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# Global environmental change and migration: Governance challenges

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ABSTRACT

Claims have been made that global environmental change could drive anywhere from 50 to almost 700 million people to migrate by 2050. These claims belie the complexity of the multi-causal relationship between coupled social–ecological systems and human mobility, yet they have fueled the debate about "environmentally induced migration". Empirical evidence, notably from a 23 case study scoping study supported by the European Commission, confirms that currently environmental factors are one of many variables driving migration. Fieldwork reveals a multifaceted landscape of patterns and contexts for migration linked to rapid- and slow-onset environmental change today. Migration and displacement are part of a spectrum of possible responses to environmental change. Some forms of environmentally induced migration may be adaptive, while other forms of forced migration and displacement may indicate a failure of the social–ecological system to adapt. This diversity of migration potentials linked to environmental change presents challenges to institutions and policies not designed to cope with the impacts of complex causality, surprises and uncertainty about social–ecological thresholds, and the possibility of environmental and migration patterns recombining into a new patterns. The paper highlights fieldwork on rapid- and slow-onset environmentally induced migration in Mozambique, Vietnam, and Egypt. Current governance frameworks for human mobility are partially equipped to manage new forms of human mobility, but that new complementary modes of governance will be necessary. The paper concludes with challenges for governance of environmentally induced migration under increasing complexity, as well as opportunities to enhance resilience of both migrants and those who remain behind.

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## 1. Introduction

Emerging empirical research indicates that environmental changes including climate change currently play a role in migration (Jäger et al., 2009; Warner et al., 2008, 2009). As environmental changes increase, migration pressures related to these changes may also grow (IPCC, 2007). For many areas in the world, more erratic weather, rising sea levels and other climate change impacts will motivate resettlement, forced migration, or other forms of human mobility (Bogardi and Warner, 2008). This raises several questions, three of which are addressed in this paper. First, where do migration and displacement fit along the adaptation continuum, and should human mobility be supported by institutions as an (adaptive) response to environmental change including climate change? This paper examines existing empirical work on rapid- and slow-onset environmental stressors and their role in migration. Second, how can institutions and policy affect the

outcomes of environmentally induced migration? The paper explores how governance can ease or exacerbate the impacts of global environmental change on migration. Third, what impacts will environmentally induced migration have on existing institutions and policies? This paper explores the degree to which current institutional arrangements that manage human mobility may be equipped to address environmental change, and whether new governance modes are needed.

This paper uses "governance" broadly as the regulation of interdependent relations with many levels and actors, and also includes an element of power and interest (Young, 2002, 2004). For practical purposes in this paper, governance refers to institutions and policies, and how state actors and international organizations collaborate and coordinate their work.

## 2. Human mobility and the adaptation continuum

History is marked by periodic episodes of migration and displacement, in relation with environmental and societal changes. With climate change, a question arises whether migration and relocation could be considered forms of adaptation and whether

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institutions and policies should facilitate migration or other forms of human mobility such as resettlement. The question gains relevance because migration and displacement were introduced in the UNFCCC climate negotiations in mid-2008. The topic is under consideration for inclusion in a post-2012 adaptation framework.

## 2.1. Is migration a form of adaptation?

Views differ on whether migration could be considered adaptation.[1] Some operational organizations and academics point out the role migration may play in helping home communities adapt, using the resources from migrant remittances (IOM, 2007; Barnett and Jones, 2002). Others express the view that migration is a maladaptive response because the migration may trigger increased risk for those who move and also possibly for areas migrants move towards (Oliver-Smith, 2009). Governments do not (yet) widely view migration as an adaptation alternative, and very few National Adaptation Programmes of Action (NAPAs) mention migration or relocation options (Martin, 2009). Others see migration or displacement as something beyond adaptation: abandoning locations in which adaptation is not possible.

Migration has yet to be discussed systematically within the context of adaptation strategies to environmental and climate change. Some characterize migration as a failure of adaptation, rather than as a form of adaptation. Yet studies have found that migration is often a proactive risk diversification strategy for households facing environmental stressors amidst a range of other risks that must be managed at the same time (Berkes et al., 2003; Hussein and Nelson, 1998). Migration and displacement are not homogenous. As will be pointed out in Section 3, different forms of environmentally induced migration occur (Warner et al., 2009a). This suggests that migration and displacement are part of a spectrum of possible responses to environmental change (Warner and Laczko, 2008a). Some forms of environmentally induced migration may be adaptive, while other forms of forced migration and displacement may indicate a failure of the social–ecological system to adapt.

## 2.2. Social and ecological linkages

The concept of social–ecological systems lies at the heart of discussions of environmental change and migration, and is defined as a complex system characterized by multiple, stochastic and/or non-linear interactions between elements of the system (Gallopín, 2006). Central to it is the idea that human action and ecological structures are linked and dependent on each other. Environmental degradation processes can be natural in the sense that they are not initiated by human activity, such as extreme floods, hurricanes, or earthquakes. Natural hazards can dramatically disrupt social interactions and contribute to human mobility. Natural hazards often reveal both physical vulnerability (such as weak infrastructure) and social vulnerability (such as poverty, power structures that undermine certain groups) (Oliver-Smith, 2002, 2003). Additionally, processes linked to human activities and their social, economic and/or political systems directly (e.g. land degradation) or indirectly (e.g. climate change) can drive migration.

Environmentally induced migration can be considered part of complex human–environmental systems (Barnett and Jones, 2002; Berkes et al., 2003; Young et al., 2008). Ecosystems are shaped by human activities, but also set constraints to human activities by shaping economic activities and social norms. Migration can represent a response to changing environmental and economic

conditions, such as a farmer's choice to migrate due to failing crops and insecure livelihood prospects. For example, desertification in Niger has undermined the livelihood stability of farmers in the region. In turn, this has lowered the resilience of farmers to recurring drought (Afifi, 2009b). Environmental change has a multiplier effect on other migration drivers (Afifi and Warner, 2008).

Migration can also exacerbate environmental and economic problems in receiving areas. As one example, many megacities today attract migrants seeking better lives. Migrants often settle in slums where they establish a social network necessary to find employment, earn wages, and send remittances home to support family members. Climate change will affect urban and rural areas with increasingly frequent and violent hazard events. Flooding, intense storms, or droughts, or more gradual changes in regional climates place stress on urban infrastructure and livelihood systems, and could motivate migration. Some of these cities, such as Dhaka, Buenos Aires, Rio de Janeiro, Shanghai and Tianjin, Alexandria and Cairo, Mumbai and Kolkata, Jakarta, Tokyo and Osaka-Kobe, Lagos, Bangkok, New York City, and Los Angeles—are all located in areas prone to sea level rise.

