered into bilateral discussions with key countries of destination, such as Thailand (2003, 2015), Malaysia (2007, 2015), Korea and Japan for the recruitment, sending and employment of Cambodian nationals under regular schemes. Discussions with the Gulf States, including Qatar, Saudi Arabia, Kuwait and Lebanon have been initiated. Another key development that impacted on migration was Cambodia's recent entry into the ASEAN Economic Community (AEC).

Three key policies are relevant to this report, namely the National Employment Policy (NEP), the Labour Migration Policy, and the National Population Policy. The NEP was adopted in September 2015 in response to Cambodia's increased migration and rapid

urbanization as a result of its emergence as a lower-middle income country, industrialization and AEC integration. It has three key aims, the first of which is to promote decent and productive employment opportunities. This is reflected in macroeconomic policy frameworks, sectoral development policies, and through transitioning workers and economic units from the informal to the formal economy. The second aim is to enhance skills and human resource development through the development of soft skills, increasing the quality and relevance of education and skill training. The third aim is to enhance labour market governance through, among other things, better protection of workers and better employment services. The NEP makes no explicit reference to environmental or climate change, however, it sets out a broader context for the LMP 2014–2018.

The LMP focuses on three policy areas, namely, governance of labour migration, protection and empowerment of migrant workers, and harnessing labour migration for development.

The LMP recognizes the economic benefits of out-of-country migration, the rising levels of youth unemployment, and the fact that such regional and international labour mobility will not be stopped, especially in the face of the AEC and globalization. A review of documentation surrounding the LMP noted several references to an increase in migration, due to the shift from agricultural to industrial work, but it should be noted at the juncture that a decrease in agricultural productivity and climate change were not explicitly mentioned. Gender was recognized as a key issue, as increasingly migrants are women and are more vulnerable to exploitation. Women migrants also tend to send more remittances back to their families than male migrants. The LMP includes provisions on improving financial services for easy remittance home, and supporting migrant families to effectively use remittances to start local businesses. These provisions promote livelihood diversification for rural people, many of who may be affected by disasters such as floods and droughts.

The General Department of Labour of the Ministry of Labour and Vocational Training (MoLVT) coordinates the implementation of the LMP in collaboration with the ministry of Foreign Affairs and International Cooperation (MoFAIC), and the Ministry of Interior (Mol). Within this bundle of related documents are several other legal documents relevant to migration management, including:

- ▶ The sub-decree No. 190 issued in 2011 which covers recruitment agencies, contractual arrangements, dispute resolution, and remittances;
- ▶ The Guidelines issued by the Prime Minister in July 2013 and eight Prakas (ministerial regulations) issued within the period of February and September 2013 to implement the Sub-decree 190;<sup>8</sup>
- ▶ Inter-ministerial Prakas (MoLVT and Mol) on the forms and procedures required to issue regular passports to migrant workers.

The MoLVT plays an important role in implementing the regulations and policies set out above, in close collaboration with the Mol and MoFAIC, but has a limited role at the provincial level, and little or no role at the community level. At the Subnational level the MoLVT operates through its decentralized provincial office, the Provincial Department of Labour and Vocational Training (DoLVT), whose main roles include:

- ▶ As of June 2014, issuing certified application forms for migrant workers to apply for passports at the Mol's General Department of Identification or selected provincial branches;<sup>9</sup> and
- ▶ An information Centre for job opportunities, as identified by the National Employment Agency (NEA).

The Mol also plays an important role in relation to migration management. In April 2014, the RGC established within the Mol the General Department of Identification in an effort to streamline the passport issuance process. However, evidence so far indicates that despite the changes, many Cambodian migrant workers still prefer the informal channels when seeking jobs in other countries. Within the Mol, the Department of Anti-Human Trafficking is also relevant to the broader issues surrounding migration.

The National Population Policy (NPP) is currently being finalized,<sup>10</sup> and it explicitly recognizes migration, together with urbanization, as key factors affecting economic and social change in Cambodia in the years to come. The NPP recognizes the inability of the agricultural sector to generate enough, or enough desirable, employment and/or income for people, especially youth, and that migration and urbanization will likely continue as a result. This continued trend of migration will create new challenges, not only for rural areas, but for destination urban areas.

In linking migration to the agricultural sector, the NPP makes connection between demographic and climate changes. This is further strengthened by its reference to the alarming rate of deforestation (partly due to increasing consumption of wood for fuel), erosion of fertile soil and irregular rainfall, contributing to environmental degradation and resulting pressure on the rural population to migrate out.

<sup>8</sup> Those Prakas include: 045/13, 047/13, 046/13, 249, 250, 251, 252, and 253. Tunon and Rim (2013).

<sup>9</sup> Prakas No 2574.

<sup>10</sup> (RGC 2015).



As stated above, migrants have contributed to a surge in the urban population, a situation which has caused serious environmental challenges in urban areas, especially around solid wastes, drainage problems and other infrastructure deficiencies. In response, the NPP seeks to facilitate integration of population dynamics into social and economic developmental planning and ensure its implementation in a synergistic manner.

To achieve this it proposes four policy and programmatic directions, namely: (a) infrastructure expansion and development, (b) managing migration and urbanization, (c) expansion of agricultural and allied activities, and (d) social sector investment and human capital formation. All four are relevant to this review, but of particular relevance are points (b) managing

migration and urbanization, and (d) social sector investment and human capital formation.

On urbanization and migration management, the NPP states that "urban growth... has to be in sync with the social, economic and environmental roadmap of the country," and that "management of cities have to be prepared in line with environmental plans." On strengthening the agricultural sector, the NPP emphasizes the importance of enforcing environmental protection measures, and the enhancement and promotion of skills and employment beyond farming to include also agro-business and small to medium enterprises.

## 2.3 POLICIES AND PLANS RELATED SPECIFICALLY TO DISASTER MANAGEMENT

Disaster management is a key component of the RGC's social and economic planning. Natural calamities aggravate poverty and so effective disaster management is an important contribution to the Government's overall aim of poverty reduction.

The National Committee for Disaster Management (NCDM), consisting of members from different Ministries, Cambodian Armed Forces, Civil Aviation Authority and Cambodian Red Cross, was established in 1995 as the lead coordinating agency for the management of natural disasters. Since then,

Cambodia has set up the necessary legal, policy and institutional foundations for disaster management.

The NSDP and the SNAP 2008 – 2013 were developed after the adoption of Hyogo Framework of Action (HFA) (2005). Together they set out the overarching framework for disaster risk management in Cambodia and reflect the HFA's key aim of creating nations and communities that are resilient to natural disasters.

To achieve this the HFA has five main objectives:

1. Strengthening disaster management systems;
2. Developing human and institutional resources;
3. Strengthening disaster management information systems;
4. Strengthening disaster preparedness and response capacities;
5. Integrating disaster risk reduction perspective into policies, strategies and plans of Governments in all sectors and at all levels.

The HFA also sets out six key disaster risk reduction components that are reflected in the Royal Government of Cambodia's SNAP-DRR, and are as follows:

1. Ensuring that disaster risk reduction is a national and a local priority;
2. Strengthening subnational and community-based disaster risk management;
3. Identifying, assessing and monitoring hazard risks and enhancing early warning systems;
4. Using knowledge innovation and education to build a culture of safety and resilience;
5. Mainstreaming DRR into policies and programs of relevant Government Ministries;
6. Strengthening disaster preparedness for effective response at all levels.

The Community Based Disaster Risk Management (CBDRM) strategy builds upon existing capacities and coping mechanisms of communities, working with them to design and implement appropriate and achievable long-term risk reduction and disaster preparedness plans. Importantly, this approach empowers communities towards long-term capacity to adapt and is an integral part of the RGC's rural development program to alleviate poverty.

Cambodia passed the Law on Disaster Management in 2015, focusing on (a) prevention and adaptation in the pre-disaster period, due to natural or human-made causes; (b) emergency response during the disaster; (c) recovery in the post-disaster period. The Law gives central responsibility for disaster management to the NCDM, while emphasizing the key roles of subnational administrations, along with key ministries. The Law on Disaster Management makes no explicit mention of migration, although it is reasonable to assume that migration is an anticipated occurrence of the pre- and post-disaster periods.

As an ASEAN member, Cambodia is a party to the ASEAN Agreement on Disaster and Emergency Responses (AADMER) which has the dual aims of helping ASEAN member countries to reduce disaster losses, and encourage them to cooperate on disaster management and emergency response. The agreement expands on the principles of the HFA and provides a framework for member countries to develop operational procedures, allowing them to respond collectively and expeditiously in the event of a disaster. The strategic components of AADMER cover risk assessment, early warning and monitoring; prevention and mitigation; preparedness and response; and recovery.

The mandate of the AADMER establishes the ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) to coordinate the technical and operational aspects of ASEAN's response to a disaster. The aim of the AHA Centre is to allow ASEAN to better respond to future disasters; and to provide a mechanism for ASEAN countries to work together in preparedness and reducing disaster losses.

The Sendai Framework for Disaster Risk Reduction 2015 – 2030 was adopted by the UN Member States on 18 March 2015 at the Third UN World Conference on Disaster Risk Reduction in Sendai City, Miyagi Prefecture, Japan. The Sendai Framework is the first major agreement of the post-2015 development agenda, and has four priorities:

1. Understanding disaster risk;
2. Strengthening disaster risk governance to manage disaster risk;
3. Investing in disaster risk reduction for resilience;
4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

The Sendai Framework's focus on strengthening disaster risk governance and enhancing disaster preparedness for effective response, are of relevance to this review. The focus on disaster risk governance requires enhanced transboundary cooperation to enable policy and planning for the implementation of ecosystem-based approaches with regard to shared resources, such as within river basins and along coastlines. The enhancement of disaster preparedness for effective response and recovery, rehabilitation and reconstruction will be relevant at national and local levels. Of particular interest for

the study, the Sendai Framework's emphasizes the need to improvedisplacement management at the regional and global levels, under the second priority area, by calling for the promotion of "transboundary cooperation to enable policy and planning for the implementation of ecosystem-based approaches with regard to shared resources, such as within river basins and along coastlines, to build resilience and reduce disaster risk, including epidemic and displacement risk". Further reference is made to the issue of

displacement under the fourth priority, focusing on preparedness strategies and actions. At the national and local levels, member states agreed "to promote regular disaster preparedness, response and recovery exercises, including evacuation drills, training and the establishment of area-based support systems, with a view to ensuring rapid and effective response to disasters and related displacement, including access to safe shelter, essential food and non-food relief supplies, as appropriate to local needs."

## 2.4



## POLICIES AND PLANS RELATED SPECIFICALLY TO CLIMATE CHANGE

Climate change has gained increased policy attention in Cambodia in recent years. The Ministry of Environment (MoE) has the mandate to coordinate policies and activities related to climate change activities. The National Climate Change Committee (NCCC), was established by a MoE Ministerial Sub-decree (Sub-Decree No. 35 dated 24 April 2006), and is made up of representatives from twenty ministries and government agencies. The NCCC is responsible for (a) coordinating the implementation of climate change activities in Cambodia; (b) developing climate change policies, strategies, legal instruments, plans and programs; and (c) the integration of climate change concerns into relevant policies, strategies and legal instruments.

The primary climate related policy framework is the National Adaptation Programme of Action (NAPA) (May 2006). In line with the RGC's development objectives outlined in the Rectangular Strategy for Growth, Employment, Equity and Efficiency adopted in July 2004 (RGC, 2004), and the National Strategic Development Plan 2006 – 2010 (NSDP), the main objectives of the NAPA project were to (a) understand the main characteristics of climate hazards in Cambodia (flood, drought, windstorm, high tide, salt water intrusion and malaria); (b) understand coping mechanisms to climate hazards and climate change at the grassroots level; (c) understand existing programs and institutional arrangements for addressing climate hazards and climate change; (d) identify and prioritize adaptation activities to climate hazards and climate change; (e) improve agricultural productivity through the expansion of irrigation and the management of water resources to reduce vulnerability to natural

disasters. The NAPA process led to the identification of 39 adaptation projects in four key sectors, namely, agriculture, water resources, coastal zone and human health. Among 39 proposed project activities, 20 were deemed to be high priority projects (16 non-health and four health), with a total estimated budget of USD 129 million.

In 2014, under the coordination of the Climate Change Department (CCD) of the Ministry Environment (MoE), the Government adopted the Cambodian Climate Change Strategic Plan 2014 – 2023 (CCCSP). The CCCSP sets the overall national strategy in relation to climate change, including adaptation and mitigation, followed by Climate Change Strategic Plans (CCSPs) and Climate Change Action Plans (CCAPs) prepared by nine ministries and agencies. Those ministries include: the Ministry of Agriculture, Forestry and Fisheries (MAFF); the Ministry of Water Resources and Meteorology (MoWRAM); the Ministry of Industry, Mines and Energy (MIME); the Ministry of Education, Youth and Sport (MoEYS); the Ministry of Women's Affairs (MoWA); the Ministry of Public Work and Transport (MoPWT); the Ministry of Health (MoH); the Ministry of Rural Development (MRD) and the NCDM.

The CCCSP provides an overarching national framework for addressing climate change across all sectors, regions and administrative units of government. It outlines the RGC's vision for promoting climate-resilient development and green growth in the period 2014 – 23. Its first goal is to "Reduce vulnerability to climate change impacts of people, in particular the most vulnerable, and critical systems (natural and societal)" through:

- Promoting climate resilience through improving food, water and energy security;
- Reducing sectoral, regional, gender vulnerability and health risks to climate change impacts; ➤ Ensuring climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal ecosystems, highlands, and others), biodiversity, protected areas and cultural heritage sites;
- Promoting low-carbon planning and technologies to support sustainable development;
- Improving capacity, knowledge and awareness for climate change responses;
- Promoting adaptive social protection and participatory approaches in reducing loss and damage due to climate change;
- Strengthening institutions and coordination frameworks for national climate change responses, and
- Strengthening collaboration and active participation in regional and global climate change processes.

Each of the nine ministries propose numerous activities and priority actions (111 in total) that they claim will help mainstream climate change into their sectoral plans.

- MAFF and MoWRAM: Agriculture is expected to be heavily affected by a combination of higher temperatures, greater variability in rainfall patterns, altered growing seasons, extreme weather events, sea-level rise and associated impacts on water availability and quality (MoE, USAID). Priority measures include increased education and capacity building for farmers, selection and introduction of climate resilient crops and cropping techniques, improve seed selection, rehabilitation of degraded soils, improved value chain, better irrigation systems and rainwater harvesting facilities, strengthening water conservation and water efficiency practices, enhanced access to meteorological information and early warning mechanisms about natural disaster, protecting water resources from pollution, implementation of long term adaptive measures related to flood management;
- MIME and MRD: diversify energy sources including solar system, small and medium enterprises (SME) development to diversify income and local employment, improving access to micro-credits, access to market, improved provincial and urban road systems and increased resilience of roads to climate change is the responsibility of the MRD for

district and commune roads and the MoPWT for national and provincial roads (ADB, 2012);

- MoH: The MoH selected vector borne diseases; water/foodborne diseases; and health impacts related to extreme weather as the three main targets for development;
- MoEYS, MoWA: promote awareness, provide early warning system, promote women's roles in policy formulation and responses to climate changes, and promote social protection/insurance schemes for vulnerable groups, including women.

It is noted that these sectoral CCSPs and CCAPs are guided by and reflect the strategic goals as stated in relevant broader policies of each of the sectors. For instance, MAFF's CCSP and CCAP reflects the key messages stated in the Agriculture and Water Policy (2007) and Rice Export Policy (2010). The MAFF's CCSP and CCAP reflect the key focuses of the Plan of Action for Disaster Risk Reduction in Agriculture (2014 – 2018). Similarly, the MoEYS's CCSP and CCAP reflect the strategic direction in the Education Strategic Plan (ESP, 2014 – 2018), and the MoH CCSP and CCAP is in line with Health Strategic Plan (HSP, 2014 – 2018) and the National Strategy for Food Security and Nutrition (NSFSN, 2014 – 2018).

