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Accommodating Migration to Promote Adaptation to Climate Change

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Accommodating Migration to Promote Adaptation to Climate Change

A policy brief prepared for the Secretariat of the Swedish Commission on Climate Change
and Development and the World Bank World Development Report 2010 team

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Summary

This report explains the ways in which climate change may increase future migration, and the risks associated with such migration. It also examines the way some of the migration that will arise from climate change may enhance the capacity of communities to adapt to climate change.

Climate change is likely to result in some increase above baseline rates of migration in the next 40 years. Most of this migration will take place within developing countries. There is little reason to think that such migration will increase the risk of violent conflict. Not all of the movements in response to climate change will have negative outcomes for the people that move, or the places they come from and go to. Migration is a tried and true development strategy, and it can do much to increase the capacity of communities to adapt to climate change. The fewer choices people have about moving, however, the less likely it is that the outcomes of that movement will be positive. Involuntary resettlement should be a last resort.

Many of the most dire risks arising from migration exacerbated by climate change can be avoided through careful policy. This report describes many of the policy responses that can be taken to minimise the risks associated with migration in response to climate change, and to maximise the ways in which migration can increase adaptive capacity. These include: ensuring that migrants have the same rights and opportunities as their host communities; reducing the costs of moving money and people between areas of origin and destination; facilitating mutual understanding among migrants and host communities; clarifying property rights where they are contested; ensuring that efforts to assist migrants include host communities; and strengthening regional and international emergency response systems.

1. Introduction

The international community has become increasingly concerned about the implications of climate change for migration, and the adequacy of existing institutions to manage increased flows of people so that they do not impact on the development and stability of host populations. A number of recent reports and media articles have highlighted the problem, and estimates of numbers of people to be displaced have emerged. These reports have for the most part focussed on estimates of increases in the number of people exposed to environmental transformation as a result of climate change across large regions (i.e. Africa, and Asia). They rarely recognise the potential for spontaneous and planned adaptations to reduce vulnerability to environmental change, and they do not adequately recognise that migration is itself a strategy to sustain livelihoods in the face of environmental and economic perturbations and change. Indeed, there is growing recognition among researchers studying the effects of migration on households and communities that in many cases migration enhances the sustainable development of both sending and host areas.

There seems, therefore, to be some inconsistency between the spate of recent dramatic reports about the risks of climate change and migration, and the evidence about environmental change, migration and development. Recognising this, the Secretariat of the Swedish Commission on Climate Change and Development and the World Bank's team preparing the *World Development Report* 2010 on 'Development in a Changing Climate' have identified migration as one of the issues they would like to explore further through a targeted policy brief. The terms of reference for this brief are to "document the pertinence of mobility as an adaptive strategy for the poor, the associated policy and institutional challenges, and examine both the positive and negative aspects of mobility". The brief requested that the conclusions be formulated in the form of concrete recommendations for decision makers on how to support mobility as an effective adaptation strategy.

This report is based on critical reviews and synthesis of literature on: climate change and migration (and on environmental change and migration more generally); resettlement; migration and development; and environmental migration and violent conflict. It argues that while climate change is likely to result in some increase above baseline rates of mobility in the next 40 years, many of the most dire risks arising from this increased mobility are amenable to management through aid, development, and migration policies. It then examines the lessons emerging from research on migration and development to argue that there is considerable potential to harness migration to promote adaptation to climate change in both sending and host communities. The report also explains the challenges associated with the resettlement of entire communities, arguing that this is a last resort option that should be avoided as much as possible. It concludes with specific recommendations about policies and

institutions to maximise the benefits and minimise the costs of migration arising from climate change.

An important caveat to this report is that it restricts its discussion of climate change to a 2°C rise in global average temperature above pre-industrial levels, which is now inevitable, and is most likely to have occurred by the year 2050 (Anderson and Bows 2008, IPCC 2007, Ramanathan and Feng 2008). The conclusions made here about the impacts of climate change on migration, and the suggestions for accommodating migration to enhance adaptation therefore apply up to the limit of a 2°C rise in global average temperature, both because this is now widely understood as the level beyond which climate change becomes 'dangerous', and because forty years hence is already an extremely long time frame in terms of policy and planning.

The closer global average temperature comes to a 2°C rise the less confident we can be about the impacts of climate change on migration, and about the contribution that migration can make to adaptation. As global average temperature moves beyond a 2°C increase above pre-industrial levels, and as populations increase, the likelihood of large scale population movements increases. However, there is insufficient evidence upon which to make reasonable speculations about the magnitude, patterns and consequences of this movement. The plausibility of discussions about migration arising from more than 2°C of warming will increase as our experience of the impacts of climate change on social and ecological systems increases in a progressively warming world.

2. Climate Change and Migration

Understanding how climate change may influence migration requires understanding the relationship between environmental change and migration, how climate change exposes people to risks, and existing estimates of the number and distribution of likely climate migrants. This section explains each of these three issues.

Environmental change and migration

Since at least 1988 climate change has been identified as a potential driver of migration (Jacobson 1988). This recognition has been part of, and informed by, a larger debate among researchers about the relative influence of environmental change on migration. An understanding of this debate is necessary for an understanding of the likely effect of climate change on migration. The following pages summarise the key features of this debate, what is known about migration in response to extreme events and slow onset environmental changes and what is known about the effect of influxes of migrants on local environmental conditions.

Key issues in the debate about environmental change and migration

Knowledge of the relationship between environmental change and migration is limited, a point recognised by almost all researchers working on this topic (Döös 1997). This is in part because of the complexity of issues that fall under the broad heading of 'environmental migration'. Migration in which environmental change may be factor can be in response to various kinds of sudden onset disasters or slow onset changes (indeed usually a combination of both), and it may comprise movements over short distances or long distances, and for short periods or very long periods. The causes and consequences of migration are also highly dependent on the social and ecological contexts from which people move and to which they move (Locke et al. 2000).

What one concludes about the outcomes of migration caused by climate change depends on the unit and metric of analysis. For example, while there is evidence to suggest that both developing and developed economies can increase growth from international migration, the effects of that migration on women within households that send migrants may be negative (Kothari 2003). To give another example, from the perspective of urban planners rural-urban migration may be the antithesis of development, from the perspective of rural families it contributes positively to development (De Haas 2007).

One of the issues in the debate about the extent to which environmental change causes migration is the degree to which such movement is 'forced' or 'voluntary'. The issue here is the extent to which migrants have choices, with some arguing that while migrants

always choose, the choice may between staying and starving, or exposing themselves to the risks associated with movement. Migrations associated with famine events, for example, would seem to be more appropriately described as forced rather than voluntary (Afolayan and Adelekan 1998, Webb and von Braun 1994). Long distance labour migration to developed countries, which requires money, is far more of a voluntary kind. In any decision to move, perceptions of the risks of staying and the risks of moving are important variables.

There is therefore a continuum of migration decisions, with completely voluntary movements at one end, and completely forced movements at the other. Very few decisions are ever entirely 'forced' or 'voluntary' (Hugo 1996 and 2008). Decisions to move in response to extreme environmental changes, such as food crises arising from droughts and flooding events, or large declines in natural capital arising from land degradation or deforestation, are of a more forced than voluntary kind. Decisions to move in response to incremental environmental changes, such as declining mean precipitation or degradation of coral reefs, or perceived risks associated with future environmental changes, may be of a more voluntary kind. In broad policy terms, the issue is perhaps best framed as maintaining the right to stay as well as the right to leave, so that people are free to choose the response that best suits their needs and values.

There is also debate about the weightings that should be given to the various factors that operate in migration decisions (Amin 1995, Black 2001, Carr 2005, Castles 2002, Clark 2007). For example, farmers in Australia, who experience climatic variability of a kind and nature comparable to those in Northern Ethiopia, do not suffer hunger and do not resort to migration as a coping strategy to the same extent as those in Northern Ethiopia. Thus it could be argued that migrations triggered by drought in Northern Ethiopia are primarily driven by poverty and institutional failures rather than by climatic variability: climate is a trigger, but poverty is the cause. Nevertheless, climate is a trigger of migration in the case of Ethiopia, and for better or worse, people migrate (Meze-Hausken 2000). The debate suggests that migration may be both an impact of environmental change (an outcome that migrants might rather have avoided) as well as an adaptation (a response to avoid or adjust to an even more undesirable outcome).

There is little doubt that social processes that create poverty and marginality are more important determinants of likely migration outcomes than environmental changes *per se*. Reducing the likelihood of migration arising from climate change is therefore something that in theory is largely within the control of people. There is also little doubt, however, that in the absence of vastly improved political and economic structures such that poverty and marginality are reduced, environmental change will continue to be an important proximate factor in migration decisions.