## 2.3. Definitions

Terms and concepts such as environmental or climate change migration, environmentally induced or forced migration, ecological or environmental refugees, and climate change refugees are used throughout the emerging literature, with no general agreement on precise definition(s) (Dun and Gemenne, 2008).

The lack of definitions for migration caused in part by environmental change and degradation is linked to two issues. First, scholars have pointed out the challenge of isolating environmental factors from other migration drivers (Black, 2001; Castles, 2002; Boano et al., 2008). Because environmental factors are in most cases not solely responsible for driving migration, defining the phenomena becomes a complicated task of defining causes and consequences of environmentally induced migration. This is also a reason why quantifying the numbers of environmentally induced migration is problematic. Expert estimates range widely in part because no measurable definition exists.

Second, it has been difficult to define the range of environmentally related migration because of the institutional and governance implications of doing so. Definitions of the "problem" allow an assignment of authority to address the problem. Thus the definition of the concept also strongly influences what institutions bear responsibility for action. This paper uses the working definition of environmentally induced migrants proposed by the IOM: "Environmentally induced migrants are persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (IOM, 2007, p. 1). This working definition is comprehensive, and identifies environmental degradation as an important push factor triggering migration. Its limitations include that it does not distinguish between temporal or permanent migration, nor does it identify the destination of migrants. This definition does not address the circumstances under which people have migrated (voluntary, forced, was return possible?), and does not indicate how institutions and policies might help environmentally induced migrants.

## 2.4. Institutions and policies today focus on economic migrants and refugees

Currently, many different international agreements, guiding principles, norms, and institutions shape governance of human

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[1] The literature on adaptation uses various definitions, ranging from the ability of a system to adjust to moderate potential damage, the ability to take advantage of opportunities, or the ability to cope with consequences (Füssel and Klein, 2006).

mobility. The majority of institutions and policies related to migration fall into two categories: the management of economic migrants, and the management of humanitarian crises and refugees. A few are mentioned below.

### 2.4.1. Do labor migrant frameworks offer protection?

To protect migrants who are workers, the International Labor Organization and other organizations have established a body of laws, norms, and recommendations for the protection of economic migrants (i.e. migrant workers). For example, Convention No. 117 concerning Basic Aims and Standards of Social Policy addresses migration and development, social standards, and the protection against racism or xenophobia in relation to migrant workers (ILO, 1962). The ILO has concluded conventions on the rights of migrant workers (such as the UN Convention on Protection of all Migrant Workers and Members of their Families, adopted on 18 December 1990 and a series of ILO Conventions and Recommendations). Yet member states (especially destination states) have not widely subscribed to these conventions. Under the WTO General Agreement on Trade in Services about 100 member states have made commitments to temporary admission of foreign nationals who provide services on a short-term basis and for highly skilled professionals. These agreements, however, only a few countries have made significant commitments to accept labor migration, let alone other forms of mobility including those discussed in this paper. In the current governance structure, country interests (especially those of industrialized countries) and the implicit system of reciprocity in international negotiations currently provide few incentives for active leadership in reshaping governance for human mobility and environmental change.

### 2.4.2. Refugees and environmental factors?

The 1951 UN Convention and 1967 Protocol on the Status of Refugees (UNHCR, 2006) is well established, but does not clearly offer protection for those affected by environmental factors. The guiding principles on internal displacement (Deng, 1998; Kalin, 2000) also do not address the full range of environmental variables that also bear on displacement. The International Organization for Migration (IOM) has surveyed the limitations of international cooperation on human mobility (Ghosh, 2000).

One set of terms – "environmental refugee" or "climate refugee" – is used often by the media. Yet this term does not offer insights about whether people are able to adapt before the voluntary or involuntary move occurs. The use of the term "refugee" suggests that people have no alternatives for survival. The term also hints that such environmental refugees might be included in existing legal and protection frameworks for political refugees, particularly the 1951 Geneva Convention (see e.g. Renaud et al., 2007; Biermann and Boas, 2008; Myers, 2002, 2005; Conisbee and Simms, 2003). Institutions like the UNHCR, the International Organization for Migration (IOM), the Office for the Coordination of Humanitarian Affairs (OCHA) and others have expressed concern that using the term "refugee" in relation to environmental stressors is a misnomer. UNHCR argues that the term "refugee" in international law refers to persons who flee from and/or cannot return to their countries because of a fear of persecution on specified grounds, or because of generalised violence (e.g. see Guterres, 2008). But even in the case that protection was expanded under a legal instrument such as the 1951 Convention to include "climate refugees," the institutions that currently address asylum issues would not be sufficiently equipped to manage the issue.

Worldwide numerous national, regional, and international systems exist to address the humanitarian and other aspects related to natural hazards, both rapid- and slow-onset. On the side of global environmental change, a wide array of local, national, and international rules, norms, treaties, and organizations exist but few

have explicitly considered the interactions of ecosystems and human mobility (Brown, 2008; Warner et al., 2008; Kolmannskog, 2008). A wider range of issues including disaster risk management, development, natural resource management, and social policy will be needed to address the needs of people who are or could become mobile due in part to environmental stressors. The paper now turns to how institutions and policy affect environmentally induced migration.

## 3. How institutions and policies affect environmentally induced migration outcomes

Distinguishing between rapid- and slow-onset events provides a point of departure for understanding the potential governance needs of migrants, as well as possible gaps in current institutions and policies designed to address human mobility. Fig. 1 helps illustrate areas where institutions and policies may make a difference in environmentally induced migration outcomes.

Rapid- and slow-onset events create a range of migration patterns which require different institutional and policy interventions (see Renaud et al., 2007, 2010). The pace of change in the environment will have a significant influence on the nature of human displacement and migration. Rapid- and slow-onset environmental situations contribute to different migration patterns, ranging from cyclical migration and permanent migration to temporary and permanent displacement, both internally and internationally. In fact, governance plays an important role in affecting whether and how people that could become migrants, as well as migrants themselves, are affected by rapid- and slow-onset environmental change. The approach outlined in Fig. 1 examines the environmental circumstances contributing to a move, including the state of the environment and coping capacities/adaptive abilities of those individuals or communities affected. This step can help begin to articulate institutional and policy frameworks needed to prepare for, prevent or respond effectively to environmental migration within current governance systems. The approach can also help identify areas where new governance approaches could be needed. This is a fruitful area for further research and development.