The review found that none of the CCSPs and CCAPs, or their related sectoral policies and plans, make any mention of a direct or indirect connection between climate change and migration. Instead, all the activities proposed focus on improving the affected people and communities' capacity to respond to climate shocks. Some of the planned activities proposed, such as infrastructure development and access to micro-finance, will directly or indirectly encourage migration, while others such as agricultural productivity improvement, SME development, and access to markets, create an incentive for people to stay in their communities.

Key informant interviews conducted for this study suggest that, not only do sector ministry policymakers not see migration as an effective adaptation response to climate change, but they see migration as negative, and as a phenomenon to be minimized. This explains why key informants often claim that their climate change projects have something to do with migration, as they promote local economic development as a way to minimize out-migration.

At the global level, the need to integrate human mobility aspects into climate change adaptation has been recognized in the 2010 UNFCCC Cancun Adaptation Framework, to which Cambodia is part of. Most recently, the inclusion of migration and human mobility into the global adaptation framework has been enacted in the final agreement reached at the 21st Conference of the Parties to the UNFCCC. The final text of the agreement refers specifically to migration and human mobility in its Preamble and in the Decision on Loss and Damage, paragraph 50, as follows:

➤ in the Preamble: "Acknowledging that climate change is a common concern of humankind, Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and

the right to development, as well as gender equality, empowerment of women and intergenerational equity.";

➤ The COP Decision on Loss and Damage, paragraph 50: "Also requests the Executive Committee of the Warsaw International Mechanism to establish, according to its procedures and mandate, a task force to complement, draw upon the work of and involve, as appropriate, existing bodies and expert groups under the Convention including the Adaptation Committee and the Least Developed Countries Expert Group, as well as relevant organizations and expert bodies outside the Convention, to develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change."

## 2.5 OTHER RELEVANT POLICIES

### DECENTRALIZATION POLICIES AND PLANS

Decentralization is a broad cross-cutting development policy in Cambodia, for it seeks to engage SNAs to take on multi-sectoral roles in various development issues, including local infrastructure development, social service delivery, disaster risk management, agriculture and local economic development. The key guiding policy documents for the reform are the 10 Year National Program for Subnational Democratic Development (NP-SNDD), and the 1st and 2nd Three Year Implementation Program (IP3 I and II).<sup>11</sup>

Both the NP-SNDD and the IP3 (I & II) recognize the importance of, and seek to, mainstream climate change into the local development planning process. Under the umbrella of decentralization reform, climate change mainstreaming has so far been happening through a number of pilot projects, such as the Local Governance and Climate Change (LGCC) which piloted the Vulnerability and Risk Assessment (VRA), and the initiation of a joint working group to integrate climate change adaptation into the subnational planning process.

In terms of actual activities, through donor project support, SNAs have been engaging in promoting climate resilient infrastructure development, farming techniques and emergency responses to natural disaster events. However, limited financial and human resources have constrained the capacity of these SNAs in performing these roles, which is why, in the 2nd IP3 (2015–2017), a plan was raised to mobilize and channel more donor support to SNAs and earmark them specifically for climate change adaptation needs.

In the absence of a clear functional assignment, both the NP-SNDD and the IP3 make virtually no reference to migration. However, SNAs are expected to be indirectly involved in managing migration through their other role of updating population statistics (part of which is about migration), issuing civil registration documents (which are needed for people to apply for passport and other documents required for migration and finding jobs in urban areas) and ensuring security and safety (part of which is about preventing human trafficking). Recent studies suggest, however, that these indirect roles

<sup>11</sup> (RGC 2010, NCDD, 2014)

have not been effectively implemented by SNAs, and have contributed very little to promote safe migration.

Also of relevance to this study, are SNAs emerging role in local economic development (LED). SNAs are expected to go beyond their traditional role in infrastructure development to promoting people's livelihood through better farming, access to markets, and skills development. It is expected that improved LED will help diversify people's livelihoods, which in turn will make them more resilient to climate change.

### POLICIES RELATING TO URBAN DEVELOPMENT AND MANAGEMENT

Urban development and management are relevant to this review, as they relate to both climate change and migration. From a policy perspective, urban development and management are partly addressed through decentralization policies, as well as the draft National Urban Development Strategy Framework, and the National Housing Policy.

The draft National Urban Development Strategy envisions that urban development needs to take environmental sustainability and climate resilience into account with regard to the design and implementation of infrastructure and promotion of economic activities. A number of possible goals

include socially inclusive and equitable development, sustainable transport (land use and transport integration), use of space, housing and commercial/ industrial economic development, urban environmental management, sound and balanced utilization of land and natural resources, and urban green growth climate resilience.

As of 2011, about 30 per cent of Cambodia's population lived in urban areas. Given the rapid urban population growth in the last 5 years, it is reasonable to expect that this figure has increased significantly, posing a significant challenge for infrastructure development and other aspects of urban governance, the informal settlement of newcomers adding pressure on already fragile urban infrastructure. It is expected that these issues will be included in Master Plan for Phnom Penh, covering the period from now until 2035.

Population growth in urban areas due to inward-migration has created pressure for more affordable housing. Responding to further expected population growth in urban areas (an additional 4 million by 2030), the National Housing Policy 2014 aims to address housing needs for middle and low income people. In operational terms, the National Housing Policy provides a framework for low-cost housing projects in urban areas, which according to the government officials, are for migrants and short term job-seekers.

## 2.6 RECOMMENDED ACTION AND PROGRAMMATIC PLANNING

Climate change and migration have been addressed separately in various RGC policy documents, however the causal nexus between the two has largely been ignored. Yet, there are growing calls from states, civil societies and academics to design and implement policies for climate adaptation that include a migration component.

This report argues that at a conceptual level, the lack of attention to this causal nexus comes from the complex nature of the dual causality between the two – climate change as the cause indirectly leading to migration, and migration as the indirect response to climate change. International literature is debating the nature of the relationship between the two, however

there is increasing evidence that climate change leads to migration as an adaptive strategy. While there is no one policy that directly addresses the migration, environment and climate change nexus, different policies do discuss different pieces of the puzzle.

Climate change policies, for instance, focus on livelihood adaptation of the affected population within their own communities; migration policies emphasize out-migration; while macro policies recognize the need to make a direct link between demographic dynamics, the environment and climate change with issues such as urbanization and rural livelihood diversification. The existing literature provides broad recommendations learned from other countries, in

terms of how to respond to climate change related migration. Overall, the literature suggests integrating migration into the National Adaptation Plan (NAP) by taking steps to reduce the pressure of migration, averting displacement, and considering planned relocation when deemed unavoidable (IOM, 2008; IOM, 2012; UNU, 2014). Complementing such integration, the literature also suggests capacity need to be built in at least three areas; (a) enhancing knowledge and improving data collection; (b) strengthening policy, institutional, administrative and legal frameworks; and (c) reinforcing operational and technical capacity.

Accordingly, this report puts forward the following recommendations:

- 1. enhancing knowledge and improving data collection:** A clear understanding is required among key stakeholders with regard to the conceptual connections between climate change and migration. Such understanding is an important first step, given the complex nature of the relationships between the two phenomena. In addition to this, empirical evidence supporting the conceptual connection is required so that relevant policymakers can be convinced of the significance of the issues.
- 2. Strengthening policy, institutional, administrative and legal frameworks:** Based on the evidence generated policy discussions need to be initiated among relevant agencies, including the MoE (as it coordinates climate change policies), MoLVT (as it coordinates migration policies), MoP (as it coordinates population control), Mol (in its capacity of reforming SNAs), and the NCDM (with its overarching role in disaster management). While on one level, these agencies focus on the issues directly within own their jurisdiction, other relevant issues such as urban development, social protection for vulnerable groups left behind in climate change affected areas, and diversification of rural livelihood could also be covered within their ambit.
- 3. Reinforcing operational and technical capacities:** Once a policy is prepared, a set of actions should be proposed. This report proposes that (a) the MoLVT be invited to prepare the CCSP and CCAPs, just as the other nine ministries and agencies have done; and (b) migration, as a cross-cutting issue, should be integrated into existing CCSPs and CCAPs, especially those relating to NCDM and SNAs.
- 4. Reduce pressure on climate sensitive areas by supporting local context based initiatives:** This will support livelihood diversification schemes, climate resilient infrastructure development, and to minimize instances of forced or distress environmental induced migration.
- 5. Facilitate temporary and circular migration schemes through protective, accessible and affordable legal migration channels:** Such mechanisms should be built on current and projected labour market dynamics and mismatches between sending and destination areas (either internal or cross-border).
- 6. Harness the potential benefits of labour migration in socioeconomic terms:** This can be achieved through improved access to formal remittance channels, facilitated investments on disaster risk reduction.
- 7. Planned relocation of communities:** This is a viable option in cases of irreversible damage in accordance with population's rights, socioeconomic needs and aspirations.

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# SECTION 3

**Case Study:**

**Vulnerabilities and Responses  
to Environmental Changes in the  
Tonle Sap Great Lake Area**

By Chea Chou



## INTRODUCTION

In the last 15 years, Cambodia has experienced significant migration from rural areas to urban areas, as well as to neighbouring countries, such as Thailand and Malaysia. This movement has emerged as an important trend in Cambodia's rural livelihood dynamics, especially for those communities in the Tonle Sap Basin. Various studies offer up different explanations for this migratory movement. Bellard et al., (2006), adopting a socioeconomic perspective, suggests that local livelihood and employment status are the main determinants of migration, while Keskinen et al. (2013), from a socioecological perspective, look beyond livelihood and attribute environmental changes, such as variation in rainfall and changes in the flood pulse system of the Tonle Sap Basin, as catalysts shaping the status of livelihoods in rural communities, and so the migratory patterns of these communities.

The link between household livelihood and the environment is obvious in Cambodia. With 80 per cent of its rural inhabitants relying on natural resources such as land, aquatic resources, and forest products to support their livelihoods (UNICEF, 2010; National Census, 2008), Cambodia is vulnerable to climatic events that affect these resources, and as such will undoubtedly continue to be affected by the ongoing trend of climate change (Ek, 2003).

The expected impacts of climate change will not be completely novel, rather they are likely to compound and multiply current environmental stressors. Cambodia already faces a multitude of environmental challenges such as deforestation, loss of biodiversity and ecosystems, land degradation, natural disasters such as floods and droughts, and water pollution (Ek, 2003) – all of which have a serious impact on the livelihood of rural households. However, the intensity of climatic events have increased in recent years. Cambodia is particularly prone to flooding, droughts, and windstorms – the frequency and intensity of these events have increased since 1989 when statistics began to be regularly recorded. The floods of 2000 and 2011 were amongst the worst in Cambodia's history, resulting in a high number of internally displaced people, hundreds of deaths, and large financial losses.

Research on the nexus between migration, the environment and climate change represents a relatively new paradigm from which to consider the impact of climate change, and with this an effort to empirically explore the consequences of climate change on people's livelihoods, especially in poor and vulnerable rural communities – in which migration has long been a livelihood strategy (Kniveton, Schmidt-Verkerk and al., 2008).

In 1990, the Intergovernmental Panel on Climate Change (IPCC) posited that "the gravest effects of climate change may be those on human migration". Since then, the volume of academic and policy publications about the link between climate change and migration has noticeably increased. In 2007, IPCC critically noted population movements as a key consequence of climate change. Paradoxically, however, the volume of the empirical studies on the link between the two has lagged behind. This is in part due to the conceptual complexity of establishing a link between the non-linear, multi-level, and multi-faceted processes of environmental/climatic impacts on migration; the many different approaches to studying climatic/environmental impacts at an individual, household, and/or community level; and the sophistication of human migration behaviours which cognitively link the behavioural decision-making processes at individual, household, and community level.

This study was developed taking into account the three main barriers identified above. The Tonle Sap Region was chosen as the area for study as a region particularly susceptible to environmental and climatic impacts, and due to the fundamental importance of its ecosystem in shaping the livelihoods of the rural communities.

<sup>12</sup>Environment is the sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage.

The four research questions for this study were:

**RESEARCH QUESTION 1:** To what extent do current and projected climate trends, climate variability and environmental changes contribute to shaping the livelihood dynamics of Cambodia's rural population?

**RESEARCH QUESTION 2:** How do Cambodia's rural communities respond to these changes in livelihood dynamics?

**RESEARCH QUESTION 3:** In what circumstances does migration appear to be a viable option in terms of a response to such dynamics?

**RESEARCH QUESTION 4:** What are the observable forms, profiles and outcomes characterizing these migration patterns?

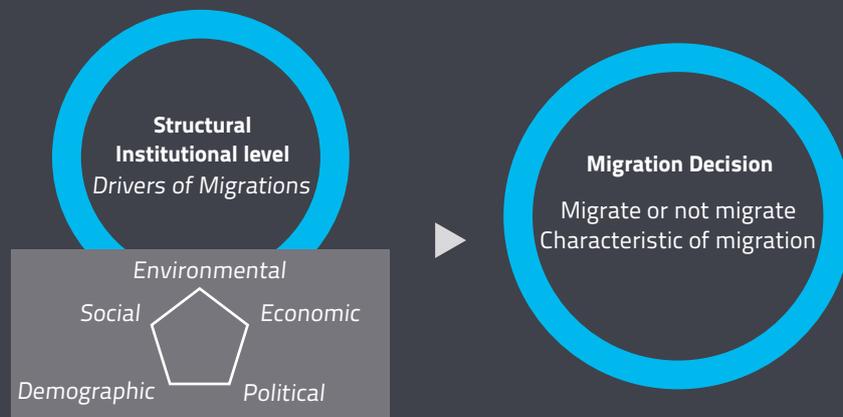
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## OPERATIONALIZING THE LINKAGES BETWEEN CLIMATE CHANGE, CLIMATE VARIABILITY, LIVELIHOOD AND MIGRATION – A THEORETICAL UNDERPINNING

As stated in Collinson (2011), migration processes are driven by complex and dynamic interactions of both direct and indirect environmental and non-environmental drivers, at and across multiple levels. Environmental drivers of migration are defined as changes in ecosystem services and exposure to hazards, while non-environmental drivers include political, economic, social, and demographic variables. The non-environmental drivers can either be influenced by environmental changes, or interact with environmental changes to affect migration flows.

Figure 4: Migration dynamics: the livelihood approach



Evidence from previous studies confirm that various levels of environmental degradation, including the impact of climate change<sup>13</sup> and climate variability,<sup>14</sup> do not directly lead to migration but do change the livelihood pattern of a household.