Migration in response to extreme events

The relationship between sudden extreme climatic events (typically high wind events and floods) and development and migration is complicated, but some general conclusions are possible. Disasters do lead to large scale displacements of people, and they certainly undermine development. However, in most cases displacement is temporary, as most displaced people seek to return to rebuild and continue living in the ways and places with which they are familiar (Black 2001, Castles 2002, Lonergan 1998, Perch-Nielsen et al. 2008, Piguet 2008). Such movements are also typically over short distances: few people who are displaced by disasters cross an international border. The patterns of movement tend to be largely determined by social networks, as people move to stay with family and friends.

Following a rapid onset disaster, migration into the affected area may increase, at least temporarily, as displaced people return, along with relatives to assist them to recover, personnel working with agencies engaged in recovery, and new migrants seeking work in the reconstruction process (Hugo 2008). Reconstruction can also lead to large, albeit often short term gains in economic growth, and there is the possibility that if done well, reconstruction can lead to new and improved development processes that in turn reduce vulnerability to subsequent extreme events.

Sustained out-migration can reduce vulnerability to disasters by reducing the number of people exposed to hazards. It usually also provides an income stream (remittances) that is not undermined by a disaster, and which in most cases increases after a disaster to assist households and communities to recover. For example, Paulson (1993) shows that remittances to Samoan households increase significantly after cyclones, and Laczko and Collett (2005) show increases in the remittances sent to communities affected by the Asian Tsunami in 2004.

Migration exacerbated by slow-onset changes

It is difficult to attribute the effect of slow-onset changes such as desertification (including drought) on migration because of the presence of other coinciding changes, such as declining prices paid to producers, or improving opportunities in urban centres relative to rural areas (Lonergan 1998). Nevertheless, there is evidence that environmental change is a proximate factor in more 'permanent' migrations. 'Permanent' here means long-term movements away from a place of origin; however, permanent migrants may intend to return, may consider returning, and may indeed return frequently and for sustained periods of time.

Environmental changes, such as land degradation, deforestation and forest degradation, a declining abundance of fish, erosion of river banks and beaches, contamination of water resources, and coral degradation all undermine the contributions of natural capital to

livelihoods, and where alternative sources of food and income are not available, people do choose to move permanently. For example, some pastoralists from the Sahel and Sudan permanently migrated in response to drought (Afolayan and Adelekan 1998, Davies 1996, Hammer 2004), Mahmood (1995) shows that people permanently migrated in response to river bank erosion in Bangladesh, people from Carterets Island in Papua New Guinea are relocating in response to coastal erosion (Parry 2006), people from southern Tanzania have moved in response land degradation (Charnley 1997), and migration from rural areas in northern Ethiopia increases in severe droughts (Meze-Hausken 2000). Circular (that is, short-term) migration is also of course a response to such changes.

There is some evidence that in the event of slow onset changes, the propensity to relocate is related to age (younger people tending to leave), and land holdings (those with secure access to better lands are less prone to leave) (EACH-FOR 2008, Hutton and Haque 2004, Kothari 2003, McLeman and Smit 2006). This suggests that adaptations to sustain populations in vulnerable areas may need to entail adjustments to make property regimes more equitable.

Migration in response to slow-onset changes seems to most often take the form of a household selecting an individual to move to seek work, which reduces the number of people that a household must support, can create an alternative income stream in the form of remittances, and can establish a bridge that may help if migration of more family members is required (Stark 1991). It seems to be the case than in times of extreme drought the rate of migration may not increase, and in some cases it may decrease (Findley 1994, Van der Geest and de Jeu 2008). It is also often the case that the ratio of international to internal migrants falls, probably because the costs of meeting immediate needs rise and so reduce money available to support more expensive longer distance movements (Kniveton et al. 2008).

Where environmental change stimulates permanent migration, the people who have the financial resources and social networks to move long distances may move to another country, and if they are sufficiently wealthy they may move to a developed country. However, in most cases the people who may move in response to such changes are the lower middle classes, who have enough money to move, but not enough to move far (Krokfors 1995, Skeldon 2002). These people are most likely to move within a country, to rural and urban destinations, with choices determined by their perceptions of risks associated with various destinations as influenced by social networks, their skill sets, and their understanding of labour markets and other income earning opportunities.

Environmental changes caused by migration

It is widely assumed that influxes of migrants into rural areas result in increases in

environmental damage. Yet as many authors observe, this is more asserted than proven (Black and Sessay 1997, Black and Sessay 1998, Jacobsen 2002, Kibreab 1997). Refugee camps can have deleterious impacts on local environmental conditions (Biswas and Tortajada-Quiroz 1996, Jacobsen 1997). However, many of these impacts dissipate over time as refugees integrate with host populations and seek to establish sustainable livelihoods (Jacobsen 2002). They can also be avoided through careful siting of camps, policies to enable refugees to pursue their livelihoods without recourse to excessive use of local natural capital, and measures to enable displaced populations to disperse. Many migrants avoid camps and choose to locate themselves, without assistance, in nearby settlements, and families inside camps tend to place members outside camps in nearby towns so that sources of income and goods are diversified (Bascom 1998, Horst 2006, Jacobsen 1997).

Land tenure and other property systems are important determinants of the environmental outcomes of influxes of migrants. Where local landowners have some security of tenure and are able to develop systems that allow migrants access to it, land can be shared, and migrants tend to use it sustainably (Black 1994, Black and Sessay 1998, Kibreab 1997, Unruh 2004). Much also depends on the reception of host communities, and the ways in which planners and donors include host communities in responses. Where efforts aimed to help migrants settle include local communities as well as migrants, and promote sustainable resource management, the combined effects of additional labour and money can enhance sustainability (see Box 1).

In situations where governments promote labour migration as a strategy for rural development, such as with Indonesia's transmigration program, it is often intended that migrants will exploit reserves of natural capital to establish new livelihood systems. Such movements therefore have environmental impacts, as well as create conflicts between local people with customary rights and state-supported migrants who assert claims to resources (Fearnside 1997).

In summary, almost all scholars agree that environmental change is an important proximate factor in decisions to migrate. Thus, while recognising the complexity and spatial and temporal contingency of the relationship between environmental change and migration, and recognising that social drivers are more important than environmental changes *per se*, environmental change is nevertheless a factor that influences migration. Given the magnitude of environmental changes expected because of climate change, then, there are grounds to think that climate change may contribute to increased numbers of new migrants.

Box 1. Refugee access to land and services in Guinea

To establish livelihoods, refugees and IDPs often require access to land or other resources (Hyndmund and Nylund 1998, Jacobsen 2002). The level of access to land and the circumstances under which access is granted is determined by the host community's traditional and legal systems (Hyndmund and Nylund 1998, Unruh 2004). In Guinea there exists both traditional and formal legal rules regulating land use, but it is the traditional system which is used in practice. These traditional rules stipulate that there is common land - some collectively farmed - but no land that is available for strangers (Black and Sessay 1998). Refugees from Liberia who arrived in 1989, 1993 and 1995 therefore had to negotiate access to land with individual households, through working for the landowner, offering gifts or through finding a 'stranger-father' (Black and Sessay 1998). This proved successful for most refugees, 75% had a farm, and the majority of the remainder had found alternative ways to access land in order to cultivate plants for their own consumption. Nevertheless, the land refugees had access to was generally of a poorer quality than that of the land used by locals (Black and Sessay 1998)

It is also important that host and migrant populations have similar levels of access to resources. In Guinea the UNHCR provided funds through both NGOs and line ministries to support both the refugees from Liberia and their local hosts (Black and Sessay 1989). With extra resources, the ministries were able to increase their capacity and provide greater services to locals as well as servicing the refugee population through existing channels. The provision of health care for the refugees was facilitated through existing government health services, rather than creating a separate clinic. Wells were provided in both refugee sites and local areas, and agricultural extension was provided to both locals and refugees alike (Black and Sessay 1989). Black and Sessay (1989) argue that equal resources for both locals and migrants, including access to land, has helped avoid environmental degradation.

Climate change and exposure to risk

There are four large-scale changes in climate that are underway, and which will become more pronounced in coming decades. First, air temperature is projected to increase by 2°C above pre-industrial levels by 2050 (IPCC 2007). It is also expected that there will be sea-surface temperature increases. Evidence suggests that tropical sea-surface temperatures have been rising over the past 50 years, and this has severe implications for coral ecosystems (Reaser et al. 2002). Second, changes in precipitation are expected. It is expected that in most places rainfall events will be more intense and possibly less frequent, exacerbating existing patterns of flooding and drying. Third, it is expected that climate change will lead to increases in sea levels. By the year 2100, sea-level may rise by between 18cm and 59cm (Meehl et al. 2007).

However, there remains a significant amount of uncertainty about projected sea-level rises and there is reason to believe that these estimates may be conservative (Rahmstorf 2007). Fourth, it is likely that there will be changes in regional climate systems such as the El Niño Southern Oscillation (ENSO) phenomenon and the Asian monsoon, along with changes in extreme events.