This section will explore how institutions and policy affect environmentally induced migration by examining recent evidence from case studies in Mozambique, Vietnam, and Egypt.

### 3.1. Empirical evidence: the environmental change and forced migration scenarios project

To contribute to the base of knowledge about the links between environmental change and migration, the European Commission co-sponsored the Environmental Change and Forced Scenarios (EACH-FOR) project.[2] The project investigated a variety of environment-migration linkages and patterns relevant for the current discussion of governance.

### 3.1.1. Case study selection

The project chose case study countries where several different types of migration and environmental processes were already documented. The environmental processes included extreme flooding, desertification, land degradation, water shortages and drought, the potential of sea level rise, and industrial pollution.[3] Case areas were selected to create a "snapshot" of environmental

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[2] The Environmental Change and Forced Migration Scenarios Project was a two year long research project within the Sixth Framework Programme (Policy-oriented research) of the European Commission (EC). Findings, case study reports, policy briefings, and materials from the 2008 Bonn conference on environment and migration (EFMSV) can be found at the project website www.each-for.eu.

[3] For an analysis of the EACH-FOR field methodology, see Warner et al. (2009b).
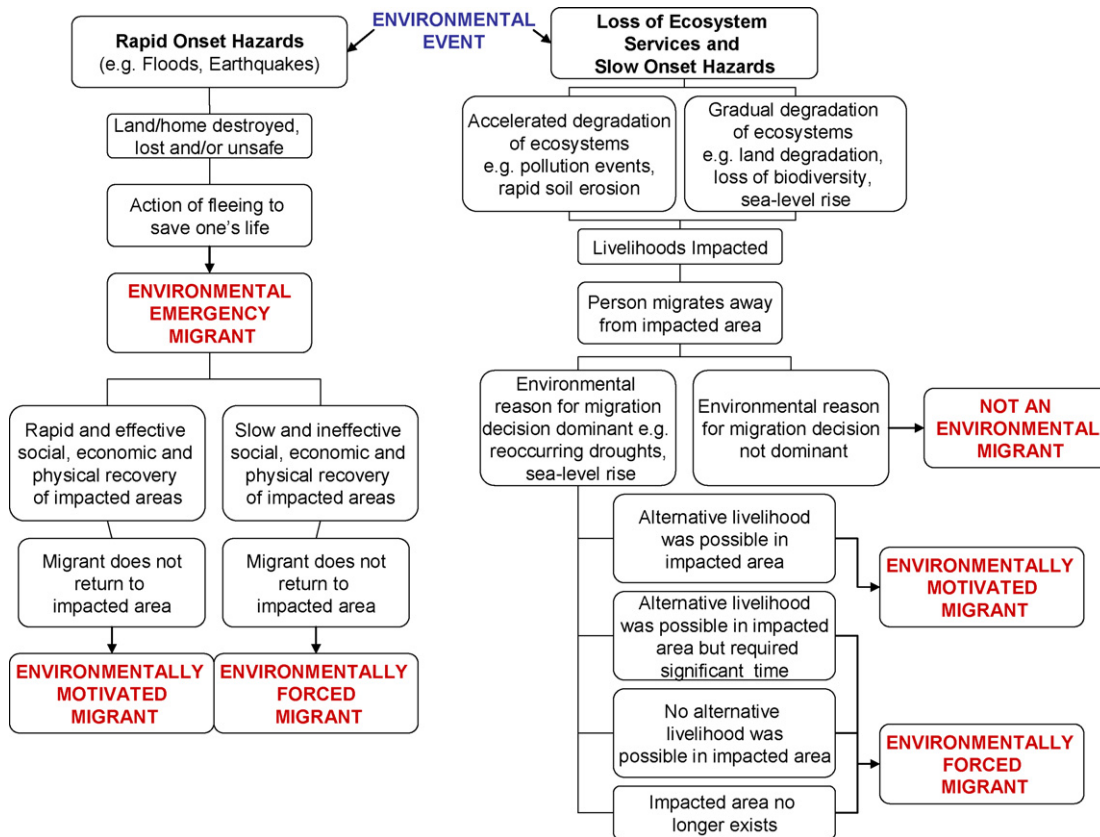
**Fig. 1.** Environmental processes and migration, rapid- and slow-onset events (Renaud et al., 2010).

processes and their possible interactions with migration. This approach allowed the project to identify "hotspot" countries with potentially high descriptive value, but it was noted that multiple environmental processes and complex migration processes occur in each country.

A set of questions was used to explore the central hypotheses of the project. These included: characteristics of migrants moving away from situations of environmental degradation/change, how environmental change interplays with other factors, what factors made it possible for some people to stay while others migrated. The guiding questions were intended to identify cases where environment plays an important role as a contributor to population movement. It tried to find answers related to why people migrated, but future research will need to ask questions such as how well migrants manage once they make it to a new place. The research tried to understand the degree of resilience to change, and role which migration may play in adaptation. Field work took place in 23 case study locations, shown in Fig. 2.

Researchers used a questionnaire with migrants, and non-migrants who had stayed behind in areas with documented environmental degradation. The comparison of migrants and non-migrants was hoped to reveal answers to the central question of the project: what role has environmental degradation or change played in the decision of people to migrate or not migrate? For those individuals that remained behind, the project asked what factors intervened to keep people from migrating, even when they faced environmental problems.

Three of the EACH-FOR case studies are presented below: Mozambique, Vietnam, and Egypt.[4] These cases help illustrate interactions between governance, migration, and rapid- and slow-

onset events. These cases also suggest some of the gaps in human mobility governance today, and the implications for resilience or vulnerability of people to environmental change. Tables 1 and 2 summarize these interactions and indicate how governance (or lack thereof) can affect migration in the face of rapid- and slow-onset environmental stressors.

### 3.2. Rapid-onset environmental change and migration: Mozambique and Vietnam

The occurrence of migration related to rapid-onset events is perhaps the easiest to identify due to the observable nature of the environmental event. People must flee from a rapid-onset environmental event to save their lives. In the aftermath of the event, people are able to return to their origins depending on the degree to which recovery of social, economic and physical characteristics of the affected area is rapid and effective, or slow and ineffective. Table 1 sketches the role of governance in the "voluntary" or "involuntary" nature of return or migration after a rapid-onset event.

#### 3.2.1. Mozambique: flooding and resettlement

In 2001, 2007 and 2008 heavy rains caused flooding along the Zambezi River in central Mozambique. These floods affected approximately 1 million people living in the Zambezi River valley. The floods of 2007 alone displaced over 100,000 people, half of whom were evacuated to temporary 'accommodation centers'. In 2007 another tropical cyclone, Cyclone Favio, increased the number of homeless people in Mozambique following the flooding of the Zambezi River. During repeated catastrophic flooding, affected people lost their homes and livelihoods including their harvest and access to medical facilities, sanitation and safe drinking water (Stal, 2009).