The study of the potential and observed impacts of climate change on all kinds of natural and social systems, including household livelihood systems, has evolved over the last three decades under the term "climate change vulnerability assessment" (CCVA). The concept of "vulnerability" has been defined in various ways in different disciplines. For example, Liverman (1990) equated "vulnerability" to concepts such as "resilience, marginality, susceptibility, adaptability, fragility, and risk"; Diley and Boudreau (2001) and Downing and Patwardhan (2003) defined vulnerability as the dose-response relationship between an exogenous hazard to a system and its adverse effects; and Dow (1992), Laikie et al. (1994), Adger and Kelly (1999) regarded social vulnerability as a prior condition of a household or a community that is determined by socioeconomic and political factors. The variety of definitions of "vulnerability" leads to inevitable critiques such as that by Timmermann (1981) who posited that the term was

<sup>13</sup> Climate change: A statistically significant variation in either the mean state of climate or in its variability, persisting for an extended period (typically 3 decades or longer) (IPCC glossary, Houghton et al., 2001; McCarthy et al., 2001)

<sup>14</sup> Climate variability: Variations in the mean state and other statistics (such as

standard deviation, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

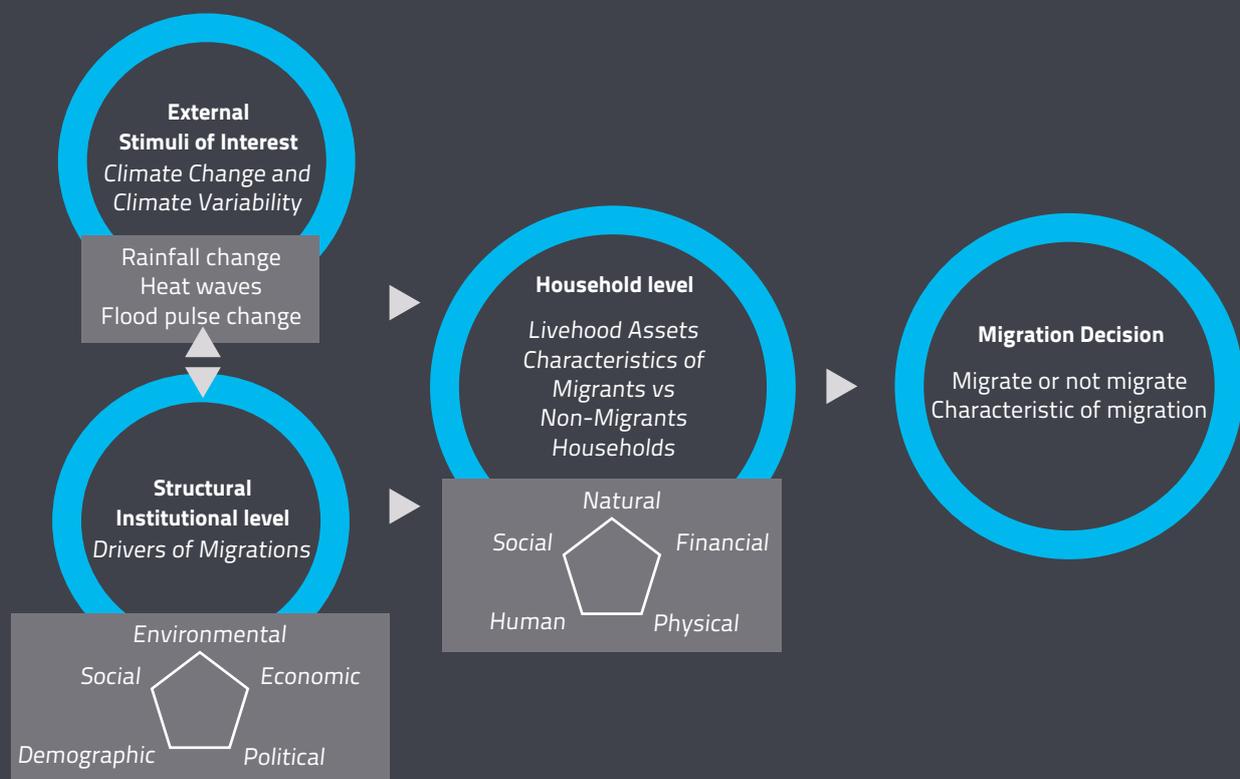
so broad in its use, as to be almost useless for careful description. In response to these critiques, the IPCC (Houghton et al., 2001; McCarthy et al., 2001) provided a more holistic and integrated definition of "vulnerability" in the context of climate change, as the degree to which a system is susceptible to, or unable to cope with adverse effects of climate change, including climate variability and extremes. Vulnerability was viewed as a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. According to this integrated view, vulnerability includes an external dimension of "exposure"<sup>15</sup> of a system to climate variations, as well as an internal dimension, which comprises its "sensitivity"<sup>16</sup> and its "adaptive capacity"<sup>17</sup> to external factors.

Vulnerability to climate change, as conceptualized here, is a broader concept than just the potential impacts of climate change, as determined in climate impact assessments. It includes additional non-

climatic factors such as social, economic, political, and demographic factors that are intertwined to determine the differing potential of communities or households to adapt to changing conditions. As Gewin (2002) noted, these non-climatic factors can affect the sensitivity of a system to climatic stimuli as well as its exposure. These drivers affect non-climatic factors such as the degree of economic diversification, the level of education, and strength of the social networks, and these in turn determine the sensitivity of a system or community to climate change. Hence, in studying the climate change and climate variability impacts on migration patterns, this study proposes to look at how these climatic variables affect the livelihood pattern of a household directly or indirectly by interacting with other non-environmental drivers of migration (see Figure 5).

As illustrated in Figure 5, the linkages between climate change and migration variables are not direct. At the macro structural level, climate change and climate

Figure 5: Conceptual model of the linkages between climate change, climate variability, livelihood and migration



<sup>15</sup> Exposure: The nature and degree to which a system is exposed to significant climatic variations.

<sup>16</sup> Sensitivity: The degree to which a system is affected, either adversely or beneficially, by climate-related stimuli.

<sup>17</sup> Adaptive capacity: 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—the ability to modify its characteristics or behaviour so as to cope better with changes in external conditions.

variability are seen to interact with various migration drivers, especially environmental drivers, to affect the choice to migrate or not, by changing the livelihood status of a household. Livelihood status operating at the household level, seen through the Sustainable Livelihood Approach (SLA) as livelihood assets, mediates the relationship between various migration drivers, including climatic drivers, and migration behaviour. These livelihood assets include natural, physical, financial, human, and social assets – which according to SLA are the main motives behind an individual's decision to undertake a migratory response in relation to stress and shock factors. Parallel with the rationale offered in New Economics of Labour Migration (NELM),

the key relevant insights in SLA are the observation that migration decisions are often made jointly by the migrant and a group of non-migrants (Stark and Bloom, 1985), usually family members who expect remittances in return for investment in the initial migration of a household member. Migration is thus not a strategy used to maximize individual income, but a means to diversify sources of household income and reduce risk (Arango, 2000). As such, it only makes sense to understand migration behaviour from a household-level perspective.

#### Box 1: Typology of livelihood assets in rural Cambodia

##### **\*\* Natural assets comprise agricultural land ownership and area, quality of the environment, land, water, natural resources, biodiversity, seasonality and location of livelihoods.**

1. Ownership of agricultural land and land sales: The amount of land owned by a family
2. Access to common pool resources (CPR): Environment, natural resources, and biodiversity including lakes, ponds, forest, fish

##### **\*\* Economic or financial assets**

1. Livelihood sources: Sources of livelihood and income including alternative and supplemental livelihood sources, such as agriculture, fishing, livestock, others
2. Access to productive assets
  - a. Technology: use of animals, rice mills, tractors, water pumps/wells, threshing machines, hand tractors, engine boats, others
  - b. Ownership of property other than land and houses: TV, karaoke machine, other assets
3. Remittances, bequests, inheritances, savings, access to and use of credit and financial capital

##### **\*\* Physical assets**

1. Housing: size, construction materials of the roof, walls and floors
2. Access to energy, clean drinking water and sanitation
3. Physical infrastructure such as roads/bridges, irrigation facilities, information and communication facilities
4. Physical mobility and means of transportation: oxcarts, motorbikes, bicycles, others

##### **\*\* Human assets**

1. Food
2. Health
3. Education
4. Human resource development and employment opportunities

##### **\*\* Social assets**

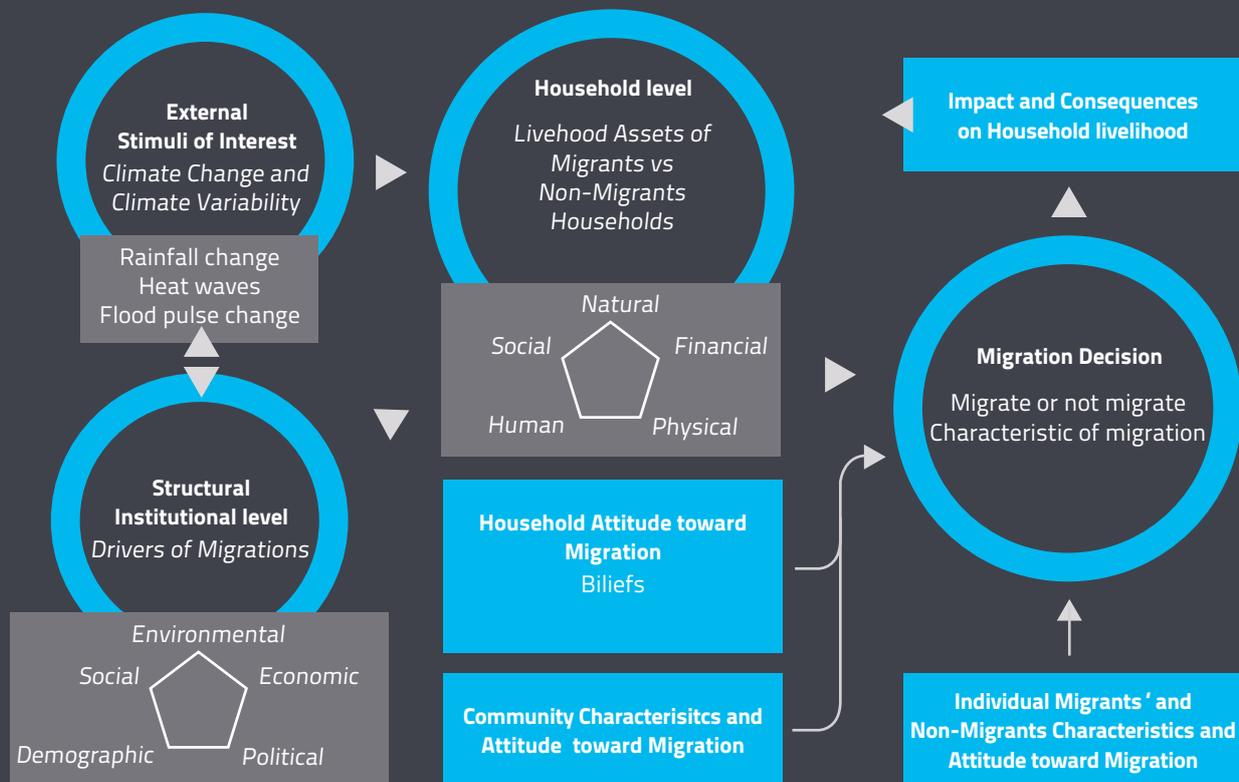
1. Household size, number and gender of income earners
2. Relationships within the community
3. Good governance within the community
4. Social networks and changes in family
5. Concerns over risks, vulnerability and violence
6. Migration history within the community

## UNDERSTANDING THE MIGRATION DECISION AS A HUMAN BEHAVIOUR

SLA assumes simple adoption behaviour by individuals, with no deeper understanding of the unique behavioural circumstances of each decision maker or collection of decision makers. While economic opportunities will no doubt affect an individual's wish to undertake migration as an adaptive response to climate stresses and shocks, the decision will also be influenced by deeper cognitive stimuli required to account for human bounded rationality (Kant and Thiriot, 2006). For example, deeper cognitive inputs such as an individual's attitude towards their current location, their intended destination, their ability to migrate, and the concept of actual migration will all be taken into consideration. Moreover, since climate change is an abstract concept, the simulation of migratory response of a community to it is effectively the modeling of people's perceptions to an abstract

phenomenon. The influence of unique cognitive responses and attitudes of individuals towards these manifestations is therefore of considerable importance in identifying the livelihood impact perceived to occur by individuals and the importance of these in their current existence. Lastly, SLA fails to consider the broader influence of community and family structures that may produce inequalities of power and influence within a group. Households are not conflict-free; but influenced by inter-generational obligations, gender and power imbalances (Waddington, 2003). In order to understand migratory behaviour, there is a need to look deeper than the household-level perspective of SLA.

Figure 6: Research conceptual framework



## 3.2 RESEARCH METHODOLOGY

### SITE SELECTION

Cambodia's Tonle Sap Basin was chosen for the current study due to its uniqueness in the Cambodian context, with close proximity to the Mekong River, direct or indirect contribution to the livelihood needs of at least 15 per cent of Cambodia's total population, high vulnerability to climate change, and established high out-migration patterns.

#### A. OVERALL DEMOGRAPHICS OF THE TONLE SAP BASIN

A total of 4.4 million people live in the wider Tonle Sap Basin (ADB, 2005). In the six provinces adjacent to the Tonle Sap Lake, up to 60 per cent of households are below Cambodia's official poverty line, and this figure is as high as 80 per cent in some locations (ADB, 2005). Two such provinces, Kampong Thom and Siem Reap, are the second and third poorest provinces with 52.4 per cent and 51.8 per cent of the population living below the poverty line, while the other three provinces, namely Banteay Meanchey, Pursat, and Kampong Chhnang have poverty rates higher than the national average (MoP, 2005).

The 2004 population growth rate in the Tonle Sap basin was 4.8 per cent, and this was significantly higher than the 1.8 per cent average growth rate for the rest of the country (NIS, 2004, cited in Heinonen, 2006). The livelihoods of communities in the Tonle Sap floodplains are principally based around fishing and rice agriculture, and utilizing natural resources from the lake ecosystem. Their livelihoods are in turn tied to the lake's flood regime (Keskinen, 2006; Lamberts, 2006; Mak, 2011; MRC, 2010a; Chantavanich, Middleton and Ito, 2013).

#### B. HIGH VULNERABILITY TO ENVIRONMENTAL AND CLIMATE CHANGE

The Tonle Sap Lake is connected to the Mekong River in Phnom Penh via the 120 kilometre long Tonle Sap River. At the onset of the annual rainy season in May or June, the Mekong River rises and water flows into the Tonle Sap Lake causing the lake's surface area to expand from 2,500–3,000 square kilometres to over 10,000–16,000 square kilometres, submerging the surrounding forests, shrubs and rice fields (ADB, 2005). The annual floods of the Mekong River is the main

driving force for the Tonle Sap flood pulse, extending the lake to the vast floodplains and bringing fertile suspended solids as well as fish larvae to the lake-floodplain system. Any environmental changes that impact on the Mekong River Basin have a direct impact on the Tonle Sap flood pulse system.

From a socioeconomic perspective, the Tonle Sap Lake and its floodplains form a vital resource for Cambodia, due to its unique flood pulse and huge fish productivity. This hydro-activity has been driving the development of communities in the area since the Angkorian era, circa 9th century. Today, the lake-floodplain system is a global biodiversity hotspot that supports a remarkable production of fish, rice, and other agricultural and wetland products. The Tonle Sap forms the basis for food security and livelihoods for millions of Cambodians. It is surprising therefore, that despite the country's impressive economic growth over the last few years and its apparent wealth of natural resources, the Tonle Sap region features some of the highest levels of poverty in Cambodia (Ballard, et al., 2007).

The environment and household livelihood of those who live in the Tonle Sap Basin are inter-connected. Generally, people living closer to the lake and on the flooded forests depend more on fishing and gathering activities, compared to those living further away whose main livelihoods are dependent on rice cultivation. This degree of dependency makes those who live in the Tonle Sap region susceptible to the environmental change which has occurred in the last decades. There are widespread reports of dramatic declines in fish and forest resources (WB, 2006), timber and non-timber forest products as landless and land-poor villages are cleared for other livelihood purposes, including the cultivation of agricultural crops. Population pressures (Keskinen et al., 2013) are higher in this region, than elsewhere in the country.

ADB (2004) findings revealed that natural disasters are one of the most difficult shocks to cope with on a community-wide basis. The impact of natural disasters on livelihood strategies are acute, often placing additional pressure on already limited resources. The World Bank (2006) identified covariant shocks, such as extreme floods and droughts, as sources of vulnerability that may push relatively wealthy

households into poverty and poor households into destitution. The impact of flooding can be extensive. In addition to spreading disease, flooding can adversely affect millions of people by causing crop failures and damaging infrastructure and property, such as houses and livestock. The impact of drought is also significant, as farmers rely heavily on rainwater and it can cause the yields of agricultural crops, including soy bean and rice, to fall dramatically in many areas of the country. Not only are there immediate impacts for local communities such as loss of livelihood assets, a decline in food security, and additional stresses and strains, but the longer term impacts such as the inability to adapt to livelihood strategies and changes in natural capital can be difficult to cope with.