These changes are and will have increasingly significant implications for the ecosystem goods and services upon which human systems rely. Rising sea-levels expose coastal populations to the risk of losses of land due to erosion and inundation. Coastal populations must also contend with the risk of increasingly intense flooding events. Warming oceans and ocean acidification pose risks to coral ecosystems and the abundance of the artisanal, pelagic, and aquaculture fisheries upon which billions of people depend for food. Changing flooding and drying cycles, along with expected declines in mean precipitation in some regions, poses risks to agricultural productivity, particularly in many low-latitude countries. Once global average temperature increases exceed $3^{O}C$, food production is likely to be adversely affected almost everywhere (Easterling at al. 2007). In the interim, climate change is likely to adversely affect food production and prices on a local/regional scale, such as in Sub-Saharan Africa and India where malnutrition already affects over 200 million and 210 million people respectively (Dinar 2007; Easterling at al. 2007; FAO 2006).

Changes in rainfall, heat, and regional climate systems also create risks to water supply. Major rivers that are fed by thawing of glaciers, such as the nine major Asian rivers that flow from the Himalayas, may all experience a period of increasing spring flows, followed by declining flows as glaciers progressively shrink. Areas such as the Sahel, where drying has already been observed, face increased water scarcity as precipitation declines, warming increases evapotranspiration, and populations grow (Hulme et al. 2001).

In addition to the health risks associated with food security and extreme events, climate change will also exacerbate the incidence of infectious diseases such as malaria, waterborne diseases such as diarrhoea and cholera, and cardio-respiratory diseases. For example, many studies estimate increases in the spread of malaria, particularly in Africa, which is significant given that 445 million people are already exposed to malaria each year in Africa, leading to over 1.3 million deaths per year (Nchinda 1998; Tanser et al. 2003). Mortality due to climate change is therefore very likely to increase through a range of direct effects (such as more intense heat waves, floods, and fires), indirect effects (such as declines in water quality and food security, and changes in disease vectors), and through social and economic disruptions (Confalonieri et al. 2007).

The impact of these changes on water, food and health also imply effects on

livelihoods. People whose livelihoods depend most heavily on natural capital, and who have minimal financial resources, such as subsistence farmers and fishers, are arguably most vulnerable to the effects of climate change on the supply of ecosystem goods and services. Vulnerability is even more pronounced when such people live in already degraded and variable environments (Leary et al. 2006). Most of these people have proven strategies to cope with variability in resource stocks, often relying on social capital and migration. However, changes in the frequency and magnitude of variations in resource stocks, coupled with long term declines in mean conditions, may mean that these strategies become less effective in the future.

However, it is not just resource-dependent low-income rural people at risk. Many people whose incomes depend on primary resource industries may also be affected. As too may the urban poor, who might experience increased health problems, and rising prices of basic goods such as food and water. Indeed, the effects of environmental changes driven by climate change will cascade through most economic sectors in most parts of the world, causing declines in growth almost everywhere. Stern (2006) estimates that climate change may cause a global average annual reduction in consumption per head of between 5% and 20%, noting, as almost all assessments do, that the impacts and associated costs of climate change will fall disproportionately, and first, on the poorest people and the poorest countries.

Recent studies have estimated populations at risk from climate impacts under different emissions scenarios, and over time. Anthoff and others (2006) estimate that there will be 145 million people at risk from a 1 meter sea-level rise, 41% of whom will be in South Asia, and 32% in East Asia. Assuming constant rates of coastal protection and medium range estimates of population growth, Warren and others (2006) estimate that by 2020 climate change may have exposed an additional 6 million people living in coastal areas to flood (39% more than would otherwise have been the case). They also suggest that by 2085 between 800 and 1800 million people will be exposed to water resource stresses. In terms of health, in Africa alone there is likely to be 16 - 28% more malaria cases (Tanser et al. 2003). Warren and others (2006) estimate that up to 600 million more people could be at risk of hunger by the year 2080. In terms of combined ecological and social impacts, they identify eight regions of primary concern (see Box 2).

Migration is one possible response to climate risks, and not everyone exposed to risk will respond by migrating (Adamo 2008, Black 2001). Others may adapt without recourse to migration. Others may not adapt, and may not be able to or may choose not to migrate, and so experience livelihood decline, increased health problems, and declining life expectancy (Kothari 2003). Indeed, the number of people who cannot migrate in response to climate change (for reasons of poverty, remoteness, ill-health, or age, for example) may far exceed

the number that do, and so may pose a far larger humanitarian problem, even though this problem will be more spatially and temporally diffuse than events where displaced people are concentrated in specific locations.

Box 2. Eight regions of concern identified by Warren and others (2006: 9), and estimates of population for each region by 2050 (from UN 2007)

o   Northern Africa, where impacts will include crop failures, desertification, and water resources stress (estimated population of 310 million by 2050)

o   Southern and Western Africa where impacts will include maize crop failure, and increased famine risk (estimated population of 682 million by 2050)

o   Central Asia where impacts will include crop failures (estimated population of 312 million by 2050)

o   Coastal areas of South Asia where impacts will include flooding and salinisation (estimated population of 2,223 million by 2050)

o   The islands of the Caribbean, through coral reef degradation, impacts on fisheries, and sea level rise, which may damage economies (estimated population of 50 million by 2050)

o   The Arctic, due to impacts on infrastructure and ecosystems (current population is estimated to be 4 million, projections are not available [UNEP 2004])

o   South America, where impacts will include water resource stress, falling crop yields, and biodiversity losses (estimated population of 517 million by 2050)

o   Small islands in the Pacific and Indian Oceans, where impacts will include flooding and submergence due to sea-level rise (estimated population of 65 million by 2050)

These changes in climate and social-ecological systems will affect people's perceptions of the risks and benefits associated with staying as compared to those associated with migrating. Where climate change exacerbates morbidity and mortality, reduces incomes, and decreases access to important forms of natural capital, people may be more likely than otherwise to choose to migrate to places which they perceive to offer prospects for a better life. So, to the extent that there is evidence about environmental change being a factor in migration, there are grounds for concern about increased movements of people in response to climate change. However, how many people will move, and where they will move from and to, are highly uncertain.

Estimates of numbers in future population movements exacerbated by climate change vary widely. At the upper end, Christian Aid (2007) argues that there will be 1 billion people displaced by 2050. Myers (2001) argues that climate change will cause up to 200 million more migrants by 2050, and this has become the generally accepted figure, even though it, like every other estimate, has almost no empirical basis (Brown 2008).

All estimates of the increased number of migrants that are likely to be stimulated by climate change are based on very broad scale assessments of exposure to risk, rather than on systematic evidence about the sensitivity of migration patterns to environmental changes. To be sure, there are many difficulties in constructing evidence-based assessments of future population movements stimulated by climate change, not least of which is identifying the degree to which a migration decision is (let alone will be) influenced by environmental as opposed to myriad other factors. It is also difficult to construct baselines of future movements against which estimates of flows exacerbated by climate change can be measured.

Another problem that besets estimates of future population movements exacerbated by climate change is that, like almost all studies that seek to model the social and economic impacts of climate change, they cannot account for the ways in which adaptation may offset climate impacts. Some adaptation is likely everywhere, but its effectiveness will be determined by barriers to change, and there may be limits to what adaptation can achieve (Adger et al. 2009). In coastal areas, for example, the costs of protection are estimated to be less than the costs of impacts, leading Anthoff and others (2006) to conclude that protecting coasts is much more likely than is commonly assumed. Certainly, many of the estimates of the numbers of people at risk of coastal flooding include major cities in China, many of which, such as Shanghai and Tianjin, have already commenced extensive coastal protection works, and all of which are likely to protect themselves against sea-level rise, thereby reducing the likelihood of migration away from the coast.

For these and other reasons, estimates of the number of people who are likely to move because of climate change must be regarded with great scepticism. It is also difficult to conclude that climate change (as distinct from regular environmental perturbations combined with poverty) is already stimulating migration. It may indeed not be possible to produce robust numbers, and the nature of the empirical difficulties suggests that policy makers should treat all existing and future estimates with great caution. It also needs to be recognised, of course, that migration is not necessarily a bad thing, either for the people who move, the places they move from, or the places they move to.

Taking into account the likelihood of effective adaptations in many places, the extent

of the problem in coming decades would seem to be overstated. The oft-cited estimate of 200 million extra people displaced by 2050 seems to us to be an upper limit on the numbers permanently displaced by climate change. However, the sum of temporary displacements due to extreme events over coming decades coupled with the number permanently displaced may well exceed this figure.

Given the lack of evidence, planning responses based on anticipated numbers may not be the best approach to policy. A approach which seeks to accommodate migration as an adaptation strategy to maximise the potential benefits associated with increased movements of people stimulated by climate change would be a more precautionary and no-regrets response.