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[4] For further information about the Mozambique, Vietnam, and Egypt case studies, refer respectively to Stal (2009), Dun (2009) and Afifi (2009b).
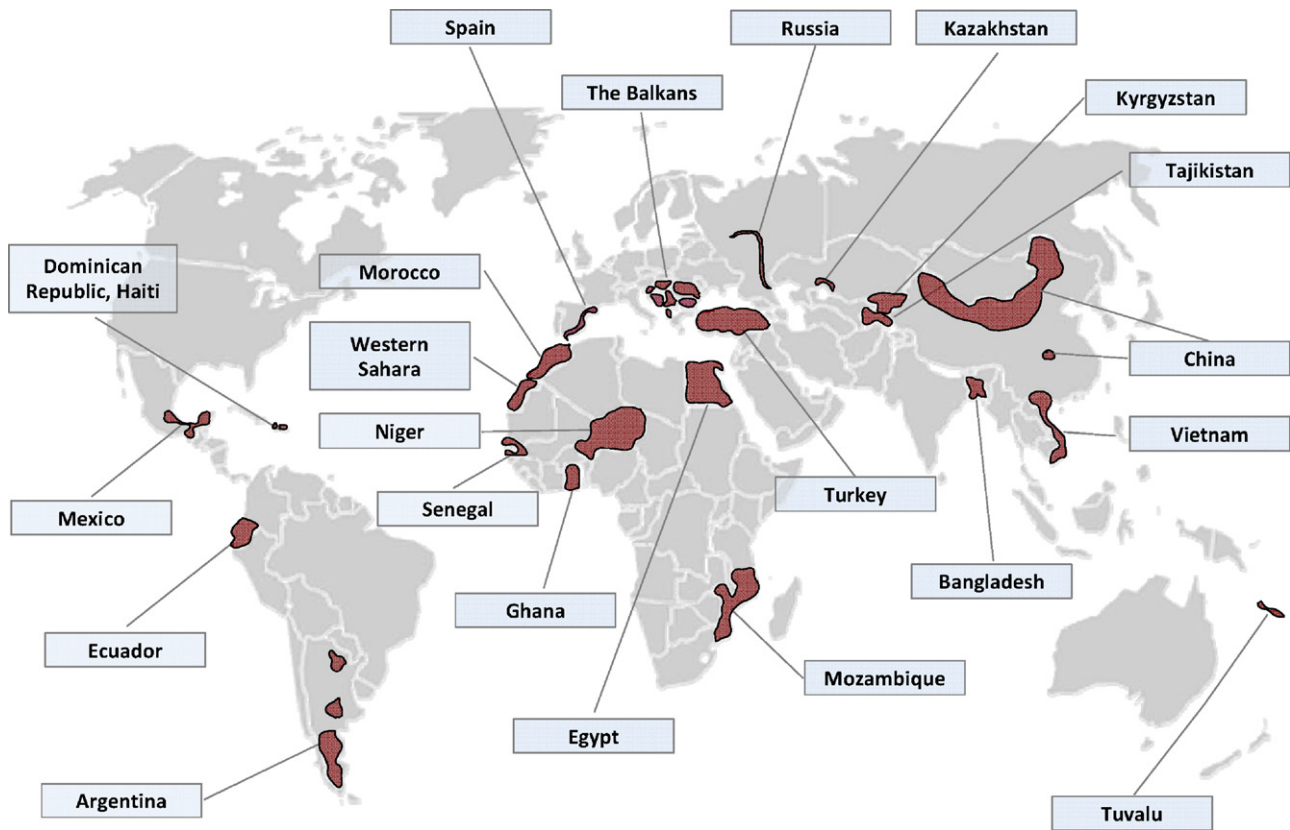
Fig. 2. EACH-FOR case study locations (www.each-for.eu).

International humanitarian aid following the 2001 floods was unprecedented at the time. In subsequent years the government encouraged resettlement away from dangerous flood plains by providing incentives such as infrastructure in a work-for-assistance program. In exchange for making bricks, the government promised to pay for other construction materials and technical assistance for houses and multi-purpose community buildings. Interviews with displaced people living in resettlement centers indicated that before the flooding the respondents had never been migrants but had only temporarily evacuated the flood plains and then returned when waters receded. Most indicated that they had lived in low lying river areas that flooded frequently during the rainy seasons. Their decision to resettle elsewhere was voluntary (in order to move to a flood-safe area) or they had been moved by the government. Most of the respondents indicated that flood-safe areas are prone to drought, but subsequent onward migration is not likely for them, because of the lack of alternative livelihoods and dependence on government-provided infrastructure and services. The relocation plan moved villages together to minimize the impact on social networks. NGOs offer training for farming techniques suited to the drought-prone conditions in resettlement areas. Yet many able-bodied people leave the resettlement areas during the planting and harvesting season in flood plains. Children and elderly remain behind.

Resettlement contributed to other issues like deforestation, soil erosion and water scarcity. Resettlement did not clearly build resilience to environmental change, although it did protect people from drowning. More frequent crop failure due to flooding or drought exacerbates the vulnerability of people both in resettlement areas and flood plains. Resettled people remain heavily dependent on governmental and international aid. Without humanitarian assistance and government funding, experts and interviewees suggested people may need to migrate longer

distances or across borders. If extreme weather events continue to impact Mozambique in the future, environmental factors will increase as push factors for migration (Stal, 2009).

### 3.2.2. Mekong Delta: flooding, livelihood deterioration, and relocation

Environmental degradation, particularly flooding, is a contributing factor to rural out migration/displacement in the Mekong Delta of Vietnam. In the Mekong Delta, floods occur slowly and are part of an natural annual cycle as part of the lowland topography and the location of the Delta at the base of the river. The Mekong Delta is home to 18 million people, or 22 percent of Vietnam's population. It provides 40 percent of Vietnam's cultivated land surface and produces more than a quarter of the country's GDP. Half of Vietnam's rice is produced in the Mekong Delta, 60 percent of its fish-shrimp harvest, and 80 percent of Vietnam's fruit crop. 90 percent of Vietnam's total national rice export comes from the Mekong.