### C. HIGH OUT-MIGRATION PATTERNS

Due to natural resource depletion, environmental degradation, and stagnant agricultural productivity, the poor are resorting to migration as an alternative means of livelihood. Out-migration has been concentrated in the agricultural and agro-fishery regions of Cambodia, areas which once attracted migrants from elsewhere in the country after the demise of the Khmer Rouge and as security improved in the 1990s. Over the last decade there has been a noticeable trend of out-migration into nearby countries such as Thailand, and into urban areas such as Phnom Penh in search of

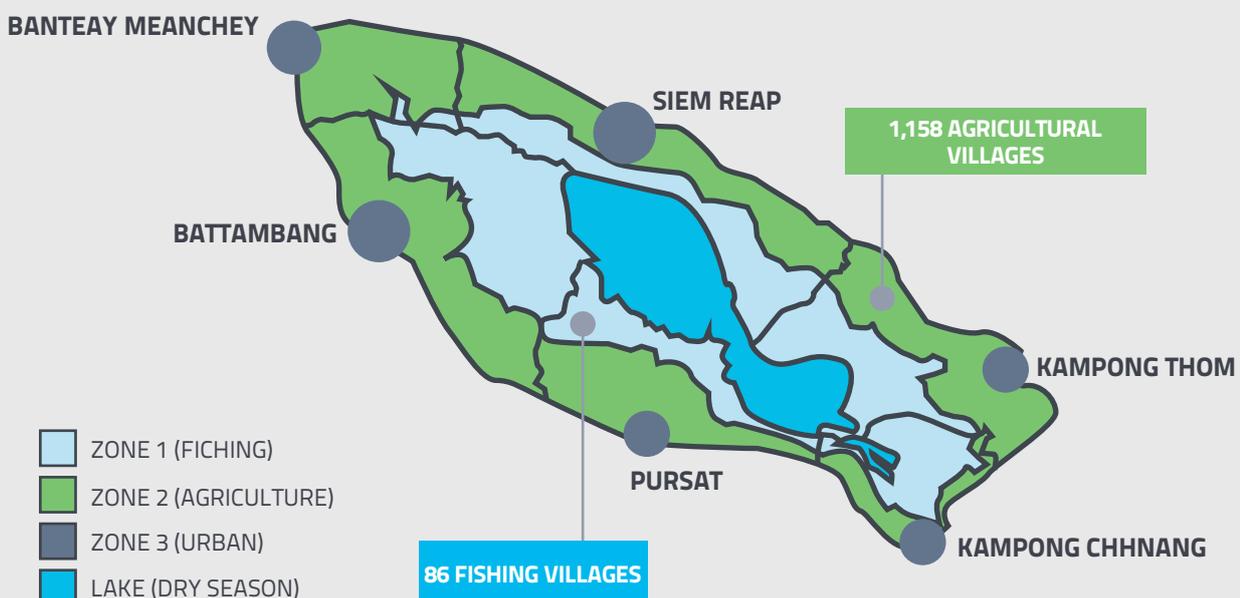
jobs. There is increasing anecdotal evidence of entire villages being transformed by families sending their daughters to work in the garment sector, and sons to towns to work in construction.

### DEFINING THE TONLE SAP AREA FOR THE STUDY

The Tonle Sap region covers Banteay Meanchey, Battambang, Pursat, Siem Reap, Kampong Chhnang, and Kampong Thom provinces. It is 60,707 km<sup>2</sup> and makes up 34 per cent of Cambodia's land mass. There are approximately 4.3 million inhabitants accounting for one-third of Cambodia's total population (Ballard, et al., 2007). For the purpose of the current study, the Tonle Sap area is defined as the area between National Roads 5 and 6, with a three kilometre buffer beyond the roads to include households and villages on both sides of the road (see Figure 7).

Researchers further divided the area into three distinct zones: Zone 1 represents a primarily fishing-based economy zone (5 per cent of population), Zone 2 a primarily agriculture-based zone (60%), and Zone 3 a urban zone (35%) (Keskinen & Rath, 2002; Keskinen, 2003, 2006). This study will only focus on Zone 1 and Zone 2. As of March 2008 (the enumeration date of Population Census 2008, carried out by the NIS and covering all households in entire Cambodia) around 1.7 million people were living in 1,555 villages within

Figure 7: Map of the Tonle Sap Great Lake area



the study area. Out of these people, 51.3 per cent were female, and the average population growth from 1998 to 2008 was 14 per cent and the annual average was 1.4 per cent, with the fastest growth occurring in the urban zone, particularly in Siem Reap. There are 1,158 villages within the agricultural zone, with an average of 889 households per village, and 86 villages within the fishing zone, with an average of 982 households per village. Two villages for Zone 1 and two villages for Zone 2 were selected for the study.

## METHODS

To address the research questions, a mixed method approach was employed. Key informant interviews were held at the national, provincial, district and commune levels with experts in areas of climate variability, livelihoods, and migration. Besides such key informant interviews, three main research tools were used:

1. Multi-stakeholder workshop (MSW)
2. Participatory rural appraisal (PRA)
3. Household survey (HHS)

### Multi-stakeholder workshop (MSW)

As a means to balance the lack of data on migration and climate trends, a bottom-up consultative process was organized in order to refine the selection of the target communes and villages in the Tonle Sap Basin. Two multi-stakeholder workshops at the provincial levels were organized to seek inputs to the study. In total, 58 experts from three provinces bordering the Tonle Sap Lake area attended the provincial consultation in Battambang City, and 60 experts from the other three provinces of the Tonle Sap Lake area attended the consultation workshop in Kampong Thom City.

A comprehensive questionnaire was developed to guide the consultation, taking into account the diverse profiles and fields of expertise of the expected participants, including central and provincial officials from the National Committee for Disaster Management, the Ministry of Environment, the Ministry of Women Affairs, the National Committee for Subnational Democratic Development, Ministry of Water Resources and Meteorology, Ministry of Agriculture, Forestry, and Fishery, Ministry of Planning, Ministry of Labour and Vocational Training, Ministry of Rural Development, representatives of district and commune authorities, local community-based

organizations and international non-governmental organizations.

The first session of the discussions entitled "Environment and Climate Change" was designed with the objectives of enumerating the climate stimuli observed in the target areas, distinguishing human-induced environmental degradation from climate variability and climate change related effects, as well as measuring the incidence and impact of extreme weather events.

In doing so, the session sought to pre-identify key climatic variables to be used as proxies for further analysis. The second session entitled "Livelihood" was aimed at determining the socioeconomic profile of the communities, listing the main income-generating activities performed by rural households and the most critical resources that support local livelihoods. Moreover, this session also sought to outline the most significant changes and trends affecting those resources over the last three decades, in light of their availability, accessibility and effective use and the livelihoods strategies employed at various points of the year in times of food shortages, in context of livelihood crisis or economic shocks. The third session was spent discussing the broad evolution of key economic, demographic, political and social factors among rural communities and their potential influence as migration drivers. The fourth session was set up to better understand the process of migration (historical overview, analysis of socioeconomic context of migration, existence of migration policies at Subnational levels), questioned the perceived impact of migration on the overall development of the rural zones, and assessed the differences between those who left and those who stayed. The last session was used to do stakeholder mapping.

### Participatory Rural Appraisal (PRA)

The overall aim of PRA is to enable local people to express the realities of their lives and the conditions that they live in. The PRA method complemented the HHS by asking interviewees open questions that are subject to more detailed and in-depth answers, which would help the research team to better understand the dynamics between climate change, climate variability, livelihood, and migration.

PRA were conducted in the four selected villages. In each village, a minimum of two PRA sessions were conducted per day, each session lasting two or three hours. Participants were identified based on the knowledge of the village chief or other local leaders, and on the results of the transect walk and wealth ranking exercise. A snow-ball sampling for pre-selection was added if necessary to ensure that gender and vulnerability were sufficiently incorporated in the research.

PRA tools used included transect walks, resource mapping, livelihood risk ranking, trends analysis, seasonal calendar, Venn diagrams, mobility mapping, impact diagram, and ranking of coping strategies. Focus group discussions with youths and young adults were also used to identify both their perceptions and understanding of their livelihood in their community, migration and their future plans (see table 7).

Table 7: Participatory rural appraisal tools

#	PRA method	Description	Target groups	No. of session
1	Transect walk, resource mapping and wealth ranking	Understanding the general governance mechanisms and socio economic trends in the target communities (assessment of topography, land type, land usage, ownership, access, soil type, soil fertility, vegetation, crops, and key issues) – Drawing of a social map focusing on habitation, community facilities, roads, temples, etc., and of a resource map focusing on the natural resources of the locality and depicts land, hills, rivers, fields, vegetation, etc.	Local experts: village authorities, leaders of local associations, elderly	1
2	Timeline of important events - both climatic and non-climatic	Listing of the major past events as perceived and recalled by the participants	Local experts: village authorities, elderly	1
3	Venn Diagram on local livelihood status Livelihood risk ranking and impact diagram Ranking of coping and adaptation strategies Seasonal calendar	Listing of the major past events as perceived and recalled by the participants Depicting the anticipated changes as perceived by the local people Listing the ways people cope with or adapt to certain risks and how those strategies are evaluated by the people themselves. Providing temporal analysis across annual cycles, with months and seasons as the basic units of analysis.	Mixed groups of male farmers and non-farmers; mixed groups of female farmers and non-farmers; group of vulnerable community members	3
4	Mobility mapping	Depicting mobility patterns of an individual, a group or the community (destination, motivations, frequency, distances)	Migrant households: 1 group of female headed and 1 group of male headed households	2

## Household Survey (HHS)

In an effort to generate more quantitative data, information from 301 households in four selected study villages was systematically gathered using a standardized questionnaire. The indicators covered in the questionnaire included the socioeconomic status of the households, land availability and utilization, family income-generating activities, sensitivity of production systems to climate variability, major livelihoods and income, aspects of different livelihood assets, coping strategies during stressful times, migration of family members, remittances, and their influence on livelihood dynamic within the locality.

The selection of households was based on stratified random sampling to ensure that a representative sample was chosen, and sub-populations within the selected villages were included in the sample. First, the study distinguished between the two livelihood zones of the Tonle Sap Basin. Second, as the study was

designed to study migration trends within each zone, researchers were required to distinguish between migrant and non-migrant households. Third, based on the results from the PRA sessions, researchers decided to split the household categories within each village into four socioeconomic categories: rich, average, poor, and extremely poor, and then approached migrant and non-migrant households in each of these categories. These categories were used to divide the population of interest into sub-populations and this formed the sampling frame of the study from which an average sample size of 72 households per village was chosen.

All data from the interviews were entered into the SPSS code book file for analysis.

## 3.3 KEY FINDINGS

### SECTION 1: INTRODUCTION TO THE STUDY

#### A. THE FISHING VILLAGES

Kampong Chamlang and Pat Sanday, located in the north-eastern part of Kampong Thom Province, were the two floating villages selected for the study. The villages' demographic, economic, social, and environmental data at the village level as of December 2010 are set out in Table 8.1.

Table 8.1: Socioeconomic profile of Kampong Chamlang and Pat Sanday villages (Cambodia Commune Database, accessed in December 2014)

Village	Kampong Chamlang	Pat Sanday
Habitants	1,176	794
Distance from village Centre to the nearest road	12 km	15 km
Distance from village Centre to the nearest market	4 km	10 km
Percentage of total illiterate people between 15-60 years	16.4%	28.4%
Percentage of families without their own latrine	Data unavailable	100%
Percentage of families without their own source of potable water	Data unavailable	100%
Percentage of families using chemical fertilizer	0%	0%
Percentage of families using chemical pesticides	99%	0%

Kampong Chamlang village is located on the Mekong River. The distance from the village Centre to the nearest road is 12 kilometres, and it takes approximately 60 minutes to travel between the two places. The well-being analysis of the village conducted for the study shows that 235 households shared the village. People here are highly dependent on fishing for their livelihood. Approximately 95 per cent of the population are fishermen, with majority relying on medium sized boats for fishing. Other livelihood activities include petty trading (10%), tailoring (2%), and household plantation such as growing corn and pumpkins (10%). Almost half of the households are reported as having average socioeconomic status, while the rest are reported as being poor.

Fishing tends to be male-dominated, with the majority of men working as fishermen while women working remain home to take care of the household, with some engaging in petty trade. Fishing is a livelihood that can be worked at throughout the year, with a peak season in January and February. According to the Law on Fisheries 2006 (RGC, 2006), fishing is restricted between June and October because that is the time that fish reproduce, although subsistence fishing is still allowed.

Table 8.2: Seasonal calendar in Kampong Chamlang

Events	Months												
	1	2	3	4	5	6	7	8	9	10	11	12	
Rainy Season													
Dry Season													
Fishing													
No Fishing allowed													
Heavy Fishing Planting Season													
Planting Season													
Small Trade (10%)													
Tailoring													
Strong Wind													
Floods													
Drought													
Pest													
Migration													

## B. THE AGRICULTURAL VILLAGES

Bak Amrek and Andong Trach are the two agricultural villages in Battambang Province selected for the study. Andong Trach village is located in Kampong Preah commune, and Bak Amrek is located in Ek Phnom commune. The villages' key figures on demographic, economic, social, and environmental data at the commune level and the village levels (Table 8.3) as of December 2010 are set out on next table.

Table 8.3: Andong Trach and Bak Amrek – socioeconomic profile

Village	Andong Trach	Bak Amrek
Habitants	1,577	1437
Distance from village Centre to the nearest road	1 km	10 km
Distance from village Centre to the nearest market	12 km	8 km
Percentage of total illiterate people between 15 – 60 years	11.3%	5.3%
Percentage of families without their own latrine	31.4%	69.2%
Percentage of families without their own source of potable water	92.5%	93.1%
Percentage of families using chemical fertilizer	42.7%	71%
Percentage of families using chemical pesticides	39.7%	71%

Bak Amrek village is located 32 kilometres from its provincial office. The well-being analysis of the village shows that there are 304 households and a population of 1,522, 764 of whom are women. It is situated on 298.27 hectares of land, 260 hectares of which is agricultural land, 0.27 hectare of ponds and the rest used for residential purposes. Approximately 90 per cent of people in Bak Amrek Village are farmers, and other livelihood activities include fishing, raising livestock, collecting non-timber forest products, petty trading, and labouring. About 60 per cent of the households reported having average socioeconomic status, 30 per cent poor, and the other 5 per cent were either rich, or very poor. The criteria of each socioeconomic group is detailed in table 8.4

Table 8.4: Bak Amrek households' socioeconomic status

Criteria	Socioeconomic status of the households in the village			
	Rich families (8 HHs)	Average families 191 HHs	Poor families (91 HHs)	Very poor families (14 HHs)
Food security	Have food to eat year round and surplus for selling	Have food to eat 8 to 9 months a year from crop production and earn additional income from selling own labour	Have food to eat 4 to 5 months a year from own crop production and earn additional income from selling own labour	No food from own crop production – just get it from others or from selling own labour
Agricultural land	1 to 6 hectares	Below 2 hectares	2 or 3 Ares	None
Livestock	3 or 4 cows	1 or 2 cows	None	None
Residential land	10 – 25 metres	10 – 15 metres	4 – 7 metres	None
Debt	Provide loan to villagers with 4 – 5 per cent interest per month, but no collateral is required for people from the same village	Borrow from the rich or from the microfinance institutions; these people make up the credible group of loan	Only some of these people are credible enough to get loans from the rich, but most do not dare to borrow as they are unable to repay	Are unable to get a loan
Materials	Car, motorbike, tractors, TVs, cell-phones, milling machines.	Motorbike, tractors, TVs, cell-phones	Old motorbikes, bicycles, old clothes, old kitchenware	Only old kitchenware

### C. BACKGROUND CHARACTERISTICS OF SURVEY RESPONDENTS

A total of 301 households were interviewed for the household survey, of these 151 households were located in the villages in the fishing zone, and 150 households in the villages in the agricultural zone. The respondents were an even mix of migrant and non-migrant families. Most of the respondents were women (75.3%), an unbalance which may constitute one of the limitations of the study findings. The respondents' ranged from 14 to 91 years of age, with the average being 46 years of age. All respondents were Cambodian, and were Buddhists. The details of the selected households and respondents are presented in Table 8.5.

The respondents were fairly evenly split between average and poor socioeconomic status, with rich and very poor households making up less than 5 per cent of respondents. In the fishing villages, a family is defined as rich when they have houses made from wood, their

houses are furnished, have one or more motor boats. Households who are average have houses that are well maintained, and have one motor boat or several non-motorized boats. Households that are defined as poor have houses that require repair or appear run down, and have one non-motorized boat, while the poorest households lived in very run down houses and own old non-motorized boats.