Patterns of movement

The literature is uncertain and ambiguous about the likely distribution of population movements exacerbated by climate change. In order to have some understanding of the patterns of migration that may arise, it is first necessary to broadly describe the existing patterns of movement in the world. Six key observations are necessary.

1. The majority of the world's migrants move within their own countries. For example, there are nearly as many internal migrants in China alone (approximately 130 million people) as there are international migrants in all countries (estimated to be 190 million in 2005) (Tuñón 2006, World Bank 2008).

2. Most internal migrants could reasonably be considered to be economic migrants, moving from rural areas to urban areas in search of work. There is also significant, if poorly estimated, rural-rural migration, which tends to smooth demand and supply in rural labour markets (often where supply shortages occur because of prior rural-urban migration), and which serves as a step in the migration path of rural migrants (de Haan 2002). Some internal migration may be forced by violent conflict, development projects such as dam construction, or by environmental changes. Some internal migration is actively encouraged by governments, such as is the case with Indonesia's transmigration program.

3. The majority of people uprooted by conflict, ethnic strife and human rights violations are Internally Displaced People (IDPs) (UNHCR 2006). The UNHCR (2006) suggests that the routes and intermediaries used by migrants fleeing conflicts are increasingly the same as those used by economic migrants.

4. Less than 10% of the world's international migrants are refugees (people forced to move for fear of persecution) (DESA 2005).

5. The majority (61%) of international migrants are located in developed countries; growth in numbers of new arrivals is higher in the developed than the developing countries; and approximately half of all international migrants are women (DESA 2005). Of these international migrants, 34% live in Europe, 23% in the United States, and 28% in Asia.

6. Half of all the world's international migrants originate from 20 countries, with the largest source of migrants (21%) coming from European countries (including the Russian Federation and Turkey), followed by 11% from South Asia, 6% from Mexico, 5% from East Asia, 5% from Central Asia, and slightly less than 4% from Africa (Migration DRC 2007).

These patterns are largely explained by barriers to movement, and the requirements to overcome them. There are financial barriers, including the costs of transport, housing on arrival, and living expenses while developing new income streams. There appears therefore to be a 'migration hump', where the rate of migration from a community increases as incomes increase beyond a level necessary to meet subsistence needs, and then net migration decreases again as the gap between incomes at the place of origin and the main destination closes (De Haas 2005, De Haas 2007, Lucas 2006, Sorensen at al. 2003a).

The existence of a migration hump implies that the poorest of the poor do not migrate (Amin 1995). However, there is evidence that the poor do move; it is just that they do not seem to move very far. This evidence also suggests that while the volume of resources sent home by poor migrants may be small, and the other benefits of migration less pronounced, the relative contribution to household incomes and capital are large and so significantly increase adaptive capacity (albeit from a low base) (De Haan 1999, Lucas 2006).

There are also information barriers to migration, including knowledge of where to go, how to get there, and ways to make a life upon arrival. Once migrants have established themselves in their new destinations they help others within their social networks to overcome these information and financial barriers. This also has the effect of testing the viability of places as destinations for migrants, so that places where migrants have been able to establish a life for themselves are demonstrably good choices for would-be migrants (the same is true for refugee camps). Thus migration flows are not random, but patterned, with flows of migrants concentrating towards places where existing migrants have demonstrated that a life can be established, and can help future migrants to overcome the barriers to movement (De Haan 1999, Lucas 2005, Massey and Espana 1987)).

Climate change is generally understood to have the most immediate and severe impacts on people's basic needs and rights in those parts of the world where low-income, resource-dependent communities are living in environments that are already variable and in

decline. In many of these places, such as in the Sahel, migration is already a demonstrated response to the combined effects of environmental and economic changes. There is also an association between vulnerability to climate change, migration (and famine), and existing or a recent history of violent conflict (Barnett 2006, Meze-Hausken 2000). Violent conflict restricts capacity to adapt to environmental changes in various ways, as well as increases the propensity for populations to move as this is a proven response to avoiding exposure to risk (Zolberg et al. 1989). Because such migrants are often very poor, they mostly do not move far, and usually remain within their country of residence.

Bearing these observations about existing patterns of movement in mind, in the coming decades climate change is most likely to exacerbate existing migration patterns more than it will create entirely new flows. This means a crude guide to the geography of future movements is present movements. Where climate change exacerbates migration, it is likely to be predominantly internal migration away from rural areas within developing countries. It may be that a larger proportion of international migrants will be the rural poor, whose ability to move to developed countries will be restricted by the financial costs of movement, and so who may instead move across one border to a neighbouring developing country. This pattern of movements within and between developing countries is unlikely to change if climate change causes violent conflicts (since most people who move away from conflict zones are IDPs rather than refugees).

In addition to the volume and spatial distribution of flows of migrants caused by climate change, consideration of timing is also important. Climate change will result in slow changes in mean conditions such as annual rainfall and sea-level, but also increases in the frequency and intensity of extreme events. Population movements may be similarly of both a slow and rapid nature. So, for example, in coming decades sea-level rise will begin to increase pressures to migrate away from coasts under certain conditions. Such flows may be incremental, largely confined within countries, and need not be catastrophic to social order given appropriate planning. However, there may also be sudden pulses of movement associated with extreme events, and it may be that as mean conditions deteriorate, and extremes are increasingly felt, the normal pattern of displaced people returning after a disaster may be disrupted, and extreme events may result in increasingly permanent displacements away from coastal areas. Indeed, climate change may eventually result in a reversal of the current trend almost everywhere in the world of people migrating *to* coasts.

It is possible to identify seven types of migration that may be stimulated by climate change. First, climate change may contribute to an increase in the number of *international labour migrants*, as people increasingly seek to move abroad in response to declining conditions at home. However, it is perhaps more likely that climate change undermines the

ability of people to finance long moves, with the result that a higher proportion of labour migrants may be *internal labour migrants*, moving shorter (and so cheaper) distances within countries to seek work. There is of course also the possibility that climate change reduces voluntary migration as it pushes some people into deeper poverty and so reduces their ability to move. Both internal and international labour migrants exercise agency and have choices, and so in many ways are of lesser humanitarian concern than refugees, the internally displaced, and the forcibly displaced. Labour migration offers the best potential for harnessing the power of migration to promote adaptation to climate change.

The third and fourth kinds of migrant flows that seem very likely to be exacerbated by climate change are *internal displacement* and *international displacements* due to rapid onset disasters (such as storms and floods) (Ferris 2007). As climate change increases the intensity and frequency of rapid onset disasters so too the frequency and intensity of short-term movements away from disaster areas may increase. The existing evidence about displacement from such disasters suggests that these movements are likely to be over short distances, and the displaced people are likely to wish to return (Raleigh et al. 2008). Governments and the international community may need to increase their planning for disasters, and their capacity to support humanitarian needs and assist in the repatriation of displaced persons. In the longer term, it may also be the case that in places where the capacity of communities to adapt to climate change does not improve, and where disasters increasingly undermine the quality of life for inhabitants, the propensity to return may decrease, and households may increasingly choose to resettle elsewhere.

The fifth and sixth kinds of movements that may be stimulated by climate change are of people who may be impelled to move permanently within their own country (*internal permanent migrants*) or to a neighbouring country (*international permanent migrants*) as a consequences of stresses exacerbate by incremental changes and slow-onset disasters such as drought. The seventh kind of movement is the r*elocation of communities* in order to reduce their exposure to climate risks. These latter three groups arguably face the greatest risks to their livelihoods and human rights. Assisting them will challenge the international community.

Conclusions

Environmental change is a proximate factor in migration. Given the likely increases in the numbers of people who will experience the impacts of climate change in the future, it seems likely that some of these people may pursue migration, either as an adaptive strategy, or to minimise impacts on their needs, rights and values. Predictions of increased numbers of

migrants due to climate change therefore do not seem unjustified, although estimates of the numbers of people displaced by 2050 are perhaps overly high.

Experience of or concern about climate impacts may lead to an increased number of people choosing to migrate to seek work. Increases in the frequency and intensity of sudden onset extreme events may lead to larger numbers of people being temporarily displaced. Slow-onset changes may exacerbate permanent moves. In each of these kinds of movement, people may move within a country, or to another country. It seems most likely that climate-induced migration in the near future will be almost exclusively a developing country problem, most particularly so for those countries already struggling to accommodate large numbers of internal and international migrants.

The literature on climate change and migration is generally very pessimistic about mobility arising from climate change. This creates a starting point bias in thinking about policy responses, eschewing the development of policies that seek to harness migration as a strategy to promote adaptation to climate change for migrants, their communities of origin, and their host communities. Indeed, there is now evidence which shows that framing migration as a threat leads to policies that do little to control migration, but which do limit the benefits of migration to migrants, their communities of origin, and their host communities (de Haan 1999, de Haas 2007, Jacobsen 2002, Kothari 2003, Sorensen at al. 2003a). At the same time, there is a good body of evidence about migration and livelihoods, the migrant experience, and resettlement, that can be used to inform policies to maximise the benefits and minimise the costs of migration, and these issues are examined later in this report. The next section examines the most dramatic possible negative outcome of climate change and migration, which is an increased risk of violent conflict.