Flooding plays an important role in the economy and culture of the area. People live with and depend on flood cycles, but within certain bounds. For example, flood depths of between half a meter up to 4 m are considered part of the normal flood regime upon which livelihoods depend, so-called "nice floods". Flood depths beyond this, however, begin to challenge the resilience capacities of affected people. Dun notes (2009, p. 6): Over the past four decades the frequency of major 1 in 50 year floods of the Mekong River has been a major concern (Lettenmaier, 2000 in White, 2002: 11) while flood patterns for the Mekong Delta show a worsening trend (Be et al., 2007).

People in the Mekong Delta face multiple challenges of environmental and developmental stressors: natural hazards, rapid socio-economic change in Vietnam and upstream countries sharing the Mekong River, and longer-term sea level rise (Dun, 2009; Le et al., 2007). Farmers, fisherfolk, and others who depend

**Table 1**
Rapid-onset events, environmentally induced migration, and governance gaps.

| Rapid-onset hazards (e.g. floods, hurricanes/cyclones): gaps related to humanitarian assistance, rehabilitation, legal status/protection of affected migrants | | | | | |
|---|---|---|---|---|---|
| Time period | Role of environment | Intervention | Governance gap? | Explanation | Comment |
| Immediate aftermath of a rapid-onset event (often the first 72 h or week following an event). | Land/home destroyed, lost and/or unsafe. People flee to save their lives. | In immediate aftermath, quality and quantity of (humanitarian) response important. 2 alternatives in recovery phase. | Partial gap | Humanitarian organizations equipped to respond to disasters, but not necessarily to adequately manage larger scale or longer-term displacement (some soft law provisions, such as for IDPs). | Increasing frequency and intensity of such events stretches capacity of humanitarian organizations, donor fatigue. |
| | | IF rapid and effective social, economic and physical recovery of impacted areas ("good" governance) —migrant has a choice whether to return to impacted area. | Gap | If migrant does not return to impacted area, becomes "environmentally motivated migrant" for which no current governance framework is established. | No legal category or status for environmentally motivated migrant. |
| | | IF slow and ineffective social, economic and physical recovery of impacted areas ("poor" governance)—migrant may not be able to return to impacted area. | Gap | If migrant does not return to impacted area, becomes "environmentally forced migrant" for which no current governance framework is established. | IDP framework potential could cover the needs of internally displaced forced migrants, but environmental factors are not currently recognized (some exceptions). |

directly on the environment for work face an uncertain future where adaptation will be necessary. For some, seasonal migration to urban areas may represent one of a variety of ways to cope with increasing variability and risk (ibid). In the longer-term, the combination of sea level rise and hazards like flooding could reduce adaptation options. n the absence of effective policy interventions, such changes will contribute to permanent displacement of many people in the Mekong (Warner et al., 2009a,b). Even for those people who will be potentially or are currently affected by environmental change in the Mekong Delta, there is little awareness of these changes. The government in Vietnam has begun to implement a program of "living with floods" (Dun, 2009).

This EACH-FOR case study indicated that lack of alternative livelihoods, deteriorating ability to make a living in the face of flooding, and debt contributed to the migration "decision". Appropriate governance interventions can dampen these effects, yet lie more in the realm of development rather than the management of human mobility or environmental problems. People directly dependent on agriculture for their livelihood (such as rice farmers) are especially vulnerable when successive flooding events destroy crops. This can trigger a decision to migrate elsewhere in search of an alternative livelihood. In Phnom Penh one Vietnamese migrant noted, "Flooding occurs every year at my former living place. I could not grow and harvest crops. Life therefore was very miserable. Besides my family did not know what else we could do other than growing rice and fishing. Flooding sometimes threatened our lives. So we came here to find another livelihood" (Dun, 2009, p. 14).

During the flooding season, people undertake seasonal labor migration and movement towards urban centers to bolster livelihoods. One migrant said, "My family had crop fields but in recent years, floods occurred very often so the crop was not stable. In addition, the price of fertiliser increased very fast, the diseases of the rice plant are too much so the crop yield was nothing. Even sometimes the yield was not enough to cover the amount required for living" (Dun, 2009, p. 15). As an extreme coping mechanism, anecdotal information from fieldwork pointed to human trafficking as one measure adopted by some families who have suffered from water-related stressors. A migrant interviewee referred to the financial vulnerability of her family related to flooding, "Disasters occurred so often—my family lost the crop, my family had to borrow money to spend. Now, my family is not able to pay off the loan so I have to come here to work to help my family to pay the loan."

The government is also currently resettling people living in vulnerable zones along river banks as part of its flood management strategy (Huan, 2003). By 2020 almost 20,000 landless and poor households are marked for relocation (Dun, 2009, p. 15). Although the "residential clusters" are usually located only 1–2 km away from the former residence, moving people out of established social networks threatens their livelihoods. People planned for relocation have nowhere else to move if their houses collapse and are often too poor to move to urban areas. For these people, social networks provide the link to livelihoods. Most rely on day-to-day employment as laborers. These resettlement programs allow families to take up a 5-year interest free loan to enable them to purchase a housing plot and basic house frame. Households may need a further loan to complete building the house (People's Committee of An Giang Province 2006). Some clusters may not provide infrastructure services like access to schools, health, or water and sewage treatment facilities (Dun, 2009). Such governance issues affect whether and how migration and displacement occur in relation to environmental change, described in Table 1.

### 3.2.3. Governance gaps: rapid-onset events and migration

For rapid-onset events, humanitarian organizations lead the efforts to assist people affected by and possibly displaced by

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**Table 2**

Slow-onset events, environmentally induced migration, and governance gaps.

| Slow-onset hazards: gaps related to livelihood protection, resettlement and legal issues (including sovereignty for sinking islands) | | | | | |
|---|---|---|---|---|---|
| Time period | Role of environment | Intervention | Governance gap? | Explanation | Comment |
| Accelerated degradation of ecosystems like pollution events, rapid soil erosion. Livelihoods impacted, contributing to migration. | Environmental change contributes to worsening livelihood situation. | Are effective interventions undertaken to protect livelihoods, and in ways that are relevant to human mobility (i.e. facilitating mobility where appropriate, or facilitating "staying" where appropriate). 2 alternatives, depending on efficacy of livelihood protection and governance interventions | Gap | Mix of gaps in development governance, overlaid by environmental and climate change. Existing governance of human mobility does not account for environmental reasons contributing to livelihood degradation. Livelihoods are governed largely within the realm of development, and environmental degradation is largely within the realm of environmental protection. | Potential for interventions to reduce vulnerability, enhance resilience, develop livelihood alternatives, improve risk management alternatives. Need to involve affected people in the definition of intervention and adaptation alternatives—ranging from helping people remain in their traditional homes, facilitating movement where appropriate (possibly in larger groups of people), and involving affected people in resettlement decisions and design. |
| Gradual degradation of ecosystems like land degradation, loss of biodiversity, sea level rise. Livelihoods impacted, contributing to migration. | | If an alternative livelihood is possible in affected area, then people have a choice of whether to migrate or not. | Gap | | |
| | | If an alternative livelihood was not possible in the relevant time period, or if the impacted area no longer exists then people may have no choice and may be either displaced or forced to migrate | Gap | | Lack of legal provisions for resettlement and sovereign resettlement. Little policy dialogue about resettlement between countries or facilitated by relevant institutions |