In agricultural villages, a household is defined as rich if they own between two and six hectares of agricultural land. A household is defined as average if they own less than two hectares of farmland. A family is defined as poor if they own two or three ares of farmland. A very poor family owns no farmland. (see table 8.5 on next page)



Table 8.5: Key characteristics of survey households and respondents

Characteristics	Fishing zone		Agricultural zone		Total
	Kompong Samlang	Pat Sanday	Bak Amrek	Andong Trach	
Household interviewed	73	78	76	74	301
	100%	100%	100%	100%	100%
<b>MIGRATION STATUS</b>					
Migrant	33	38	37	37	145
	45.2%	48.7%	48.7%	50.0%	48.2%
Non-migrant	40	40	39	37	156
	54.8%	51.3%	51.3%	50.0%	51.8%
<b>SOCIOECONOMIC STATUS</b>					
Rich	2	2	2	3	9
	2.6%	2.6%	2.6%	4.1%	3.0%
Average	30	29	39	39	137
	41.1%	37.2%	51.3%	52.7%	45.5%
Poor	38	43	33	30	144
	52.1%	55.1%	43.4%	40.5%	47.8%
Very poor	3	4	2	2	11
	4.1%	5.1%	2.6%	2.7%	3.7%
<b>RESPONDENT'S STATUS</b>					
Head	40	48	25	19	132
	54.8%	61.5%	32.9%	25.7%	43.9%
Spouse	31	23	45	53	152
	42.5%	29.5%	59.2%	71.6%	50.5%
Other	2	7	6	2	17
	2.7%	9.0%	7.9%	2.7%	5.6%
<b>RESPONDENT'S BIOLOGICAL SEX</b>					
Male	30	12	16	16	74
	41.1%	15.4%	21.1%	21.9%	24.7%
Female	43	66	60	57	226
	58.9%	84.6%	78.9%	78.1%	75.3%

Note:

1. Respondent's average age: mean=46; min=14; max=91.
2. Household average size: mean=5.

## SECTION 2: CLIMATE PATTERNS AND CLIMATE VARIABILITY

This section outlines the respondents' perceptions of climate change and climate variability within the last 30 years in both the fishing and agricultural villages.

### A. THE FISHING VILLAGES

Results from the provincial workshops, PRA sessions, and the household surveys show that the five main perceived changes in climate affecting the fishing villages include:

1. Increased frequency of heavy rains and severe floods
2. Strong abrupt winds, which usually follow heavy rains
3. Increased frequency and duration of drought
4. Significant increase of heat
5. Increased dangerous lightning

Table 9.1: Major climatic events reported in the fishing villages in the last 30 years

Important climatic events	Timeline within the last 30 years			
	1979 – 1990	1991 – 2000	2001– 2010	2011 – 2015
Floods	Two big floods in 1988 and 1989 destroying houses and boats	One big flood	- One big flood in 2006 - Migration started in the early 2000's	- Big floods almost every year, followed by strong abrupt winds and lightning - Temperature of water can drop very low - Lack of clean water - Decreased fish yields - Out-migration continued
Droughts	Very rare	Very rare	Droughts more common	- Prolonged more frequent droughts - Increased temperature in water
Windstorms	No storms	No storms	Ketsana storm 2009 killed people, animals, and destroy houses	Strong abrupt winds becomes very common
Temperature	Very good	Very good	Temperature started to change can be very hot or very cold	Increased temperature and prolonged very hot days and very cold days
Lightening	Normal	Normal	Dangerous	Dangerous

As shown in the above timeline, the fishing villages have experienced floods every year since 1979, but the nature and intensity of floods had changed remarkably within the last five years. Only one or two big floods were observed within a 10 year timeframe prior to 2011, but since then big floods have hit the villages annually, and with them accompanying strong abrupt winds and lightning. Respondents reported that houses, boats, and fishing equipment were blown away, fishermen drowned or hit by lightning, and as a result migration started and/or continued.

Table 9.2 : Perceived exposure to climate variability and other environmental factors

Characteristics	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non migrant	
Droughts	52	56	46	48	93	110	202
	71.2%	72.7%	60.5%	64.9%	64.6%	70.1%	67.4%
Floods	66	70	62	66	130	135	264
	90.4%	90.9%	81.6%	89.2%	90.3%	86.0%	88.0%
Rainfall change	38	45	38	47	82	87	168
	52.1%	58.4%	50.0%	63.5%	56.9%	55.4%	56.1%
Windstorms	64	59	29	25	81	97	177
	87.7%	76.6%	38.2%	33.8%	56.3%	61.8%	59.1%
Landslides	0	0	2	3	1	4	5
	0.0%	0.0%	2.6%	4.1%	7.0%	2.6%	1.7%
Temperature change	48	54	32	37	82	90	171
	65.8%	70.1%	42.1%	50.0%	56.9%	57.3%	51.7%
Deforestation	40	48	25	19			132
	54.8%	61.5%	32.9%	25.7%			43.9%
Water pollution	28	23	11	1	33	30	63
	38.4%	29.9%	14.5%	1.4%	22.9%	19.2%	21.0%
Air pollution	3	0	6	0	3	6	9
	4.1%	0.0%	7.9%	0.0%	2.1%	3.8%	3.0%
Soil pollution	6	3	19	21	21	29	49
	8.2%	3.9%	25.0%	28.8%	14.6%	18.6%	16.7%
Animal epidemics	1	2	15	10	19	9	28
	1.4%	2.6%	19.7%	13.7%	13.2%	5.8%	9.3%
Human epidemics	6	2	16	5	12	18	29
	8.2%	2.6%	21.1%	6.8%	8.3%	11.5%	10.0%

The perception of all respondents from the fishing village household surveys is that there have been changes in the climate and environment around them (Table 9.2). Almost all of them experienced floods (over 90%) and increased occurrence of windstorms (over 80%). The other climatic events experienced by households in the fishing villages were droughts (72%), change in rainfall (55%) and change in temperature (51%).

PRA respondents revealed that over the last 5 or 10 years, heavy rains, flooding, and specifically the feared strong and abrupt winds and lightning have posed a new and more serious danger to their lives and livelihood.

Some respondents reported that the strong winds that accompanied the heavy rains between July and October often destroyed fields, crops, houses, boats, and claimed lives. A 67-year-old fisher-woman explained:

"Floods are heavy rains which are almost always followed by strong winds. And these really kill our livelihood. Our houses were blown away, our boats were submerged, and our lives were at stake. Several of my neighbours got lost in the water in times like this, and we now are very afraid of water – that provides our livelihood."

Similarly, droughts did not pose much of a problem to the fishing villages until approximately 10 years ago, situation that changed due to a reported increase in temperature. April used to be the hottest month in the Tonle Sap provinces, but now it is difficult to say which month is hottest. Respondents claimed that from February it begins to get very hot, and that with higher temperatures and less flooded forest cover, heat is absorbed into the river, making the water hot and affecting fish survival.

"Within the last several years, the temperature gets very high. This makes the water become so hot and the fish die. So, we, fishermen, living in these floating houses find it very difficult to fish and survive," said a 52 year-old man in our PRA session.

Cambodia's annual average temperature is 27 °C (MoE, Cambodia, 2010). Over the last 50 years, Cambodia has experienced an increase in average temperature at a rate of 0.1 to 0.3 °C per decade, as well as changes in temperature extremes such as heat waves, increased numbers of hot days and warm nights, and a decrease in the number of cold days and cold nights. Alarming, Cambodia's temperature may increase by up to 1.35 to 2.50 °C by 2100. However, data from Table 9.4 show that very few of the respondents (only between one and three respondents) perceived the impacts of this change in temperature on crops, fish, livestock, or other vegetation.

## B. THE AGRICULTURAL VILLAGES

Results from the provincial workshops, PRA sessions, and household surveys show that the main perceptions of the changes in climate in the agricultural villages include:

1. Increased frequency of extreme weather events, such as floods, droughts, strong abrupt winds
2. Shift in duration and timing of dry season, to a dryer and longer dry season
3. Shift in rainfall pattern, to one of greater variability and less predictability
4. Increased temperature

All respondents in the agricultural village household survey perceived changes in the climate and environment around them (Table 9.3). Most of them observed a higher frequency of extreme weather events such as river and flash floods (over 80%), droughts (over 60%), and strong winds (over 30%). More than half the respondents also perceived temperature and rainfall changes. Of note, was that non-climatic environmental factors such as deforestation, water pollution, and soil pollutions were not identified by household survey respondents as impacts on their livelihood, but they were identified in the provincial workshops and PRA.

Table 9.3: Major climatic events reported in the agricultural villages in the last 30 years

Climatic events	Timeline within the last 30 years			
	1979 – 1990	1991 – 2000	2001– 2010	2011 – 2015
Floods	One big flood in 1989	Two big floods in 1996 and 2000	Many big floods	Big floods almost every year
Droughts	Big drought in 1981 and 1983	No big droughts	No big droughts	Big droughts almost every year
Strong abrupt winds	Very rare	Very rare	Droughts more common	Prolonged more frequent droughts
Windstorms	No	No	No	Strong abrupt winds every year followed the heavy rains
Lightning	Normal	Normal	Dangerous	Dangerous
Temperature	Not too cold not too hot	Not too cold not too hot	Increased heat and cold temperature	Prolonged cold days and hot days

Table 9.4: Reported impact of climatic events on households' livelihoods

	Crops	Fishing	Livestock	Home garden
Droughts	77	106	42	58
	81.9%	59.6%	48.8%	82.9%
Floods	5	10	1	1
	5.3%	5.6%	1.2%	1.4%
Rainfall change	4	11	0	2
	4.3%	6.2%	0.0%	2.9%
Temperature change	1	2	1	3
	1.1%	1.1%	1.2%	4.3%
Windstorms	0	1	0	0
	0.0%	0.6%	0.0%	0.0%

Table 9.4 shows that, roughly 80 per cent of those in the agricultural villages noticed an increase in floods, however, its impacts on fish, crop, and livestock production were only felt among 5 per cent of respondents (Table 9.4). This is in line with the results from PRA and provincial workshops. The qualitative interviews revealed that respondents in the agricultural zone saw floods as both negative and positive, while respondents in the fishing villages saw the increase in floods as dangerous and of opportunity in terms of livelihood. When asked about floods during the PRA, a 62 year-old farmer explained:

"Floods destroyed our crops, sometimes our houses, and even our lives. But this is because of its magnitude right now. We live here in the floodplains. Floods are part of our lives. It is not totally negative. They help wash our soil from those polluting chemical fertilizers and bring in fertility to our soil... If we human didn't cut the forest; if we didn't suffocating our earth mother... floods would be more positive to us as farmers."

Floods are one of the most significant natural hazards in Tonle Sap Basin, due to its surrounding mountainous terrain, rivers and their tributaries. They are triggered by various phenomena, the most common being a combination of heavy precipitation and poor drainage. However, respondents link the increase in severe floods to the thinning of the country's forest cover. PRA and workshop participants describe the strong winds that accompany floods as a new phenomenon attacking their villages, over the last five years.

Approximately 60 per cent of respondent farmers noticed an increase in droughts, however its risk is difficult to quantify as droughts can occur anywhere and vary in intensity, duration, and spatial extent. A droughts affect on agriculture is complex, as it is difficult to separate the accompanying phenomenon of the crop disease, animal disease, or pests from the impact of the drought itself. Household surveys indicated that 80 per cent of all respondents see droughts as the main catalyst in destroying or lowering the yield of crops and vegetation, and around 50 per cent see it as contributing to a decrease in fish yield and livestock productivity. PRA respondents described their crops as being vulnerable to pests and disease during drought as a result of an increase in temperature and higher evapo-transpiration and reduced soil Moisture.

More than half of respondents perceived a change in rainfall patterns over the past 10 to 15 years (Table 9.4), with more droughts, longer dry spells during the rainy season, heavier rainfall and more extreme weather events. During the PRA discussions, people claimed to have observed changes in the timing, amount, and intensity of rainfall over the years. A participant in one PRA session in Andong Trach village said "Rainfall now is unpredictable. It stops when it is needed and rains when it is not needed". People complained that at a critical stage of the crop cycle, there was either no rain or too much rain, and that this was detrimental to plant growth and crop yields. They also claimed that the rainy season, which used to start in June, has now shifted to late April or May. During one seasonal calendar PRA session in the agricultural zone, a respondent explained,

"Rainfall was very favorable in the last 10 to 15 years compared to today. One could know when to start their crops so that they have enough water for their plants. At that time, even we cultivate small land, we could harvest a lot. Today, the rainfall is very unpredictable; we would rather farm larger land sizes and harvest little. We are now struggling hard."

"Many years ago, things were better. We knew when the rain would start or end. But now, nobody knows. It keeps changing from year to year. Things just don't happen as they used to. It's hard to understand why."

Similar to the responses from the HHS and the PRA sessions, workshop participants at the provincial

level also agreed that significant changes have been observed in all the provinces along the Tonle Sap. Both the average amount of annual rainfall and the number of rainy days has decreased, but there was a significant increase in intense rains and floods. They also identified the changes to the onset of the rainy season, its intensity, and length. According to one official from the Provincial Department of Agriculture in Battambang Province, the rainy season used to begin in late May or early June and continue until October, with a small 10 to 15 day dry spell in late July or early August. Nowadays, he claims that the rainy seasons starts as early as April and the dry spell could be very long, with the rain resuming and continuing as late as November or December. In short, it is becoming increasingly difficult to predict the onset and end of the rainy season, as well as its accompanying dry spell. These changes directly affect the start of the planting season and the agricultural cycle. Some farmers sow early, some sow late, and others sow different fields at different times to mitigate the risk, and – depending on the rainfall patterns, soil fertility and sunshine – yields can be good or bad, with little predictability.

### SECTION 3: CLIMATE, LIVELIHOOD ACTIVITIES/STATUS, AND LIVELIHOOD RESPONSES

This section presents (a) the main sources of livelihood of households in the study area (agriculture, fishery, and livestock production) and changes over time; (b) how climate change and climate variability contribute to this change; and (c) how different households respond to the livelihood challenges posed by the climatic and non-climatic factors. It focuses on answering RQ1 and RQ2 by taking the respondents' perceptions of climatic events and rural livelihoods within the last 30 years, together with their change catalysts, in both the fishing and agricultural villages by both migrant and non-migrant families.

#### A. LIVELIHOOD ACTIVITIES AND LIVELIHOOD STATUS

Households in the fishing zone are almost solely dependent on subsistence fishing, whereas those in the agricultural zone are largely dependent on subsistence agriculture, fishery, and livestock rearing.

Table 10.1: Main livelihood activities of the surveyed households

Characteristics	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Farming	3	2	49	57	54	58	111
	4.1%	2.6%	66.2%	79.2%	37.5%	37.7%	37.6%
Fishing	63	70	46	58	115	123	237
	86.3%	89.7%	67.6%	82.9%	82.1%	82.0%	82.1%
Livestock	6	4	35	69	61	54	114
	8.3%	5.3%	49.3%	97.2%	42.7%	36.5%	39.5%
Home gardening	20	20	36	41	68	49	117
	27.4%	26.3%	83.7%	85.4%	56.2%	41.2%	48.8%

Table 10.2: Main sources of income

Characteristics	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Farming	3	2	49	57	54	58	111
	4.1%	2.6%	66.2%	79.2%	37.5%	37.7%	37.6%
Fishing	63	70	46	58	115	123	237
	86.3%	89.7%	67.6%	82.9%	82.1%	82.0%	82.1%
Livestock	6	4	35	69	61	54	114
	8.3%	5.3%	49.3%	97.2%	42.7%	36.5%	39.5%
Home gardening	20	20	36	41	68	49	117
	27.4%	26.3%	83.7%	85.4%	56.2%	41.2%	48.8%
Wage labour	1	0	1	1	3	0	3
	1.4%	0.0%	1.3%	1.4%	2.1%	0.0%	1.0%
Remittances	3	1	16	17	36	1	37
	4.1%	1.3%	21.1%	23.0%	24.8%	0.6%	12.3%
Other	13	10	44	33	54	47	100
	17.8%	12.8%	57.9%	44.6%	37.2%	29.9%	33.4%

### The fishing villages

Results from the household survey (see Table 10.1 and Table 10.2) show that approximately 90 per cent of the respondents living in the two fishing villages are employed in fishery, with half of them relying on traditional boats and methods for fishing, and the other half able to afford a small or medium-sized motor boat. All of them live in floating houses, which are able to be moved from one place to another depending on the level of water in the village. For example, during the dry season, villagers may transport their houses onto land because the water conditions can be extremely polluted and smelly with the shallow river and dumping of waste in the river. When there are very strong winds and heavy rains, villagers can move their houses to nearby forests for protection.