3. Climate Change, Migration and Conflict

Violent conflict is clearly a driver of migration. To some extent conflicts in turn follow people who are displaced by conflict (Salehyan and Gleditsch 2006, Salehyan 2008). This does not mean violent conflict inevitably follows refugees, because as Gleditsch and others (2007) show, the majority of countries that have had an influx of refugees remain peaceful. Nevertheless, the risk that violent conflict will cross borders increases with refugee flows.

An understanding of the effects of people fleeing war zones on the risk of subsequent violent conflict is, however, not a useful guide to the effect of people stimulated to move by climate change but who are not moving from war zones. The risk of violent conflicts following people who move from regions of environmental change should be much lower than for those moving from war zones (Gleditsch et al. 2007).

There is no serious study of the links between climate change and conflict that suggests with any certainty that climate change will increase the risk of violent conflict. This is true for case-based as well as quantitative studies (Barnett 2003, Nordas and Gleditsch 2007). In terms of the links between climate change, migration and conflict, uncertainty about the magnitude, location and timing of migration that may be exacerbated by climate change is further compounded by uncertainty about the relationship between migration and conflict. Thus Raleigh and others (2008) and Gleditsch and others (2007) find minimal evidence that migration exacerbated by climate change will provoke or exaggerate violent conflict. They argue that those who will be displaced are the poor and marginalised, and so will have little capacity to wage conflict of any significant kind. Nor do they have any incentive to fight as their ability to build new lives for themselves, or to provide for themselves temporarily, depends very much on the cooperation of their local hosts. Bascom (1998) suggests that refugees often remain poor and marginalised by the systems of power that local hosts hold over them by virtue of their control over the means of production.

Nonetheless, many of the studies that hypothesise about the risks that climate change poses to violent conflict posit that migration is an important causal variable (e.g. CAN 2007, CSIS 2007, van Ireland et al. 1996, Rahman 1999, WGBU 2008). Still, the evidence for linkages between migration triggered by environmental change and violent conflict is sparse, and many studies are unconvincing (see Gizewski and Homer-Dixon 1998, Howard and Homer-Dixon 1998, Percival and Homer-Dixon 2001, Swain 1993). Very few large scale migrations lead to conflict, and given the ubiquity of migration, where movements of people have coincided with violent conflicts the relationship may not be causal (Reuveny 2007).

Where there does appear to be a connection between migration (for reasons other than fleeing conflict) and conflict in destination areas, migration is often a proximate rather

than primary factor. Factors that seem to be common to most conflicts where migration is present are: the ways in which leaders blame migrants for pre-existing problems, and build a support base by mobilising people against migrants (as is almost always the case in so called 'ethnic conflicts' (see for example Collier 2000, Cramer 2002, David 1997, Goldstone 2001, Gough 2002); and the ways in which migrants increase pre-existing tensions over rights to resources (see for example Baechler, 1999, Klötzli 1994, Peluso & Harwell 2001, Swain 1996, Unruh 2004).

It is therefore the political and institutional context in destination areas prior to movement, and the way these institutions respond to migrants, that are the underlying drivers of conflicts in which migration is a factor. Conflicts may have arisen in such places regardless of migration, and migration to areas where leadership is good, institutions are robust and just, and property rights are clear, rarely leads to violent outcomes. In other words, conflicts arising from migration are not ethnically but are rather politically determined, and so they can be averted through social measures.

The institutional failures that increase the risk of conflicts arising from migration can be reformed, so there is nothing inevitable about violent conflict arising from increased concentrations of migrants. There is good evidence to think that external assistance (such as credit schemes, employment schemes, and agricultural development programs) that include both migrants and local communities can promote local development and so make local hosts more receptive to migrants (Black 1994, Black and Sessay 1998). Much depends on how the state responds to population movements. Where local and national governments make efforts to promote cultural awareness and understanding, ensure that migrants have full access to government services, and facilitate citizenship, the risk of violent conflict is further reduced (Gleditsch et al. 2007, Smith and Vivekananda 2007). If the state is prepared and capable, committed to the effective integration of migrants, and willing to work with international agencies and donors, then there is no reason that migration should lead to violent outcomes.

Conclusions

There is insufficient evidence to suggest that the migration that may be exacerbated by climate change will increase the risk of violent conflict. If such risks were to increase, they can be managed through national and international responses that seek to promote mutual understanding among host and migrant populations, to clarify property rights where these are ambiguous and/or highly contested, and to integrate migrants into local economies in ways that benefit locals as well.

4. Migration and Adaptation: A Positive Story

While there are negative effects on households, communities and countries of origin arising from migration, due largely to the loss of labour (Kothari 2003), in most cases, and in aggregate, migration seems to contribute positively to the capacity of those left behind to adapt to climate change. It also most often leads to net gains in wealth in receiving areas. These findings are heavily context dependent, but broadly taken they suggest that migration can enhance capacity to adapt to climate change.

Many of the benefits of migration for the adaptive capacity of communities of origin arise through remittances. Globally, the volume of remittances may be double the volume of Official Development Assistance (ODA) (Sorensen at al. 2003a). They are also, in many ways, far more reliable capital flows than ODA or Foreign Direct Investment (De Haas 2005, Lucas 2005). The economies of small island states such as Tonga and Samoa probably receive more money in the form of remittances than any other revenue stream (Brown 1997, Connell and Conway 2000)).

Remittances have many positive effects, including that they: smooth consumption of basic needs such as food across seasons; sustain access to basic needs in times of livelihood shocks such as drought; finance the acquisition of human, social, physical and natural capital; and increase demand and so stimulate local production (De Haan 2000, Ellis 2003). Families with labour migrants who remit incomes fare better during livelihood crises than those that do not (Ezra 2001).

The magnitude and duration of remittances varies from case to case. Families which have members living in developed countries tend to receive more remittances than do those which have members working within the same country (De Haas 2007). There is some debate about how long remittance transfers last, and there is insufficient evidence as yet to make conclusions about the sustainability of remittances as an income stream (Guarnizo 2003, Vertovec 2004). In the case of remittances from Samoans and Tongans who have settled in Australia, permanent residence has not significantly diminished the volume of remittances (Brown 1997).

The resources that flow from migrants to areas of origin are not merely transfers of money between individuals and households. Networks of migrants have been known to pool resources and invest in public good facilities such as schools and health clinics (Gammeltoft 2003, Sorensen et al. 2003a). There is potential for governments in both countries of origin and destination to help build networks among diaspora and facilitate such endeavours, for example through matching funding, and assistance with visas, shipping, and financial transfers (see box 3).

Box 3. Remittances from Hometown Associations in Mexico

Remittances sent from Mexican migrants accounted for 8.9% of Mexico's GDP in 1999, with 1.3 million households receiving remittances (Goldring 2004). A substantial amount of these remittances are sent from the United States. In the last two decades, remittances have evolved from being transactions between individuals and households, to include transfers from Hometown Associations (HTAs) formed from migrants from the same town, sent to support the entire community of origin (Bada 2003, Goldring 2004). In Chicago alone, there are over 1000 HTAs, and one club alone (the Federation of Michoacano Clubs of Illinois) has sent more than US$1million to support public infrastructure, and the promotion of education (Bada 2003).

During the early 2000s the Mexican government began to implement policies regarding remittances (Goldring 2004). Aligned with the Government's intentions of development through market forces and public-private partnerships, collective remittances were matched by government funds through the initial Two for One program (so called because various arms of government combine to collectively provide two dollars for every dollar raised), followed by the Three for One program (Bada 2003, Goldring 2004). The joint funding programs stipulate that projects must meet local demands, and provide basic infrastructure, services or generate employment (Goldring 2004). Between 1993 and 2000, in one region alone (Zacatecas), 429 projects collectively worth over US$16.8m were jointly funded. The program has proved successful, a celebrated example being the Campesinos El Remolino club from Juchipila municipality, which used the Three for One program to fund the El Ranchito dam, which their relatives used to irrigate their land and water their cattle. However, not all projects are successes, there are examples of poor planning, corruption and money running out before projects are completed.

When migrants have security in their new destination, and are confident of their ability to return if they leave for a period of time, they tend to return to their communities of origin on a regular basis. These periods of return can enhance the adaptive capacity of communities of origin, by: bringing understanding of the world and of climate change risks and response; consolidating social networks; transmitting money and goods; and transferring new skills (such as banking). Returning migrants may also act as agents for positive changes, for example against corrupt practices, or advocating for peace in conflict situations (Sorensen et al. 2003b).