environmental hazards, in coordination with national governments and donors. Yet environmental change today blurs the mandates of humanitarian organizations. Traditionally, these organizations have provided relief and disaster assistance. Increasingly today, however, they are faced with more frequent and intense disasters, as well as longer-term displacement issues. There are some provisions, such as in soft law, for the protection of internally displaced people, but these are often specifically related to conflict situations where development agencies and organizations are less able to intervene. Humanitarian organizations could face a capacity challenge if the number of rapid-onset events and the number of people affected by them grows significantly. One report noted: "In the last 20 years the recorded number of disasters caused by floods has increased by 300 percent—from about 50 to more than 200 events. Floods and storms now trigger the bulk of sudden-onset international humanitarian responses. Of the 26 UN Flash Appeals issued since January 2006, 18 have been in response to floods and cyclones" (Kirsch-Wood et al., 2008, p. 40).

The efficacy of governance plays a critical role in whether environmental emergency migrants will return, or whether they will become environmentally motivated or environmentally forced migrants. Environmentally motivated migrants will likely need support in integration, establishing livelihoods in new areas, and protection from any number of discriminatory practices. Soft law such as the Guiding Principles on Internally Displaced People may protect these people to some extent, but the lack of recognition of environmental stressors as a legitimate cause of migration may limit effective assistance or protection. Following the 2002 earthquakes in El Salvador or the 2005 Hurricane Katrina, governments like the U.S. have granted temporary visas for migrants so that they could work and provide remittances and assistance to affected family members. It is unclear whether such practices will become an international norm, hence a partial gap exists.

### 3.3. Slow-onset events and migration: Egypt

For slow-onset events, the intervening factors that prevent or enable people to return (or avoid migration and displacement in the first place) become more complex. The urgency for flight is temporally less pressing because the rate of environmental change is slower. People may not have a choice to return to their former place of residence due to the physical loss of their land, e.g. due to coastal erosion or sea level rise. However, in cases where the physical land is still available, people may have the opportunity to return to their original place of living, particularly if they can implement alternative livelihoods. Accelerated or slower environmental change affects the livelihoods of people to a degree that some or all household members migrate. A challenge is understanding the relative importance of environmental factors in affecting the livelihoods of people, which in turn can be a push factor in migration. In some cases, alternative livelihoods or other coping capacities are possible in the affected area. Yet people may still choose to leave the area, anticipating worsening conditions. If alternative livelihoods are not possible in the relevant time frame, or if the impacted area ceases to fulfil its function (such as succumbing to desertification or sinking below the sea level) then forced migration could occur. Policy interventions will largely shape the outcome, as described in Table 2.

#### 3.3.1. Nile River Delta: desertification and sea level rise, resettlement efforts

In Egypt slow-onset events like sea level rise and desertification affect the Nile Delta. The total area of the Arab Republic of Egypt is about 1 million km$^2$, most of which has an arid and hyper-arid climate. The most productive zones in Egypt are the Nile Delta and

Nile Valley (3 percent of the total land). Projected increases in sea levels will pressure a quickly growing population into more concentrated areas. Desertification and soil degradation claim large swaths of land in the Eastern and Western Nile Delta. The overall area influenced by the active encroachment of sand and sand dunes is estimated to be roughly 800,000 ha (Hegazi and El Bagouri, 2002). Land productivity has diminished by about 25 percent compared to its original productivity (Arab Center for Dry and Arid Area Studies 2000). The annual erosion rate has been estimated between 0.8 and 5.3 ton/ha/year (Desert Research Center et al., 2005). Desertification and land degradation drive some people to migrate internally in search of livelihoods. In the future, sea level rise could affect an additional 16 percent of the population (Dasgupta et al., 2007).

The government of Egypt combats desertification through an internal migration scheme related to the Mobarak National Project in the Western and Eastern Delta. The program was initially designed to alleviate environmental programs but also unemployment, poverty, and overpopulation in Cairo, Beheira, Kafr El-Sheikh and Qalioubia. This project aimed to create an internal urban-to-rural migration flow towards the edges of the Delta.

People who were resettled in the *Eastern* Delta were mainly unemployed young men from urban slums. In contrast, the people who moved to the *Western* Delta were mainly farmers affected by a law that favoured land owners who could easily drive away sharecroppers from desirable agricultural areas. After eviction, the sharecroppers were moved by the government to the Western Delta.

The program allocated each sharecropper/farmer in the Eastern and Western Delta a land parcel of 10,500 m$^2$. The new immigrants received shelter, agricultural extension and veterinary services from the government and NGOs. Government funding provided migrants with pesticides and artificial crop pollination. Yet initial investments and incentives to encourage poor people to migrate to new areas tapered off with time. The Western and Eastern Delta lack access to potable water, proper infrastructure, public facilities, schools, health care and well functioning sewage systems. Consequently many migrants did not stay and others are expected to leave either to other regions or to return to their original regions. Today, only half of designated resettlement land has been utilized.

#### 3.3.2. Governance gaps: slow-onset events and migration

The table above also examines some of the gaps for slow-onset events. These events can happen at an accelerated or gradual rate, and are manifested through a deterioration of livelihoods or quality of life. It is possible that existing institutions can make effective interventions to protect livelihoods, and in ways that are relevant to human mobility (i.e. facilitating mobility where appropriate, and facilitating "staying" where appropriate). There is a potential for interventions to reduce vulnerability, enhance resilience, develop livelihood alternatives, improve risk management alternatives, etc. Yet some institutions with proficiency in such areas — like livelihood creation and protection — are not a full part of the governance regime for human mobility.