Less than 5 per cent of these households have land to grow pumpkins and corn, or received income from other sources like livestock rearing and remittances. As the two villages surveyed are located in the water, their livelihood is hard to diversify and very few changes have occurred in this regard as a result of changing climate conditions. The high dependence of these villages on water rendered most fishing households highly vulnerable to the environmental conditions

in which they live. The main challenges they faced in the last 5 or 10 years were heavy rains and strong winds, increased heat, droughts, and pests. One of our PRA respondents, a 56-year-old man said:

"Now, we have floods almost every year, so it's hard for us to go fish.... The winds within the last 5 years have been so strong. The waves were so big and we dared not go fish or our boats would be submerged. We might also die. That's not uncommon here. We also need to move our houses adjacent to the flooded forest...or the winds would blow it away or destroy parts of it.... This is what we experience in rainy season. But in the dry season when it's hot, it's too hot and the hot water made fish die.... Before fishing was quite productive but now we fish one day just for one day. There seem to me no moderation in our nature now – only the extreme ones."

The dissatisfaction expressed by this man with the current state of his livelihood, is supported by the survey data shown in Table 10.3. Around 60 per cent of respondents said that currently their livelihoods were worse than they were 10 or 15 years ago.

Table 10.4 shows that around two-thirds of the surveyed households in the fishing zone faced food shortages for a portion of the year, less than one-fifth were able to meet their monthly expenses and have some income left, and another one-fifth had only enough to cover their expenses with nothing left over.

PRA sessions and interviews with village chiefs and commune chiefs revealed that the decreased fish catch over the last 15 years, combined with increased

food prices in the market are the two main reasons for the current poor livelihood status in the fishing zone.

Fishermen in the floating villages complained there were insufficient fish to secure their households throughout the year. As shown in Table 10.3, about two-thirds of these households were more satisfied with their livelihood in the past.

Table 10.3: Households' evaluation of their current livelihood status

Characteristics	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
<b>OVERALL LIVELIHOOD SATISFACTION</b>							
Strongly satisfied	2	0	3	0	0	5	5
	2.7%	0.0%	3.9%	0.0%	0.0%	3.2%	1.7%
Satisfied	21	40	19	29	55	54	109
	28.8%	51.3%	25.0%	39.7%	37.9%	34.6%	36.2%
Both	23	18	23	32	49	48	96
	31.5%	23.1%	30.3%	43.8%	33.8%	30.8%	32.2%
Dissatisfied	23	20	23	12	35	43	78
	31.5%	25.6%	30.3%	16.4%	24.1%	27.6%	25.9%
Strongly dissatisfied	4	0	8	0	6	6	12
	5.5%	0.0%	10.5%	0.0%	4.1%	3.8%	4.0%
<b>COMPARED WITH OTHERS</b>							
Better	6	3	4	1	4	10	14
	8.2%	3.8%	5.3%	1.4%	2.8%	6.4%	4.6%
Same	27	34	43	47	83	69	151
	37.0%	43.6%	56.6%	63.5%	57.2%	43.9%	50.3%
Worse	40	41	29	26	58	78	136
	54.8%	52.6%	38.2%	35.1%	40.0%	49.7%	45.0%
<b>COMPARED WITH PAST</b>							
Better	24.7%	30.8%	46.7%	48.6%	38.9%	36.3%	37.5%
	5	13	10	21	22	28	49
Same	6.8%	16.7%	13.3%	28.4%	15.3%	17.8%	16.6%
	50	41	30	17	66	72	138
Worse	68.5%	52.6%	40.0%	23.0%	45.8%	45.9%	45.8%

Table 10.4: Households' ability to meet monthly expenses

Characteristics	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Enough and some left	1	2	2	0	2	3	5
	1.4%	2.6%	2.6%	0.0%	1.4%	1.9%	1.7%
Enough and left a little	7	12	9	14	18	24	42
	9.6%	15.6%	11.8%	18.9%	12.5%	15.3%	14.0%
Enough	1	12	15	21	31	18	49
	1.4%	15.6%	19.7%	28.4%	21.5%	11.5%	16.3%
Irregular	39	39	46	36	75	86	160
	53.4%	50.6%	60.5%	48.6%	52.1%	54.8%	53.5%
Not enough	25	12	4	3	18	26	44
	34.2%	15.6%	5.3%	4.1%	12.5%	16.6%	14.6%

Table 10.5: received changes in crop, fish and livestock production in the last 10 years

	Farming			Fishing			Livestock			Home gardening		
	Migrant	Non-migrant	Total	Migrant	Non-migrant	Total	Migrant	Non-migrant	Total	Migrant	Non-migrant	Total
Extremely decrease	13	10	23	50	44	94	2	0	2	7	5	12
	26.0%	17.9%	21.7%	43.1%	34.6%	38.7%	3.3%	0.0%	1.7%	9.5%	9.4%	9.4%
Decrease	30	38	68	51	60	111	39	32	71	18	25	43
	60.0%	67.9%	64.2%	44.0%	47.2%	45.7%	63.9%	58.2%	61.2%	37.8%	47.2%	41.7%
Same	3	6	9	6	5	11	14	15	29	23	15	38
	6.0%	10.7%	8.5%	5.2%	3.9%	4.5%	23.0%	27.3%	25.0%	31.1%	28.3%	29.9%
Increase	4	2	6	7	12	19	3	5	8	7	3	10
	8.0%	3.6%	5.7%	6.0%	9.4%	7.8%	4.9%	9.1%	6.9%	9.5%	5.7%	7.9%

### The agricultural villages

As indicated in Table 10.1 and Table 10.2, livelihoods in the agricultural zone are more diverse than that in the fishing zone. The majority of the surveyed households in the agricultural zone work on agricultural land (>70%), fish (>80%), own livestock (>80%) and grow vegetables at home. In addition, almost a quarter of these households receive remittances from migrant family members. While crops and fish are the two most important livelihood strategies for these households, livestock rearing also contributes. Life in the two agricultural villages were similar, with

surveyed households in Bak Amrek and Kampong Trach villages owning poultry, pigs, and cattle. This is consistent with the information obtained in the PRA sessions and interviews. Respondents and an official from the Department of Fishery in Kampong Thom stated that owning livestock serves as insurance or a buffer against crop and fish failures, climatic events and other stressors, as they can be sold to be able to enable households to buy food from the market. Livestock is also used for important social events, like wedding and funerals.

One-third of households in the agricultural zone derived part of their income from remittances, and about half of all households were also involved in other minor livelihood activities such as collecting non-timber forest products, and petty trading. These small-scale low-return activities were mostly performed by women. Overall, livelihood diversification was very minimal and the households in the agricultural zone are highly dependent on crops, fish, and livestock and so are vulnerable to the environmental conditions in which they live.

Table 10.3 shows that almost half of the respondents expressed satisfaction with their livelihood, saying it had improved and citing improved transportation and communication as the main reasons for this. Worsening climate conditions were noted, but with improved transportation and communication they could earn an income by migrating, and had an increased life satisfaction because they owned more assets such as a house, motorbike, mobile phone, TVs and the like. Approximately one-fifth of respondents said their livelihoods were the same as before, while another one-third said their livelihood had worsened.

Table 10.4 shows that over half of the surveyed households claimed they faced food shortages for a portion of the year, 20 per cent had enough to cover their expenses without any income left, and 15 per cent were able to meet their monthly expenses and have some or little income left over. Similar to the fishing villages, PRA sessions and interviews with village chiefs and commune chiefs in the agricultural zone indicated that crop, fish, and livestock production had decreased over the last 15 years due to environmental factors, and this combined with increased food prices made it difficult for households to make ends meet.

In focus group discussions (FGDs), farmers in the agricultural zone stated that insufficient crop yields made it difficult to secure the necessary household income throughout the year. They typically faced food shortages during the wet season, prior to the next harvest. Farmers complained of bad rice harvests due to unfavorable climatic conditions, pests, decreases in predicted rainfall, and unseasonal heavy rainfall as the reasons for poor yields.

Further findings from the survey (Table 10.5) indicate that more than 80 per cent of respondents in the agricultural zone, whether from migrant or non-migrant families, perceived a decrease in crop and

fish production. Comparatively, only 60 per cent of respondents noticed a decrease in their livestock production. Farmers in both the household surveys and PRA sessions said the success or failure of their crop production depended heavily on the onset of rain each year, and the duration and predictability of the dry spells. In one PRA, a 62-year-old woman explained that:

"It's like gambling. We predicted which month the rain will start to come. Sometimes we are correct, but most of the time we are incorrect. No one really knows God's mind now.... In the case that we predicted incorrectly, our crop harvests would fail. So now to cope, we could only spread the risks by sowing different field at different time."

## **B. CLIMATE AS ONE FACTOR OF CHANGE IN RURAL LIVELIHOOD**

RQ1 aims to measure the extent climate and environmental factors contribute to the change in rural livelihood. Cases selected from different PRA sessions in the previous sub-section shows that climatic variables, particularly rainfall patterns, drought, heat, and strong abrupt winds largely decrease crop, fish, and livestock production, all of which are the main livelihood sources of farmers and fishermen in the identified livelihood zones. During PRA sessions, the villagers enumerated not only climate-related factors as the cause of their decreased satisfaction with their livelihood, but non-climatic environmental factors such as infertile soil, pests, polluted water, lack of modern farming techniques, lack of job diversification, lack of financial capital to buy fertilizers and pesticide. In order to further compare these climatic factors with non-climatic environmental factors, demographics, social factors, economic factors, and political factors, respondents were asked (using multiple choices) about various events that affect their overall livelihood such as deforestation, loss of soil fertility, drugs, domestic violence, increased number of working population, corruption, rising food price, inflation, and lack of education. The findings (Table 10.6) indicated that the climatic environment (90.2%), non-climatic environment (87.8%) and economic factors (89.5%) are the three factors perceived by respondents to affect their overall livelihood. Such perceptions were slightly different across households in different livelihood zones.

Table 10.6: Reported factors affecting rural livelihood

Factors	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Environmental	52	67	73	66	125	134	258
	73.2%	90.5%	96.1%	90.4%	88.7%	87.0%	87.8%
Climate change	51	65	76	74	127	140	266
	71.8%	87.8%	100.0%	100.0%	90.1%	90.3%	90.2%
Socio-demographic	51	49	61	48	100	109	209
	71.8%	66.2%	80.3%	64.9%	70.9%	70.3%	70.6%
Governance	32	29	61	39	72	89	161
	45.1%	39.2%	80.3%	54.2%	51.1%	58.2%	54.8%
Economic	53	64	74	73	122	143	264
	74.6%	86.5%	97.4%	98.6%	86.5%	92.3%	89.5%

Table 10.7: Reported impacts of climate change and climate variability on rural livelihood

Factors	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Physical assets	53	55	20	5	59	74	133
	72.6%	71.4%	26.3%	6.8%	41.0%	47.1%	44.3%
Crops	8	11	39	48	58	48	106
	11.0%	14.3%	51.3%	64.9%	40.3%	30.6%	35.3%
Fisheries	50	54	59	65	111	118	228
	68.5%	70.0%	77.6%	87.9%	77.1%	75.2%	76.3%
Livestock	2	1	24	28	35	20	55
	2.7%	1.3%	31.6%	37.8%	24.3%	12.7%	18.3%
Financial assets	37	34	25	24	54	66	120
	50.7%	44.2%	32.9%	32.4%	37.5%	42.0%	40.0%

### The fishing villages

A key question considered is to what extent climate and environmental factors contribute to the change in rural livelihood in fishing villages? As previously discussed, almost all the households surveyed in the fishing zone are fishermen, and so a good portion of their income is generated from fishery production. Thus, climatic factors – particularly heavy rainfall, windstorms, heat, and drought – play an enormous influence on their livelihood. Over 80 per cent of respondents checked the climatic factor as one main factor affecting their livelihood in the last 10 to 15 years. The only factor that was perceived by more respondents to affect their livelihood included non-climatic environmental factors, namely water pollution and the thinning of the flooded forest. According to

respondents, life is hard to bear in the floating villages as there are no sanitary toilets within these areas. People dump the waste from all sources directly into the river, causing significant pollution to the water and the surrounding environment, and affecting their own health and well-being. Moreover, the thinning of the flooded forest caused by villagers and others cutting and/or burning the forests to get fertile land for plantations, has destroyed the natural fish shelters and so the fish population.

In addition to the non-climatic environmental factors referred to above, economic factors, including the lack of diversified jobs in the area, the high price of food in the market, and unemployment were noted

by 80 per cent of respondents as another reason for dissatisfaction with their livelihood. Climatic, socio-demographic, and political factors were the other main reasons for dissatisfaction with their livelihood. The key socio-demographic factors were low levels of education and the lack of vocational skills, while the key political factor were low levels of enforcement of development policies and corruption.

The impact of climate change and climate variability was seen most starkly in relation to physical assets (72%) and fish production (70%) (Table 10.7). During PRA sessions, respondents stressed that climate change had a direct impact on their livelihood, including destruction of houses, boats, fishing equipment and increased water temperature. The vast majority of people in the fishing villages live in floating houses built from poor-quality materials and so their home and other assets are susceptible to damage from windstorms and other climatic events. Indirect impacts include decreased fish yields, the worsening of one's livelihood, deteriorating housing conditions, poverty and migration.

### The agricultural villages

To what extent do climate and environmental factors contribute to the change in rural livelihood in the agricultural villages? As previously discussed, most households in the agricultural villages generate their main income from crops, fishing, and livestock production. Each of these are dependent on climatic factors such as rainfall patterns, the timing of the seasons, and temperature. Not surprisingly, all respondents checked climatic and environmental factors as the main factor affecting their livelihood, followed by the non-climatic environmental factors and economic factors (Table 10.6).

The findings are consistent with other more general studies that state economic factors play a significant role in changing rural people's livelihood. This study seems to equate the significance of economic factors with non-climatic and climatic environmental factors for people living around the Tonle Sap Lake. This is not surprising given these households' sources of livelihood are intertwined with the environment. Results from both PRA and the HHS show that households that experience a sharp decrease in their crop or fish production also experience insufficient money, rendering them vulnerable during certain months of the year. In Cambodia, short dry spells

that occur in the middle of the rainy season have been increasingly severe, withering young plants and affecting crop production and livelihood. One expert in the Battambang provincial workshop stated:

"Economic factors – I mean financial asset – is very important for rural people's livelihood. And people here make most of the money from selling the surplus of their rice crops, fish, and livestock – which is their possessed natural asset. So, it is very hard to distinguish the two factors – the economic and the environmental factors. They are different but the same. Just like the issue of egg and chicken."

Table 10.7 shows that respondents in agricultural villages perceived an impact on fish production (more than 80%), crop production (almost 60%), decreased livestock production due to animal diseases (33%), decreased financial assets (around 30%), and damage to houses, due to climate change and climate variability. While crop yields are determined by climatic conditions such as rainfall variability and temperature, they are also affected by soil fertility, farming methods and intensity, types and variety of crops, farm inputs like fertilizers and others. However, unlike climatic factors, these factors do not vary as much as climatic conditions. The death of livestock was mentioned by one-third of respondents in the agricultural villages, and they stressed the negative impact of heat on the health of livestock.

During PRA sessions, respondents in the agricultural zone stressed that changing climate had both direct and indirect impacts on their livelihood. Direct impacts included floods and heavy rainfall, temporary inundation of homesteads, the destruction of crops, fruit trees, and disruption to communication, sanitation and drinking water. Droughts and increasing temperatures have resulted in staggered growth of crops, a decrease in soil fertility, declining water tables, pestilence, and diseases affecting crops, animals – and humans. The indirect impact of climate change has resulted in poor crop yields, the worsening of livelihoods and housing conditions, poverty and migration. Migration was seen as a means to improving the living conditions of households, but it has had negative consequences, including a decline in the village labour force to maintain agriculture and livestock rearing.

### C. LIVELIHOOD RESPONSES IN THE FACE OF CLIMATE CHANGE AND CLIMATE VARIABILITY

The second research question looked at the ways how Cambodia's rural households tend to respond to a change in livelihood dynamics caused by climate change and climate variability. Respondents gave seven main strategies (see Table 10.8) they used for coping with livelihood challenges. They were, reducing food consumption (77.5%), getting external help (74.8%), reducing expenses (64.2%), diversifying income (59.3%), selling household assets (49.2%), modifying food production (45.2%), and migration (38.9%).