Migration expands the social networks of households and communities, which reduce the risks associated with short-term displacement in response to crisis. It also boosts

incentives to pursue education as this is a determinant of success in moving, and so migration increases the educational attainment of sending populations Katseli et al. 2006). Migration reduces per capita demands on resources in sending regions, which increases adaptive capacity. It can increase the acquisition of new technologies (Kothari 2003), and migrants (and their families) are often early adopters of information communication technology (De Haas 2005).

Migrants of all kinds consistently display initiative in helping themselves (Skeldon 2002). They are rarely hapless victims of circumstance; indeed, the very fact of their movement suggests that they take action to resolve problems (Ellis 2003). Labour migrants, for example, are hard working, seeking to maximise incomes to finance a better life for themselves and their children (irrespective of whether they are temporary or permanent migrants), to send money to families at home, and to help new migrants to overcome barriers to movement and settlement. For example, in most cases migrants to urban areas are more likely to be employed than non-migrants (Tacoli 2007). When labour migrants fill labour shortages they can make a significant contribution to growth, as recognised in seasonal work programs such as being developed in Australia and New Zealand (Mares 2007, Ware 2007). The downward pressure on wages and inflation may at times be welcomed by governments and employers. Yet, for the most part, the public and private sectors in many OECD countries fail to fully appreciate the benefits of labour migration (Sorensen et al. 2003a).

The entrepreneurial endeavour of refugees and IDPs makes them a potentially important resource that can enhance the capacity of the hosting community to adapt to climate change. They often bring resources with them, including their skills and labour, and use these to build livelihoods (Black 1994). National and international assistance serves their needs best when it supports this initiative, for example through the provision of micro credit schemes and new income generation programs to both migrant and host populations (Jacobsen 2002) (see box 4). The ability and willingness of local and national governments to assist migrants is critical to maximising the benefits they can bring to host and destination areas, as well as minimising the costs the migrants themselves experience. Where local and national governments are unable to assist, their willingness to work with international agencies to fill capability gaps is important.

When refugees and IDPs have secure access to land in their new locations, they can share new agricultural techniques and their labour, which can increase local yields and incomes, and improve conservation practices, a process which Jacobsen (2002) describes in the case of migrants in Guinea. Where they attract resources from external groups seeking to provide humanitarian and development assistance, and where these resources are targeted towards the host community as well as migrants, all people in the area can benefit from the

increased opportunities on offer.

Box 4. The benefits of micro-finance for IDPs

Micro-finance facilities and voucher programs can help refugees and IDPs to pursue livelihoods (Jacobsen 2006, Hill et al 2006). In two IDP camps in Northern Uganda, micro-credit projects commenced in 2004 providing funds for groups of 5-7 women and training that included elementary banking and bookkeeping (Jacobsen et al 2006). At first, the program provided 183 loans to 120 clients over two cycles, with most people using the loan to start or expand a small business (90%) and most agreeing that they had generated profits (92%). Many clients (68%) invested their profits in their children's education. There appears to be several successful aspects to this project: IDPs indicated that the program had boosted their self confidence, knowledge and leadership skills; the program provided a means by which IDPs could generate incomes; and repayment rates were 100% in one camp and 99% in the other. Similar programs have been implemented in Darfur with results including: greater security for women in the camps; a reduction of violence against women; and mitigation against dependence on the humanitarian community (Hill et al 2006).

Refugees and IDPs, like all migrants, are able to pursue the livelihood strategies that best suit their skills and values when their entitlements are maximised, and outcomes are most equitable when those entitlements are equal to those of their local hosts. This includes entitlements to health care and education, financial services, political and economic freedoms, justice, and the right to re-entry. When these entitlements are maximised displaced people can access labour markets and establish new businesses to grow their incomes, and they can borrow, save and remit money, and return to their communities of origin and help with development in those places (Horst 2006). Thus, the benefits of migrants to both their hosts and their places of origin are maximised when they have de jure and/or de facto citizenship (Kothari 2003). Much therefore depends on the receptiveness of local people and institutions to new migrants. At least in the case of international migrants, secure visas and citizenship are critical determinants of successful outcomes from migration (Jacobsen 2002).

The extent to which migrants benefit the communities to which they move depends on the labour market conditions and policy and institutional settings of receiving areas. Where there are shortages of labour relative to other forms of capital, migration makes a positive contribution to wealth creation, and by implication adaptive capacity. Where migrants attract increases in official developing assistance that is directed towards both host and migrant communities, it can lead to enhanced provision of infrastructure and social opportunities such as new and better schools and health care. Where migrants find work and pay taxes they

contribute positively to growth and the provision of public goods. A critical factor in the successful integration of migrants is that the rate of growth in employment is commensurate with the increase in population; otherwise there can be increased scarcity in the labour market, which is blamed on migrants.

The capacity of a system to respond to climate change to moderate or avoid its negative consequences is a function of a number of properties, including: financial resources (to pay for adaptation); governance (how well society can steer the adaptation process and how legitimate that process is); information (to anticipate climate risks, devise appropriate adaptations, and learn from their implementation); social resources (networking and bonding among people and groups so that social responses to climate change are cohesive, equitable, and robust); infrastructure, and technology (tools and crafts that help adapt) (Adger et al. 2007). Migration can therefore make significant positive contributions to many of these determinants of adaptive capacity; for example, remittances increase financial resources, migrants can increase a community's access to information and expand social networks, and diaspora can contribute to social infrastructure.

Conclusions

Migration is not without risks to migrants, host communities, and to a lesser extent their communities of origin. However, it is a common practice pursued by hundreds of millions of people around the world for good reason. Migration most often works to improve the lives of migrants, their families, and the communities from which they come and to which they move (De Haan 1999, Skeldon 2002). Migration is a proven development strategy pursued by agents to maximise their needs and values. It is also therefore a strategy that can help migrants, their families and the communities from which they come and to which they move adapt to climate change (Agrawal 2008). In the last section of this report we discuss ways in which the potential for migration to contribute to adaptation can be enhanced. However, at least one kind of migration – community resettlement – rarely leads to positive outcomes, as we explain in the following section.

5. Community Resettlement

As explained in the introduction to this report, it is optimistic to assume concentrations of greenhouse gases in the atmosphere will stabilise at less than 650 parts per million carbon dioxide equivalent. This equates to approximately 4 °C of warming above pre-industrial levels. It seems likely that beyond a 2°C rise in global average temperature, decision makers will need to plan for both spontaneous and planned community relocations. Nevertheless, despite some speculation in the media and environmental community, such relocations are unlikely to be necessary in the coming decades, and where necessary climate change is unlikely to be the principal driver. Indeed, in the near future there is a danger that powerful actors will use the excuse of reducing community exposure to climate change in order to conduct forced migrations for political or economic gain.

Relocation of communities should be a strategy of last resort. Even in the case of highly exposed populations, whose livelihoods are sensitive to climate, and which have ostensibly low levels of adaptive capacity, such as those living on low-lying atolls, community relocation would be a premature response (Adger and Barnett 2005). In these islands, as elsewhere, the full gamut of adaptation responses, and their barriers and limits, has not been adequately assessed. Yet it seems quite likely, given existing technologies and institutions, that adaptation can do much to avoid impacts in these and other highly vulnerable places in the coming decades (Barnett 2005). It is notable that the emerging evidence suggests that people are reluctant to move from islands which sustain their material cultures, lifestyles, and identities (Mortreux and Barnett 2009). There is arguably, therefore, a legal requirement of all parties to the International Covenant on Economic, Social and Cultural Rights to protect the social and cultural rights of people living on atolls through deep cuts in greenhouse gas emissions and a significant effort to enable them to adapt to climate change. Failing this, atoll islands may cease to be able to sustain existing numbers of people, and in the longer-term may be subsumed (Barnett and Adger 2003). In this case, relocation of atoll island communities may be the option of last resort.

Nevertheless, in as much as there is already some talk of community resettlement (e.g. Byravan and Rajan 2006), and it may become a more likely solution for some highly exposed groups as we near and move beyond a 2°C of warming, we discuss in this section the challenges posed by resettlement.

The empirical record of involuntary resettlement derives largely from resettlement for dams and environmental remediation (Cernea 1997; Cernea 2000; Cernea and McDowell 2000; WCD 2000). Populations undergoing forced relocation pass through stages of reconstruction (Scudder and Colson 1982), which depend on the strategies that people employ

as they adapt to their new circumstances (Partridge 1989; Muggah 2000). The principal risks to which resettlers are exposed include: (a) landlessness; (b) joblessness; (c) homelessness; (d) marginalization; (e) food insecurity; (f) loss of access to common property resources; (g) increased morbidity; and (h) community disarticulation (Cernea 1997). These risks are causally interrelated. For example, people's capacity to produce may deteriorate, leading to such observed effects as food insecurity, marginalization and loss of income. That deterioration in turn may originate from causes – the loss of such productive assets as land, common property resources, jobs, health and community articulation. Common outcomes of involuntary resettlement include precarious livelihoods, declining standards of living and uncertainty of production and development, for which both villagers and officials hold the other responsible (Croll 1999). Omitting some important risks (Mathur 1998; Horgan 1999; Mahapatra 1999; Webber and McDonald 2004), this literature makes no pretence to examine the processes from the top (planning and implementation) or from the bottom (strategies and resistances) that create the actual outcomes.