Gaps also exist in legal provisions for resettlement and sovereign resettlement. Dialogue about resettlement practice is limited. A gap exists in involving affected people in the definition of intervention alternatives—ranging from helping people remain in their traditional homes, facilitating movement of households or larger groups where appropriate, and involving affected people in resettlement decisions and design. These are challenges that are already observed in some coastal areas. For example, in the case of Shishmaref, Alaska, local, state, and federal authorities are struggling to address accelerating coastal erosion that is forcing several communities to relocate (Bronen, 2008). Even in this setting of arguably strong institutions and state and federal

funding, a 2006 study identified several critical governance gaps that require attention if relocation is to occur: no government agency has the authority to relocate communities, no funding is designated for relocation, and no criteria are defined for identifying relocation sites (US Army Corps of Engineers 2006). Governance in developing countries may face even more challenges in trying to resettle people threatened by environmental change.

### 3.3.3. Those who remain behind

The focus of some political and academic debate is centered on migrants or refugees, rather than the question of people who remain behind (Zetter, 2008). Some people who remain behind may be able to do so because of resilient capacity, an ability to adapt to changing environmental conditions. These people may be vulnerable, but they are not always helpless. People who do not migrate away from environmental change can be active agents with resilient characteristics. Literature on social capital and networks suggests that there are public and private elements of adaptive action, based on trust, reputation, and reciprocal action of those individuals involved. In many cases, adaptation to environmental and climate change will be in the form of collective action at the community level (Adger, 2003). In coupled social–economic systems, adaptive activities can enhance resilience of communities against rapid- and slow-onset environmental change, particularly if networks of people share their learning experiences.

There may also be circumstances where people are forced to remain behind or are unable to migrate because they lack education or vocational skills, lack social networks, or are too poor to move. The current governance regime does not account for those who remain behind—both those with resilience capacity and those who have no opportunity to move away. This constitutes a gap in the governance of human mobility. Future studies could compare and contrast motivation for staying and leaving in order to offer insights about the differences that there might be between those who leave and those who stay behind.

In sum, appropriate governance interventions can potentially enhance resilience and adaptive capacity. Yet existing gaps, identified in the case studies and discussion, pose challenges. Mechanisms and policy processes for managing environmental change largely ignore human mobility issues, although awareness about the interrelations has increased recently. Existing mechanisms for managing human mobility cover economic migrants and humanitarian crises, rather than environmental change.

Governance solutions for rapid-onset stresses such as extreme weather events tend to be organized around disaster management and emergency relief, providing temporary assistance in times of acute need including addressing the needs of migrants and displaced persons. The institutions designed to provide such relief cluster around humanitarian organizations. The governance solutions for slow-onset events such as drought do have some of the characteristics of the prior category, in that activities tend to be organized around food security once acute need is manifest. To some extent, there are overlaps in approaches. However, for other slow-onset issues linked to migration and displacement — such as land degradation, coastal erosion and sea level rise, long-term shifts in water availability and quality — the institutional landscape includes development agencies, ministries of water and agriculture, and some transboundary initiatives. These institutions attempt to govern complex social–ecological systems, yet they may not have a mandate to address human mobility issues. Particular governance gaps exist for managing human mobility linked to slow-onset environmental change. Governance structures are needed that address environment-related livelihood loss, as well as resettlement and legal issues.

The paper has explored how institutions and policies affect environmentally induced migration, and gaps in current gover-nance frameworks for rapid- and slow-onset environmental change. It now looks at what impacts environmentally induced migration will have on existing institutions and policies.

## 4. What impacts will environmentally induced migration have on existing institutions and policies?

This section discusses challenges for institutions and policies in the future and asks whether new forms of governance are needed to address environmentally induced migration. A few opportunities are identified to enhance the resilience of both migrants and those who remain behind.

### 4.1. Challenges: short-term, emergency-focused institutions and policies

#### 4.1.1. Institutional and policy "silos"

Silos of institutional management will be hard pressed to effectively address the needs of migrants and their families if the wider context of resilience and adaptation is not considered. Some facets of the current governance system may actively encourage approaches that may be too narrow to manage complex issues like environmentally induced migration. For example, the management of human mobility today falls largely within the mandates of international humanitarian organizations, and national governments. Humanitarian organizations focus traditionally on crisis and disaster management, often with a short-term perspective and not with the goal (or capacity) to maintain long-term guidance, support, and protection.

#### 4.1.2. Where to administer help?

Dynamics of migration and coupled social–ecological systems today make it less clear where and how to administer help: at the source of environmental degradation and where people stay behind, for migrants in transit, or in receiving communities including the Diaspora. This has the potential to create differentiated groups with different capacities and needs. While large groups of people may migrate together in the future, even among such a group there may be little homogeneity, save the unifying environmental stressor that set them on the move. Environmental change will affect what individuals or households in a community become mobile. Characteristics like gender, age, socio-economic status will all affect unfolding patterns of environmentally induced migration. In the face of slow-onset environmental change those who are able to move — those with money, social networks, and alternative livelihoods — may migrate independently. The vulnerable poor, those with no capacity to move, the very young and the elderly may be left behind initially, and forced to resettle later. Gender and demographic structure also play a role in environmentally induced migration patterns. Property rights, resource distribution and family roles affect men and women's migration patterns, particularly when the environment becomes a strong push factor. Young healthy males forced to abandon their farming lands will have different governance demands than a household of young children and aging parents, headed by a single mother in flight from advancing deserts or a hurricane. One group may need livelihood assistance, another may need resettlement assistance, another may need humanitarian assistance, and all may need some kind of differentiated legal protection.

#### 4.1.3. Authority

Several questions related to authority arise for the future: what institutions will have authority to classify environmentally induced migrants, protect the interests of receiving or sending countries? The international community can play a role in shaping norms and standards related to environmentally induced migra-

tion (for example, the role it has played in creating principles for internally displaced people (IDPs)). Yet nation states will largely remain the implementing actors and will retain authority for classifying and administering assistance to environmentally induced migrants, motivated or forced. A number of operational issues arise: how can the voluntary or forced nature of environmentally induced migration be determined and by whom? Would those who migrate voluntarily be able to qualify for government assistance, even if their choice to move was not part of a government policy or program? In Mozambique, Vietnam, and Egypt, the government relocated people into planned settlement areas, but more needs to be known about how decisions were made and how programs were sustained over time.

### 4.2. Are new modes of governance needed?

Current institutional frameworks for managing migration and environmental change divide institutional management and responsibility along lines of environmental, migration, and humanitarian needs (Zetter, 2008). Likewise for governments, many of the environmental stressors they face within their territories result from transboundary issues including river delta management, desertification, and climate change. Responses and management often occurs within a country's borders and within specific ministerial lines (i.e. environment ministry, agricultural ministry, disaster management, immigration services, etc.) (Vlassopoulos, 2008). This structure is partly suitable to address some forms of environmentally induced migration. For example, following rapid-onset disasters, governments and humanitarian organizations mobilize to provide assistance to environmental emergency migrants on a largely short-term basis.