#### The fishing villages

As discussed in the previous section, fishermen have related a change in temperature with a reduction in gains from fisheries, and have linked heavy rainfalls and windstorms as a factor preventing them from going fishing, both of which have resulted in a drop in fish production for their households. When fish production is hampered within the fishing zone, the livelihood of these fishermen is directly affected as fishing is virtually their only source of income, and this is compounded with their dependence on the market for purchasing essential food items as a result of the

current high food prices. How do they then respond to these changes? Table 10.8 shows that a majority of respondents (87% choose to restrict food consumption within their household by limiting portion size at mealtimes, reducing the number of meals eaten each day, rely on help or loans from relatives or neighbors (around 80%), and reduce expenses by relying on less preferred and less expensive food (about 70%).

This group identified diversification of income activities as a coping strategy, and 30 per cent named migration as their main action. This links the impact of climate changes directly to migration. Women play an important role in the diversification of income, supplementing the family's budget with their small-scale processing and selling activities. Some respondents are forced to sell key assets such as boats and fishing equipment (25%).

#### The agricultural villages

As discussed in the previous section, climate change and climate variability have a multitude of far-reaching livelihood implications for the farming villages in the Tonle Sap basin. The coping strategies that were assessed through the survey largely represent the ways in which those with agricultural-based livelihoods respond to the impact of climate variability. The majority of our respondents (73.7%) choose to

Table 10.8: Reported livelihood responses

Factors	Fishing zone		Agricultural zone		Migration		Total
	Kompong Chamlang	Pat anday	Bak Amrek	Andong Trach	Migrant	Non-migrant	
Modify food production	10	16	56	53	65	71	135
	13.7%	20.5%	74.7%	71.6%	44.8%	45.5%	45.2%
Reduce food consumption	64	67	51	51	106	128	233
	87.7%	85.9%	67.1%	68.9%	73.1%	81.5%	77.5%
Income diversification	35	54	45	44	87	92	178
	47.9%	69.2%	59.2%	59.5%	60.0%	58.6%	59.3%
Sell household assets	21	16	52	58	76	72	147
	28.8%	20.5%	69.3%	78.4%	52.4%	46.2%	49.2%
Migration	23	27	34	33	113	4	117
	31.5%	34.6%	45.3%	44.6%	77.9%	2.6%	38.9%
Reduce expenses	50	58	41	45	99	95	194
	68.5%	74.4%	53.9%	60.8%	68.3%	60.5%	64.2%
Seek external help	59	68	57	41	115	111	225
	80.8%	87.2%	75.0%	55.4%	79.3%	70.7%	74.8%

modify food production within their households by using fertilizers and pesticides on their farmland, plant varieties of the same crops on their farmland, support other modes of irrigation instead of relying solely on rainfall, and separate their planting times taking the chance that if the first crop is hit by drought, the second or the third may not be. These strategies have been developed to spread the risk of unpredictable rainfalls and dry spells. The second majority of respondents (around 70%) chose to sell household assets, including parcels of land and livestock. Other common strategies were to reduce food consumption by limiting the portion size at mealtimes, reduce the number of meals eaten each day, or reduce their expense. Almost 60 per cent of respondents said they diversified their income activities by increasing the number of income earners within the household, by sending children to work in the provincial towns or to neighbouring countries such as Thailand. Others sought help or loans from relatives or neighbors (around 60%) or reduced expenses by relying on less preferred and less expensive food (about 55%).

The above findings show that the impact of climate change and climate variability is most directly related to the food production of affected families, and coping strategies relate to food production or migration as an alternative income source. This implies that if food production within the locality is strongly affected by climatic phenomenon, a migratory response is likely to be one of the most important strategies to secure one's livelihood in the agricultural villages.

#### SECTION 4: MIGRATION AND HUMAN MOBILITY PATTERNS

This section focuses on the research questions 3 and 4, which ask in what circumstances migration appears as a viable livelihood response in the face of climatic challenges and which seeks the observable forms, profiles, and outcomes characterizing migration patterns in

both fishing and agricultural villages. From the 301 households surveyed, 145 had migration experience. 61 per cent of the respondents reported current migrants within their households, and 48 per cent were returned migrants. Surveyed results reveal that households with migrants have between one and six family members who have migrated. Table 11.1 shows that 62.7 per cent of the participants perceive migration as an acceptable income-generating strategy which is important for household livelihood, whereas 20.4 per cent perceive it as having little importance, and use it as a strategy only in times of crisis. The other 16.9 per cent of migrant households perceived migration as not important for household livelihood, as migrants rarely send any remittances.

Interestingly, around 40 per cent of households in the fishing zone perceived migration as "very important" for their livelihood, while more than 80 per cent of the surveyed households in the agricultural village thought so. This can be attributed to the fact that more households in the agricultural villages have benefited from migration, as a result of better transport links between the villages and the migratory destination.

#### A. FISHING VILLAGES

The survey revealed (see Table 11.2) that 47 per cent of all families interviewed had some migration experience, with 104 migrants from the two study villages, 80 per cent of whom migrated within Cambodia, half of these to Phnom Penh. About half of the studied households in this zone have never migrated. There is a particularly high migration rate for women, who account for almost 60 per cent of all migrants who work in the garment factories. International migration from the surveyed fishing villages was found to be very low, at around 16 per cent. PRA sessions revealed that the high rate of poverty is a barrier to international migration from the locality.

Table 11.1: Reported importance of migration on households' livelihood strategies

	Fishing zone		Agricultural zone		Total
	Kompong Chamlang	Pat Anday	Bak Amrek	Andong Trach	
Very important	14	16	33	26	89
	42.4%	44.4%	89.2%	72.2%	62.7%
Of little importance	8	12	2	7	29
	24.2%	33.3%	5.4%	19.4%	20.4%
No importance	11	8	2	3	24
	33.3%	22.2%	5.4%	8.3%	16.9%

Table 11.2: Communities migration profile

	Farming			Fishing		
	Kompong Chamlang	Pat Sanday	Total 1	Bak Amrek	Andong Trach	Total 2
<b>HH INTERVIEWED</b>	73	78	151	76	74	150
<b>HH WITH MIGRATION EXPERIENCE</b>	34	37	71	37	36	73
	46.6%	47.4%	47%	48.7%	48.6%	48.6%
<b>NUMBER OF MIGRANTS</b>	48	56	104	70	55	125
<b>MIGRANTS (DISAGGREGATED BY SEX)</b>						
Male	19	24	43	42	30	72
	39.5%	42.8%	41.3%	60%	54.5%	57.6%
Female	29	32	61	28	25	53
	60.4%	57.2%	58.6%	40%	45.4%	42.4%
<b>AVERAGE AGE OF MIGRANTS</b>	33	26	29.5	28	26	27
<b>EDUCATION</b>						
None	11	7	18	15	6	21
	22.9%	12.5%	17.3%	21.4%	10.9%	16.8%
Some primary education	16	21	37	32	38	70
	33.3%	37.5%	35.6%	45.7%	69.1%	56%
Some secondary education	21	24	45	23	11	34
	43.80%	43.50%	43.30%	32.90%	20%	27.2%
Higher than secondary education	0	4	4	0	0	0
	0%	7.1%	3.8%	0%	0%	0%
<b>MAJOR REASON FOR MIGRATION</b>						
Find job	29	33	62	50	34	84
	60.4%	58.9%	59.6%	71.4%	61.8%	67.2%
Education	6	15	21	2	0	2
	12.2%	26.8%	20.2%	2.9%	0%	1.6%
Marriage	10	5	15	0	0	0
	20.8%	8.9%	14.4%	0%	0%	0%
Other	3	3	6	18	21	39
	6.3%	5.4%	5.8%	25.7%	38.2%	31.2%
<b>DESTINATION</b>						
Phnom Penh	23	30	53	4	15	19
	47.90%	53.60%	51.00%	5.70%	27.30%	15.20%
Provincial town	16	12	28	11	7	18
	33.30%	21.40%	26.90%	15.70%	12.70%	14.40%
Other rural village	2	2	4	1	0	1
	4.20%	3.60%	3.80%	1.40%	0.00%	0.80%
Thailand	5	12	17	54	33	87
	10.4%	21.4%	16.3%	77.1%	60%	69.6%
Malaysia	2	0	2	0	0	0
	4.2%	0%	1.9%	0%	0%	0%

The average age of migrants from the fishing village at the time of survey was 29.5 years, one-fifth of whom have never had any schooling. Approximately half had at least had some primary education, with a minority migrating to continue to study at college level in Phnom Penh. The main reason for migration from the fishing zone was economic, with approximately 60 per cent of migrants finding jobs in their destination, 20 per cent continuing their education, and 15 per cent moving to their spouses' village.

## B. AGRICULTURAL VILLAGES

Migration is more common in the two studied agricultural villages. People here started to migrate in the early 1990s as a way to earn additional income to support the ever-increasing size of families. With the fixed size of farmland, increasing family size, a diminishing resource-to-man ratio in each successive generation, and frequent occurrence of natural hazards, migration has become increasingly important to enhance income and sustain livelihoods, in particular for poor households. Table 11.2 shows that 48.7 per cent of all families interviewed have some migration experience, with almost 60 per cent of men

migrating from the agricultural zone, a higher rate than in the fishing zone. This is attributed to higher levels of international migration, particularly to Thailand. The number of women migrating internationally is not as high as women find it more convenient and secure to migrate within Cambodia, rather than outside the country.

The average age of migrants from the agricultural villages studied was 27 years old, at the time of the survey. More than 80 per cent of them had at least some primary education, but none had higher than secondary education. The main reasons for their migration was found to be economic, with two-third of the migrants migrating elsewhere to find a job to help with the family's economic status. Only two migrants from these villages migrated for educational purposes. Thailand accommodated more than two-thirds of the migrants from the agricultural zone, while 16 per cent of the migrants from these two villages went to Phnom Penh. When compared to the movements within the fishing villages, those data are quite telling about the importance of proximity and distance in deciding the migration destination.

Table 11.3: Migration decision making process

	Fishing zone		Agricultural zone		Total
	Kompong Chamlang	Pat Anday	Bak Amrek	AndongTrach	
<b>PARTICIPATION IN THE DECISION PROCESS</b>					
Family	30	24	32	36	122
	88.2%	77.4%	86.5%	100.0%	88.4%
Friends	5	0	19	11	35
	15.2%	0.0%	52.8%	31.4%	26.5%
Neighbors	11	17	12	13	53
	33.3%	60.7%	33.3%	37.1%	40.2%
Extended family members	16	10	4	11	41
	48.5%	35.7%	11.1%	31.4%	31.1%
Other	1	1	1	0	3
<b>FINAL DECISION MAKER</b>					
Head of household	8	11	20	14	53
	25.8%	30.6%	54.1%	38.9%	37.9%
Migrant	18	17	16	20	71
	58.1%	47.2%	43.2%	55.6%	50.7%
Consent from household members	4	7	1	2	14
	12.9%	19.4%	2.7%	5.6%	10.0%

### The decision to migrate

In more than half of migrant households, both within the fishing and agricultural villages, migrants themselves make the final decision regarding migration destination. This is particularly so in the fishing villages, where there seemed to be more independence given to the migrants (Table 11.2). Moreover, migration is quite a new phenomenon in the fishing villages compared to the agricultural villages, so it is likely that the head of those households might not have much information about the movements, compared to the migrants themselves. Additionally, being in the floating villages, communication and transportation between the village and the destination are prohibited, making migration information largely unavailable to all but those who are very willing to migrate.

In approximately 25 per cent of cases, the head of household makes the final decision regarding migration, and there are a slightly higher percentage of such migrant households in the agricultural villages (Table 11.3). Most of the heads of household are male, which mean they have broader social contacts as compared to females, who generally have less social contacts and more limited knowledge regarding the economic and educational opportunities elsewhere, or what might be awaiting the migrants in a proposed destination. The information sought in respect of migration destinations are the working conditions, wages applicable to the type of job they are applying for, living conditions and the safety of the destination.

FGDs in both fishing and agricultural villages revealed that migrants generally consult with family members, neighbours, and friends on the choice of destination, job, and contacts at the place of destination. They value information from experienced migrants in their villages, and consultations with these people are very important in deciding on the destination. Most PRA respondents reported that they decide as a family before committing to a migratory decision. For a majority of them, security is the primary cause for collective migration decision-making, followed by payment status and working/living conditions.

Migrants in the agricultural villages preferred to migrate in groups, particularly with other experienced migrants from their village, because they believe that when they are together they have a better opportunity to tackle unforeseen hazards, overcome potential barriers and can take care of each other. Women's

international migration is limited compared to their male counterparts. Female respondents stated that they did not want to migrate to Thailand, because most migrants do so illegally, and while this costs less, it was more dangerous. One PRA respondent, an experienced international migrant, said:

"We have to face many challenges if we migrate to Thailand. It is not secure at all. Sometimes, we have to stay and sleep in the forest for two days or one week. Sometimes we do not have food and need to wait there in the forest until the broker came to take us. And we have to walk across Cambodia-Thailand borders. When we reached Thailand we rode on a closed bus and there were many people crowding together on the bus. It's not safe at all; that's why this is more appropriate for men."

### Major reasons for migration

In addition to wanting to increase household livelihoods, respondents stated that their general dissatisfaction with life in the villages, better education prospects and health care in the cities, and the impact of natural phenomena were among the reasons for migration. To investigate these reasons further, respondents were asked to help assess the complex reasons behind the decision to migrate by selecting from 39 potential options, grouped into social, personal, economic, and natural/environmental factors.

The results show that in over 80 per cent of migrant households from the fishing villages, migration took place due to economic and/or food security reasons. These reasons include, a decrease in fish catch for consumption and sale, unemployment, and not enough income. About one-third of respondents perceived the direct influence of climatic and non-climatic environmental factors on migration. FGDs revealed that the two most raised climatic events that directly impacted on livelihood were severe floods, and strong abrupt winds that destroyed their possessions and prevented them from going fishing, as well as prolonged drought and increased water temperature that reduced the fish population.

Similarly, in agricultural villages, over 80 per cent of the migrant households attributed the cause of migration to economic factors, including unemployment, decline in crop, fish and livestock production for consumption and sales. About one-third of respondents perceived the direct influence of climatic and non-climatic

Table 11.4: Reported major migration drivers

	Fishing zone		Agricultural zone		Total
	Kompong Chamlang	Pat Sanday	Bak Amrek	Andong Trach	
Economic	30	24	32	36	122
	88.2%	77.4%	86.5%	100.0%	88.4%
Personal	5	0	19	11	35
	15.2%	0.0%	52.8%	31.4%	26.5%
Conflict	11	17	12	13	53
	33.3%	60.7%	33.3%	37.1%	40.2%
Social	16	10	4	11	41
	48.5%	35.7%	11.1%	31.4%	31.1%
Natural Disaster	12	10	7	12	41
	38.7%	30.3%	25.9%	35.3%	32.8%
Food security	23	29	6	13	71
	74.2%	87.9%	17.6%	38.2%	53.8%

environmental factors on migration. FGDs revealed that the most complained of climatic factors were the unpredictable timing of the seasons, and prolonged droughts resulting in rising temperatures, animal and crop diseases and pests.

Taking both the fishing and agricultural zones together, the results reveal that the most common reasons for migration in both fishing and agricultural villages, in order of selection frequency, were:

1. Decline in crop, fish, and livestock production for consumption and sale (economic/food security factor)
2. Unemployment (economic factor)
3. Unpredictable timing of the seasons and/or changes in rainfall patterns (natural/environmental factor)
4. Severe dry spells/prolonged and frequent droughts, abnormal heat (natural/environmental factor)
5. Floods and strong abrupt winds
6. Pests

Most of these reasons centre exclusively on agriculture, fishery and livestock rearing, which are directly linked to livelihood around the Tonle Sap Lake in both the fishing and agricultural zones, and to climate change and climate variability. People's main economic activities showed a low degree of diversification, rendering them highly vulnerable to climate variability. Not surprisingly, respondents declared that they mainly migrated due to economic reasons. This means that environmental factors tend to influence migration

in an indirect way, mostly through economic and/or livelihood drivers. PRA respondents and experts in the provincial workshop generally considered both climatic and non-climatic environmental factors as an underlying cause that threatened rural livelihoods. One of PRA respondents in Kampong Trach aptly described the situation in these words:

"If we had water for our rice field; if droughts and pests did not destroy our crops; if we could earn incomes from other sources besides agriculture in our village; if livelihood was easy on us, we would not allow our children to migrate away from us."