Although these risks are widely recognised, involuntary resettlement still typically entails impoverishment. In other words, the methods applied by national governments, international institutions and private consultants typically condemn displaced people to conditions of chronic impoverishment (Cernea and Kanbur 2002) because they assume that compensation for basic material losses in cash or in kind is sufficient to resettle people successfully (see also Fernandes 2000; Mahapatra 1999; World Bank policy 4.3, 1994; WCD 2000). Resettlement with Development (RwD) is one response to this idea. RwD is intended to solve the daily subsistence problems of resettlers (Heggelund 2002), contingent on development projects planned by project administrators and local governments (Bartolome et al. 2000; Picciotto et al. 2001). China, for example, has a well-established legal framework and a variety of regulations to govern involuntary resettlement, which include the notion of RwD (McDonald 2006).

In the case of the Three Gorges Project in China, which has caused the resettlement of perhaps a million people, investment into the affected counties has been channelled through funds from rich eastern provinces and a tax on electricity generated. China's hierarchical, devolved system of government gives many localities a deal of autonomy, so that the outcomes of resettlement depend on the specific local class interests, resource endowments, demands from and freedoms offered by higher level governments and interactions with the world outside. The structure of land ownership also matters. When households are dispossessed of their land, they are compensated for the loss of use value, the cost of relocation, and the replacement value of their houses and other fixed assets. But compensation never reflects the price of land in its developed use. Rather, the increment in

value from development accrues to the city government and can be used to pay village officials to agree to the transfer of land, fund social services, line the pockets of local officials, and build urban infrastructure and industry (Ding 2007; Edin 2003). This provides a perverse incentive towards resettlement.

Notwithstanding the tremendous effort put into Resettlement with Development in the Three Gorges Project, including national laws about compensation, the investments into the region and the supervision of the central state, the outcomes have been largely dismal (McDonald 2006). People have lost resources: including their land and their knowledge of local farming conditions, if they were farmers; and their local jobs if they were urban dwellers. Their communities were disrupted and their social networks broken; their trust in social institutions such as government was reduced. Opportunities for corruption were taken and much money was wasted on inefficient projects that were never likely to succeed. When ethnic minorities have been resettled, resentments also flare against the 'Han state'.

The literature on resettlement has remained largely separate from work on resilience and vulnerability that has emerged from ecology (Holling 1973), natural hazards (Burton et al. 1978) and entitlement failures (Sen 1981) (compare Adger 2006; Folke 2006). Neither resilience (the capacity to cope with, adapt to and shape change) nor vulnerability (susceptibility to harm from stresses and inability to adapt) are commonly applied in studies of resettlement. However, the impacts of resettlement on communities imply that it leads to increased vulnerability to climate change. Therefore, moving communities in anticipation of climate change may precipitate vulnerability more than it avoids it.

Conclusions

Involuntary resettlement rarely leads to improvements in the quality of life of those who are moved. People who are resettled lose their land, the understanding of the local environmental and institutional conditions necessary for development, their jobs if they were employed, their trust in social institutions such as government, and their social networks are disrupted. The resettlement process creates opportunities for corruption, and in some circumstances resettled communities are the subjects of sporadic and at times organized violence. For these reasons, resettlement that is anything other than entirely voluntary and consensual would in no way constitute an 'adaptation' in the sense of an avoided impact from climate change. Further, there is a danger that powerful actors use climate change as an excuse to conduct forced migrations for political or economic gain, and so careful monitoring of resettlement purportedly to reduce vulnerability to climate change is now required.

6. Maximising Benefits, Minimising Costs

Migration is not without its costs. Migrants are often exploited, subjected to discrimination, denied basic rights, and paid less than local counterparts (Afolayan and Adelekan 1998, Hill et al. 2006). People who have little choice but to move lose their homes and sites that are important to them, and their jobs. Their communities and families may be broken up, their livelihoods disrupted, and so they may become poorer in absolute as well as relative (to their host population) terms. Yet, it is also clear that there are many positive outcomes associated with migration. Much depends on the nature of the migration, including the financial endowments, skills, and social networks of migrants, where people come from and the factors causing their movement, and the institutions that govern the places to which they move.

Policies to restrict migration rarely succeed, are often self-defeating, and increase costs to migrants, communities of origin, and destination communities (De Haas 2007). Many efforts to control rural to urban migration, for example, have failed to stem migration, and have restricted the opportunities for urban migrants to lift themselves out of poverty (Chapman 1991, Wu 2004). There is considerable scope for careful and coordinated policies to minimise many of the potential costs and maximise many of the potential benefits arising from migration that may be exacerbated by climate change. In this section we discuss many of the options for labour migrants who may move in response to actual or perceived future climate change impacts, people temporarily displaced by sudden onset disasters, people permanently displaced, and communities that may be resettled. We highlight in box 2 ten specific recommendations for policies that would lead to better outcomes.

Labour migrants

Those people who may pursue labour migration partly in response to actual or perceived future climate change impacts at home may require assistance to minimise the costs to them of moving. This includes assistance with visas (if they cross a border), finding a job, finding housing, development of language skills, networking with other migrants, and understanding public services such as the taxation and health care systems (Zetter et al. 2002). It is also important that public authorities promote a positive image of migrants, and do not allow them to be scapegoats for social and economic problems. These efforts will help maximise the benefits of migration to the host community as it will speed up their entry into the workforce and minimise the social frictions that may arise when migrants are disenfranchised (Kuhlman 1990).

The benefits of labour migrants to their communities can be maximised by reducing the costs of money transfers, for example by capping fees, encouraging multiple service

providers, and supporting governments and businesses in areas of origin to establish a service to receive money (De Haas 2005, Lucas 2005, Hall 2005, Sorensen et al. 2003b). Citizenship, and/or equal rights to work, social support, and the freedom to move in and out of both the place/country of arrival and origin can facilitate freer movement of people, and so increase the benefits of this movement for the communities from which migrants originate. In the case of international labour migrants, dual citizenship is one way of achieving this freedom of mobility.

There is therefore a lot of scope to harmonise development and migration policies in developed countries in order to improve growth in both developed countries and adaptive capacity in developing countries. Where there are shortages of unskilled labour in sectors of the economy, such as in farming, then developed countries could augment that labour supply by encouraging migration from communities which are vulnerable to climate change and which do not yet benefit from remittances. Where there are needs for semi-skilled labour, then developed countries could work with developing countries to invest in skills training in vulnerable communities.

Box 5: Suggested policies with respect to labour migration

1. Orient international migration policies to benefit people in most vulnerable regions
2. Target training packages to encourage the development of skills that are scarce in developed countries
3. Reduce the transaction costs on remittances
4. Reduce the barriers to return migration
5. Develop OECD / developing country migration agreements that facilitate migration in exchange for agreements to maximise the benefits of that migration to communities of origin (for example in the form of dual citizenship, protection of rights in both destinations, reduced costs of remittance exchanges)
6. Ensure migrants have the same rights and freedoms as local people
7. For developed countries, coordinate aid and migration policies
8. Build networks among diaspora and encourage them to support communities of origin, for example by offering matched funding, and assistance with visas, shipping, and financial transfers
9. Develop migration plans and strategies that identify areas of labour scarcity (skills, and workers relative to capital) and facilitate voluntary movements
10. Develop regional labour migration agreements

Labour migration has some costs to communities in the places of origin. In particular, when those who leave have scarce skills and capabilities, the human capital deficits that arise

can restrict adaptive capacity. Countries that benefit from skilled international migrants may offset these negative effects by facilitating temporary placements in countries of origin, investing in skills training in countries of origin, maximising opportunities for remittance transfers, diversifying sources of skills migrants, and encouraging reverse migration. When these deficits arise from internal migration, skills training may be useful to increase supply. Information and transport and communications infrastructure to improve internal labour market mobility may also help balance supply and demand. Importing labour may also of course be possible if wages in areas of skills shortage are higher than in nearby countries.

People displaced by extreme events

Many of the increasing numbers of people who may temporarily move in response to extreme events will have immediate humanitarian needs that will create new demands on national governments and the international community. Those who move to places where they do not have established social networks that can support them are likely to require assistance with shelter, water and sanitation, food, and in some cases protection while they wait to return to their homes. When poorly designed and inadequately funded, shelters may expose migrants to new health risks associated with overcrowding and poor water and sanitation services.