For longer-term displacement, however, assistance of different forms and of more durable nature may be required. Institutional responsibility and governance become more blurred for slow-onset events such as drought. For example, in case studies of Niger, the Nile Delta, and the Mekong Delta, migration occurred when slow-onset environmental change altered the ability of people to maintain their livelihoods and a certain quality of life. In these cases, the vulnerability of both those that departed and those that remained behind increased (Afifi, 2009a,b; Dun, 2009). Gradual changes in ecological systems and related social shifts will require that governance address the vulnerability of those who migrate or are displaced as well as those remain behind. Ideally, this governance would be comprehensive and coordinated to prevent "protection gaps" (Kolmannskog, 2009).

### 4.3. Opportunities to enhance resilience of both migrants and those who remain behind

Despite challenges, opportunities exist for institutions and policies to play a mediating role in the form that environmentally induced migration takes. Effective policy interventions may increase the quality and quantity of alternatives available to people faced with environmental pressures, therefore preventing human mobility from becoming a humanitarian crisis. States will implement policies and institutions that will largely make a difference in whether environmental factors including climate change motivate (other options available, including return) or force (few if any options available) migration and displacement. These governance interventions will therefore play a leading role in determining the degree to which migration is a form of adaptation, or an indicator of a failure to adapt.

#### 4.3.1. Guiding principles and dialogue

Recognizing that states will be the main implementing actors, sets of guiding principles can be established to assist countries in the implementation of policies that govern environmentally induced migration. A more substantial evidence base of cases and lessons learned from practice is needed to support such a set of principles. Policy dialogue, especially at the national level, is needed to understand how climate change impacts affect livelihood potential. It would be useful to provide a dialogue platform for exchange about the experiences in countries which are already using resettlement programs as a response to environmental stressors. Migration is a livelihood issue not only reflecting where people are emigrating from, but also where they are immigrating to. Little is known about the longer-term capacity of receiving countries to accommodate larger numbers of (environmentally forced or motivated) migrants (Warner and Laczko, 2008b).

#### 4.3.2. Foster adaptive capacity through migrant networks

There is potential to foster adaptive capacity and resilience in migrant networks. Migrants often remain linked to communities that remain behind, whether as individual migrants or as larger groups such as environmentally displaced people. These links may be material (remittances), cultural/social, or political, and shape the resilience and adaptation capacity of both those who leave and those who stay (Adger et al., 2001). Networks provide security for migrant passage and livelihood security. Effective networks mutate to adjust to changes in external circumstances and in response to internal changes among network members. Research indicates that networks are perceived by migrants as having costs (obligations to help others in the network, sanctions against detrimental behavior) and benefits (gaining information, access to livelihoods or entitlements). When internal and external cost-benefit surrounding a network changes, such as when environmental conditions change, a member can become more inclined to actively participate, stay in, or rejoin a network.

#### 4.3.3. Flexible policies and institutions

An opportunity and challenge for governance systems is to create policies and actions that flexibly manage migration and environmental change, which in themselves are highly dynamic and non-linear processes. This may mean a combination of approaches that have been shown to be effective in the past, including: improving education and training that facilitate access to alternative livelihoods in communities affected by environmental change; technical measures that complement better resource and land management; enhancing access to other types of risk management tools such as risk sharing and risk transfer tools like (micro)insurance.

#### 4.3.4. Participation in policy formation

Migrants face high costs in creating and preserving new network ties, which requires the development of mutual trust and obligations, and social ties. New links are time- and resource-intensive, and these links are also geographically fragile. Resettlement or other mobility can interrupt networks and represent a loss of investment and risk diversification. When resources like ecosystem services become scarce, migrant networks commonly "resize" themselves. Instead of cleanly breaking from a kin-based network, network boundaries are often redrawn to manage conflict and redefine mutual obligations. Because of the complex and dynamic nature of social networks among migrants, one conclusion for governance is that people should be actively involved in planning activities such as resettlement, and as much as possible be given the freedom to move and react to micro-level incentive structures. Heavily controlled migration management systems may be ill-equipped to address the nuances of migrant needs in the face of environmental change and the fluid boundaries of migrant networks and other resilience or adaptation capacities.

## 5. Conclusions

Understanding coupled social–ecological systems is crucial for the analysis of human migration. It is not only environmental change which affects migration outcomes — clearly migration and displacement are multi-causal issues—but also how socially mediated factors interact with those environmental factors which affect the outcome. This paper addressed some of the governance challenges posed by migration and displacement related to environmental change. Socially mediated factors including governance help determine whether people threatened by rapid- or slow-onset environmental change can remain in their homes, or return once the threat has passed. In the aftermath of Hurricane Katrina, out of the 1.5 million people displaced, only one-third returned. Governance played a large role in that instance, underlining the need to understand how social and ecological factors interact and shape human mobility in the face of global environmental change.

Empirical evidence has begun to be gathered about the relationships between environmental change and migration, yielding insights about the variety of patterns and contexts of the phenomena today. The EACH-FOR project found that environmental factors do contribute to migration in the cases observed, particularly through pressures on livelihoods (EACH-FOR 2009): in Mozambique and Vietnam, people are affected by rapid-onset flooding; in Egypt the slow-onset hazards of desertification today and sea level rise in the future contribute to migration. Environmental change, particularly climate change, is expected to affect all three areas in serious but differing ways. Increasingly frequent and violent storms will affect Mozambique and Vietnam with a high degree of certainty (IPCC, 2007). Sea level rise of 1 m would displace more than 10 percent of the populations of Egypt and Vietnam due to flooding in the Nile and Mekong Deltas. In all three cases national governments are experimenting with resettlement programs, in which traditional institutions with a mandate to offer humanitarian or other forms of assistance or protection to people on the move have played a role in varying degrees.

Existing strategies of humanitarian relief will help some people fleeing from rapid-onset disasters. However, the analysis suggests that new governance modes are needed to bridge gaps in protection and assistance for environmentally induced migrants who cannot return after disasters, and people made mobile because of longer-term environmental change. New governance approaches will need to consider the role of migration in adaptation: not only will support be needed for migrants, but also for those that remain behind. These new modes of governance must take into account dynamic social and migrant networks, and enhance resilience in flexible rather than control-based ways. Both established modes of governance and new modes of governance are needed to improve society's ability to manage environmentally induced migration. This challenges the notion of what needs to be controlled, and what needs to be governed flexibly.

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