The results from the survey support this statement, as only 20 per cent of respondents wanted family members to migrate, with the rest preferring to have all whole family stay together in the village.

### The migration process

#### The fishing zone

Besides information regarding employment potential at the destination, the aspiring migrants require finance and other forms of support before migrating. FGDs reveal that migrants received emotional support from their family members, relatives, friends, and neighbours. These people encouraged them to migrate because life at their villages was hard. The decrease in fish catch, the in-flow of fishermen from elsewhere during the fishing season, and particularly the harsh

climatic pattern over the last 10 years are some of the reasons PRA respondents gave as reasons their young and able should migrate. However, in terms of financial support, migrants have to depend on their own households or borrow money from wealthy villagers, with monthly interest up to 25 per cent, or from a micro-finance institution with monthly interest of around 3 per cent, so they can afford to migrate. Despite the high interest, migrant households prefer to borrow from wealthy villagers, rather than micro-finance institutions, because it requires fewer formal papers, is quick and requires no collateral. Household surveys in the fishing villages revealed that almost 75 per cent of migrants depend on household savings and over 80 per cent of migrants depend on loans to support their migration costs, which is mainly transportation costs.

There are three types of migration, the first being internal migration to Phnom Penh where the process is dictated by social norms and practices rather than by legal documentation, for example a verbal contact is regarded as more than enough to engage in a contractual relationship. New migrants usually go to Phnom Penh with other experienced migrants from their village, and these people act as a link between them and their prospective employers. In most of the cases, they work in garment factories or as construction workers, they come home to visit only once or twice a year – usually during Khmer New Year and Pchum Ben. These migrants can earn between USD 80 and 300 per month, but they have to cover all their expenses themselves and so often do not much left to send back home.

The second type of migration is external where migrants seek work outside of Cambodia. These migrants, particularly those going to Korea, must follow the legal process of preparing documents, taking language exams and health tests. If they are selected, they will have to follow a three year work contract, which means they are not able to visit home as often as those migrating within Cambodia. These migrants usually work as labourers for Korean companies or on farMs FGDs revealed that those working in the companies are treated better by their employers than those working for on farMs These migrants get paid between USD 800 and 1000 per month, a high salary by Cambodian standards. Only two or three migrants from Kampong Chamlang were able to pass the language exam and fulfill the other requirements to go to work in Korea. FGDs revealed that households with

members migrating to Korea are comparatively quite well-off, both before the migration and even more so after migration.

The third type of migration found in the fishing villages is that for education. Some well-off families were able to send their children to Phnom Penh to continue their college education. Parents of children migrating for education don't expect to receive remittances, and spend a large amount on transportation, food and money to help their migrant children with the cost of being in the city and at school.

### *The agricultural zone*

Like those who migrate from the fishing zone, those in the agriculture zone require finance and other forms of support before migrating. Many take loans to bear the cost of migration, or use family savings, borrow the money from friends, relatives, or a neighbour. Micro-credit or formal credit can also provide the starting capital for migration, and institutions are willing to assist those who wish to migrate, as compared to five or 10 years ago. Again, the migration process is dictated by social norms and often local leaders known as Me Kjol play a major role in contacting the employer, arranging the contract, liaising with employers in distant places and arranging the transportation, accommodation and food for those migrating. The social position of Me Kjol in facilitating migration is vital in Cambodia. Not only are they required to have good contacts with potential distant employers, they also need to be able to find jobs with "good" employers or their fellow migrants would suffer in some way. As one PRA respondent put it:

"Especially if we go to work in other country like Thailand... If our Me Kjol is good, we tend to meet good employer. Not only will we get good payment, but we will also have security. We won't be beaten, or exploited by our employers. Also, we won't get our payment late."

Those from agricultural villages tend to migrate towards Thailand (70.4%), in particular the border cities between Thailand and Cambodia. According to the FGDs, the migrants who find work in the border cities are mostly agricultural migrants, and migrated to work in agricultural sectors. This migration tends to be seasonal, with workers going out in February and coming back in April to celebrate Khmer New Year, returning to Thailand in May, coming home for Pchum Ben, and returning to work for December and January.

Table 11.5: Use of remittances

	Fishing zone		Agricultural zone		Total
	Kompong Chamlang	Pat Anday	Bak Amrek	Andong Trach	
To buy food	18	19	33	33	103
	69.2%	86.4%	91.7%	91.7%	85.8%
To buy consumption goods	11	15	24	23	73
	42.3%	68.2%	66.7%	63.9%	60.8%
Healthcare	13	16	26	19	74
	50.0%	72.7%	72.2%	52.8%	61.7%
Pay-off debts	5	12	18	16	51
	19.2%	54.5%	50.0%	44.4%	42.5%
Housing	4	8	7	3	22
	15.4%	36.4%	19.4%	8.3%	18.3%
Education	1	3	5	3	12
	3.8%	13.6%	13.9%	8.3%	10.0%
Investment in agriculture production	0	0	1	4	5
	0.0%	0.0%	2.8%	11.1%	4.2%
Other	0	1	3	4	8
	0.0%	6.3%	8.6%	11.1%	8.2%

Table 11.6: Contribution of remittances to migrant households' income

Remittances contribution to household income	Fishing zone		Agricultural zone		Total
	Kompong Chamlang	Pat Anday	Bak Amrek	Andong Trach	
Substantial	6	4	19	14	43
	18.2%	11.4%	54.3%	40.0%	85.8%
Intermediate	7	12	10	16	45
	21.1%	34.3%	28.6%	45.7%	32.6%
Small	13	7	5	5	30
	39.4%	20.0%	14.3%	14.3%	21.7%
Never send money	7	12	1	0	20
	21.2%	34.3%	3.0%	0.0%	14.5%

In these villages, migration is truly seen as a temporary risk management strategy to overcome loss of employment and/or income.

Those who migrate to Thailand usually work in construction, factories, or in agricultural work earning 200 to 350 baht a day. Job opportunities arise through illegal Me Kjol, friends, or relatives in their own village. To get to Thailand they sometimes stay in the forest for several days, often with no food until Me Kjol come take them to walk across the border, or they are bused in unsanitary conditions.

### C. MIGRATION AND REMITTANCES

The survey indicated that two-thirds of migrant households in the fishing villages received money from migrant family members, and almost all migrant households in the agricultural villages received money from their migrant family members. The FGDs revealed that an internal migrant can make between USD 100 to 150 a month, while an international migrant to Korea can make USD 800 to 1,000 a month and one in Thailand can make around USD 300 to 400 a month. Some of this money is remitted home, often via mobile services such, or as cash with another returning migrant. The migrant brings home the rest of the money he or she has saved, when he or she returns home. Female migrants usually bring home more savings than male migrants. Student migrants might earn small amounts while studying, but usually cannot remit anything to their household as they need the money to pay for school and accommodation related expenses, and may even need additional money from home to cover their expenses.

#### The fishing villages

In the fishing zone, the contribution of remittances to a household's overall income appears to be substantial in less than 20 per cent of households, of a reasonable sum in 30 per cent of migrant households, and a small contribution in around 25 per cent of the migrant households. Moreover, less than half of the migrant

household respondents in this zone have noticed a slight to substantial increase in the contribution of remittances to the household's income over the past 5 to 15 years, whereas the other more than half reported no change. FGDs revealed that the remittances did not effectively lead to major changes in rural household's consumption patterns, but the study showed that almost half of migrant households noted "substantial increases" in their own expenditure due to the money sent back by migrants. The differing results on the effect of remittances on consumption might be attributed to the price hike of commodities, compared to the amount being remitted, or perhaps to the increase in family size over the time period.

Most of the remittance-utilizing households spent the largest proportion of the remitted money on food (77.8%) and healthcare (61.35%), buying consumer goods (55.25%), repaying debt (36.85%), and building or fixing houses (25.9%). This highlights that migrant households are probably food impoverished or indebted, have family members who are sick, or houses that are deteriorating. FGD respondents revealed that the above circumstances are now common in their villages after facing strong abrupt winds that damage houses or completely destroy shelters.

#### The agricultural villages

In the agricultural zone, the contribution of remittances to a household's overall income appears to be substantial in almost half of migrant households, and the contribution considered be small in only one-third of cases. One-fifth of the migrant household respondents noted a substantial increase in the contribution of remittances to the household's income over the past 5 to 15 years, half reported a slight increase, and the other one-third reported no change.

Most of the remittance-utilizing households spent the largest proportion of the remitted money on food (91.7%), consumer goods (65%), healthcare (65%), and repaying debt (47.2%).



## D. NON-MIGRATION

### The fishing zone

The survey revealed (see Table 11.7) that about half of those interviewed in the fishing zone have never had a family member migrate in their lifetime. The main reasons for non-migration were both emotional and economic. More than half of the non-migrant households said they did not want to be separated from their families, and more than one-third of non-migrant families were happy with the current situation within their household. Other family obligations such as taking care of elderly parents or young children were also given as reasons for not migrating. Only about 40 per cent of these households said their non-migration was due to a lack of starting capital and/or a network. The survey highlighted that more than two-thirds of the non-migrant households (76.89%) perceived migrant households to be more well-off, and more than half of the respondents said migration was a possibility for their families in the future.

Table 11.7: Determinants of non-migration

Non-migration	Fishing zone		Agricultural zone	
	Kompong Chamlang	Pat Anday	Bak Amrek	Andong Trach
<b>REASONS FOR NOT LEAVING</b>				
Lack of kick-off capital	12	19	3	6
	30.8%	45.2%	8.0%	15.8%
Lack of network	4	16	1	1
	10.2%	38.1%	2.6%	2.6%
Don't want to be separated from family	25	24	17	21
	64.1%	57.1%	44.7%	55.3%
Satisfied with current situation	14	20	5	6
	35.9%	47.6%	13.1%	15.8%
Take care of family members	11	19	19	16
	<b>28.2%</b>	<b>45.2%</b>	<b>50.0%</b>	<b>42.1%</b>
<b>PERCEPTION OF MIGRANT HOUSEHOLD</b>				
More well-off	26	35	37	33
	68.4%	85.4%	94.9%	86.4%
<b>MIGRATION CONSIDERED AS AN OPTION IN THE FUTURE</b>				
Yes	21	21	17	17
	53.8%	50.0%	49.9%	47.2%
<b>PERCEIVED POTENTIAL TRIGGERS FOR MIGRATION AMONG NON-MIGRANT HOUSEHOLDS</b>				
Natural disaster	8	11	13	16
	20.5%	26.2%	35.1%	44.4%
Economic shocks	12	17	15	19
	30.8%	40.5%	40.5%	52.8%
Access to credit	1	5	0	0
	2.6%	11.9%	0.0%	0.0%

## The agricultural zone

The survey revealed (see Table 11.7) that half of studied households in the agricultural zone have never migrated in their lifetime. The reasons for their non-migration were similar to the fishing zone, with half of the non-migrants saying they did not want to be separated from their families, some stating they were satisfied with the current situation within their households, half of the respondents saying they had to take care of their elderly parents or young children, and less than 10 per cent saying the reasons for their non-migration was due to a lack of starting capital and/ or a network. FGDs revealed that migration information within agricultural villages was widespread and any villager who wanted to migrate could talk to those experienced migrants. Most non-migrant respondents in the PRA expressed a willingness to migrate if they had starting off capital and someone to take on the burden of the household tasks on their behalf. The most favored destination was Thailand as respondents had heard they could earn more money there, than through internal migration.

## 3.4 SUMMARY AND CONCLUSION

### THE FISHING VILLAGES

The research in the two fishing villages of Tonle Sap Basin indicated that environmental changes have negatively impacted the livelihoods of villagers. Climate change includes changing weather patterns, such as increased frequency of heavy rains and severe floods, strong abrupt winds, the increased frequency and duration of droughts, coupled with the significant increase in temperatures, and more frequent cases of lightning. These have all had a significant impact on the fishing villages with increased heavy rainfall and the strong abrupt winds destroying houses, boats, and fishing equipment, and the increase in temperature contributing to decreasing fish numbers and corresponding catch, for local fishermen.

People in the study area have developed several coping or adaptation strategies to deal with their change in livelihood, including reduction of food consumption and other expenses, dependence on external help, and migration. This study shows that the main destination area of migration from these fishing villages is Phnom Penh with a looking migrating internationally Thailand or Korea. The factors that lead to a household send one or more family members into migration are complex and intertwined, but are mainly economic due to a reduction in household income as a result of decrease fish catch, unemployment and little income from other sources. While climatic and non-climatic environmental factors were not perceived as a direct cause of migration for this group, they are certainly a significant indirect contributing factor.

A strong link between climatic variables and livelihood was demonstrated, as people were shown to be highly dependent on the river and the fish and have very few, if any, other economic options in the area of origin. As these two villages are located in the river, all their other income-generating activities are also dependent on favorable climatic conditions. The study has proved that migration is increasingly appearing as a possible adaptation strategy, allowing villagers to diversify their income and spread risk.

### THE AGRICULTURAL VILLAGES

The research indicated that climate change has had a negative impact on the livelihoods of villagers in the two selected agricultural villages of the Tonle Sap Basin, including increased frequency of extreme weather events, a shift in the duration and timing of dry spells and rainfall patterns, and increased temperature. The previously predictable pattern of the rainy season has changed, and is now marked by heavier periods of rainfall, strong abrupt winds, and periods of dry weather during months traditionally viewed as rainy season months. The resulting dry spells and heavy rainfall events during planting season has had a negative effect on crop production and has led to reduced crop yields on many occasions, which translates into food shortages for poorer households.

People in the study area have developed several coping or adaptation strategies to deal with their livelihood change. These include modifying crop production within

their households, by planting different crop varieties, splitting the onset of their planting, selling household assets such as livestock, reducing food consumption, and sending grown-up children to work elsewhere in Cambodia or abroad. Migration in agricultural villages is viewed as an income-generating strategy, rather than a strategy to be used in a time of crisis. Like those for the fishing villages, the factors that lead to a decision to migrate are complex and intertwined. The survey revealed that the two main reasons were economic and environmental factors, and are very closely aligned. The most important economic factors mentioned were unemployment in the agricultural village, a decline in crop, fish, and livestock production for consumption and sales. The most complained of climatic factors were the unpredictability of the rainy seasons, prolonged droughts, and the increase in temperature, all of which contribute to the above mentioned economic factors.

A strong link between climatic variables and livelihood was demonstrated, as people were shown to be highly dependent on rain fed agriculture and fishing to make a living and have few other economic options in the area of origin. However, other factors also contribute to their decrease in satisfaction with their livelihood such as soil degradation, traditional farming methods and a lack of modern equipment. The other local income-generating activities, such as livestock rearing also depend on favorable climatic conditions and with the challenges climate change has caused there has been a steady migration in order to generate an income elsewhere. The study has proved that migration is a crucial strategy for those in the agricultural zone to diversify income and to spread risk.

There are several recommendations from our study participants, both at the provincial and local level, for the "government" and "NGOs" to help improve the situation in the agricultural villages:

1. Invest in irrigated agriculture to ensure year round farming
2. Development and extension of climate resilient crop varieties, such as early maturing, drought and flood resilient crops
3. Create local employment opportunities in agriculture by establishing bigger more modern farms
4. Develop livelihood diversification schemes for local communities such as implementing alternative livelihood activities
5. Improve animal husbandry, by for example creating shelter vaccination campaigns
6. Provision of micro-credit services to farmers to better access farm inputs
7. Curtail high food prices
8. Create a market for local rice at a fair price
9. Incorporate both migration and climate change adaptation issues into national development plans
10. Ensure that the local authorities incorporate climate adaptation strategies in their medium-term development plans
11. Finance more in-depth research about climate change, livelihood, and migration in different provinces of the country in order to develop further refined policy plans and NGO interventions
12. Further improve the infrastructure in the region so villagers can better access markets, schools and health care institution

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