Meeting the needs of people displaced by disasters will be the responsibility of civil society, Non-Governmental Organisations and Governments in the host country. Much will depend on their capacity and willingness to respond. Where they are unable or unwilling to meet the needs of the displaced, the international community will need to be involved. The duration of the response will depend on how long it takes for disaster recovery efforts to convince people that it is safe to return home. It may therefore be in the interests of neighbouring countries to work cooperatively to implement disaster risk management strategies to reduce damage to property and livelihoods from extreme events, and to develop cooperative approaches to disaster recovery and repatriation of displaced peoples.

In some cases internal movements may be seized upon by opportunistic actors as a means to acquire the lands of those displaced (Williams 2000). This deters and impedes the successful return of those displaced. Indeed, people are often reluctant to move from disaster zones for fear of loss of property, particularly where systems of law and order are illegitimate. Codifying and enforcing the property rights of the temporarily displaced is therefore important, although such efforts may only be as effective as the governments that are responsible for them. There may therefore also be a role for the international community in assistance the displaced to resecure their rights to property upon their return.

The international community has the capacity to mobilise to meet the humanitarian

needs of people displaced by extreme events when local institutions are unable or unwilling to do so. This capability has emerged out of the institutions established to safeguard the human rights and well being of refugees under the aegis of the 1951 Convention Relating to the Status of Refugees, including the office of the United Nations High Commissioner for Refugees. However, refugees are a distinct category of migrant in two respects: they must have moved owing to 'fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion', and they must have crossed an international border. If these criteria for an international response were the only ones that mobilised an international response to a humanitarian crisis in the future, there would seem to be little prospect of international responses to safeguard the rights of people displaced by climate change (unless climate change drives armed conflict and persecution, which seems unlikely).

Nevertheless, the international system can and does respond to humanitarian crises involving displacements of people who are not refugees, either because their movement does not arise from persecution, or because they do not cross a border. Many of the same institutions that respond to refugee problems also respond to other humanitarian crises, including helping meet basic and protection needs, and working with people and governments to help with repatriation once the crisis that displaced them has ended.

Yet there is frequently inadequate funding for responses to humanitarian emergencies. Funding has often not been available when required, and has been given by donor governments according to their particular interests in certain regions (UNHCR 2006). Further, some donor countries prefer not to work within the United Nations system, creating duplication of services and inefficiencies. This has meant that there has been inadequate funding for emergencies in regions that are of little significance to the national interests of donors. To help address this problem, in 2006 the UN General Assembly established the United Nations Central Emergency Response Fund, which since its inception has disbursed over US$1 billion to assist people in 65 countries.

Coordinating the response of United Nations agencies, governments, and local and international non-governmental organizations is necessary to maximise the effectiveness of emergency responses. This remains a persistent problem, even within the UN system where a collaborative approach to dealing with humanitarian crises has proven to be inadequate (UNHCR 2006). Much of the problem lies in the resistance of various agencies to centralised control in the field, and in the inconsistency of agencies in the nature and timeliness of their responses to emergencies of different kinds (UNHCR 2006).

Many of these problems were revealed in the response to the Asian Tsunami, where

despite very significant mobilisation of resources from many countries and agencies, the basic needs of displaced people were compromised by difficulties in coordinating the delivery of the US$6.8 billion worth of assistance that was pledged, and the activities of the 16 UN agencies, 18 Red Cross response teams, 160 or more international NGOs, hundreds of private and civil-society groups, and 35 armed forces (UNHCR 2006). These difficulties existed despite ongoing improvements in the international emergency-response system since 1991 (UNHCR 2006).

A major problem in responding to the needs of the displaced is the willingness and capability of national governments to meet their responsibilities. Many of the current situations where the response of a government is inadequate are those where conflict is the primary driver of displacement, and in these complex emergency situations governments may lack the resources to protect and provide humanitarian assistance. They may also choose not to, and to hamper the efforts of international agencies to assist, because some refugees and IDPs may come from groups seen to be opposing governments, and/or because humanitarian assistance and spaces can be used by armed groups in various ways to sustain their operations (Goodhand and Hulme 1999, Le Billon 2000).

This securitisation of refugees and IDPs may be far less likely in instances where violent conflict is a not a major factor in displacement. Where it is climatic events rather than violent conflicts that drive displacement, the political barriers to assisting the displaced may be lower. This discussion suggests that peace building and brokering are very important adaptation actions as they: increase the capacity of communities to adapt to climate change; increase the capacity of governments to facilitate adaptation; reduce a key driver of population displacement; and greatly enhance the capacity of efforts to provide relief in situations where climate change does lead to displacement.

There is some debate about the desirability of extending the 1951 UN Convention on Refugees to include people who are not refugees. Some suggest creating a new treaty for environmental migrants. Others suggest an agreement related to the United Nations Framework Convention on Climate Change (UNFCCC); for example Williams (2008) argues for regionally-oriented regimes to deal with migrants flows due to climate change which operate under the auspices of the UNFCCC, and Biermann and Boas (2007) argue for a Protocol to the UNFCCC on Recognition, Protection and Resettlement of Climate Refugees. Most commentators favour enhancing the existing United Nations system's principles and frameworks for responding to humanitarian emergencies (UNHCR 2006, Warner et al. 2008). A notable development in recent years has been the development a standard for the treatment of IDPs, called the Guiding Principles on Internal Displacement. The Guiding Principles outline the rights of IDPs and the responsibility of governments, combatants, and

humanitarian agencies to uphold those rights. They are rapidly becoming a form of soft law of some significance in the international system, as many governments, regional institutions, UN agencies and NGOs use and refer to them (UNHCR 2006). Nevertheless, there is much to be done to ensure that the Guiding Principles are implemented effectively in all situations.

Box 6: Suggested policies with respect to people displaced by extreme events

1. Increase commitments to the UN Central Emergency Response Fund

2. Improve the international emergency response system, including increasing: the number of professional emergency response staff; stockpiles of emergency supplies; and logistical capacity for transporting displaced people, response staff, and supplies

3. Promote awareness of the responsibility of governments to protect displaced people

4. Develop frameworks between countries with respect to mechanisms for triggering an international response to an emergency, and allowing free passage of refugees in times of crisis

5. Increase investment in disaster risk reduction in developing countries

6. Develop bilateral and regional disaster response systems, including for repatriation of displaced peoples

7. Promote awareness of and work to improve implementation of the Guiding Principles on Internal Displacement

8. After an extreme event, mainstream adaptation into reconstruction activities to reduce vulnerability

9. Do not encourage or facilitate movement into conflict zones

10. Give people who move en mass the choice of staying in camps or moving into settlements, and support them in their decisions. Plan to integrate people with their host populations over time

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People permanently displaced

Permanent migration in response to slow-onset environmental changes driven by changes in climate would for the most part constitute an impact of climate change on the people that move. It is important, then, that there are policies and programmes developed that will enable people to adapt in ways that do not entail permanent migration. In this sense, the principle that people should be free to exercise the 'right to stay home' in their customary lands is as important as the principle that they should be free to move if they so choose (Bacon 2008).

Adaptation efforts directed towards the most vulnerable communities must therefore be a priority if permanent migration is to be avoided. The specific nature of adaptation responses in any given location will depend critically on the nature of the social and ecological systems in which people live, and the needs, rights, and values of people and communities (Barnett 2008). Importantly, adaptation is about more than merely avoiding climate risks, and must accommodate people's rights and aspirations for the future (Adger et al. 2003). Adaptation responses are therefore not universal, and in any context cannot be prescribed but must rather be determined through participatory processes, and there are numerous guides for conducting such processes (Few et al. 2007, Lim and Spanger-Siegfried 2004, UNFCCC 2005).

In as much as permanent migrations may be triggered by a threshold event such as drought or a food crisis, well timed and delivered disaster assistance can significantly offset migration (e.g. Paul 2003, see Box 7). Indeed effective responses to famines are those that seek to augment entitlements so that people in famine conditions do not lose assets and/or migrate, as these distress responses increase their vulnerability to subsequent famine events. There are many examples of systems that can successfully respond to food crises so that migration does not result, and there is a need to strengthen these where they exist, and replicate them where they do not.

Box 7. Successful disaster relief in Bangladesh

The case of floods in Bangladesh in 1998 shows how timely relief can minimise social disruption, including displacement, due to disasters (Paul 2003). The July 1998 flood caused minimal compared to previous floods of similar gravity, due to greater effort on the part of the Government of Bangladesh to deliver disaster relief. The 1998 flood lasted for 59 days and inundated 68% of the total area of Bangladesh. It affected half of the population, destroying 2.2 million tones of rice and causing US$3.5 billion worth of damages. A formal appeal for external aid was made in mid-August and by February the government had received almost US$700 million. Emergency relief was well targeted and was directed to the real flood victims: receipt of assistance was significantly affected by occupation, landholding size and level of education. Furthermore, relief was timely and reportedly not corrupted. Numerous committees were formed to oversee the successful distribution of relief: grassroots levels officials were instructed to cooperate; teams monitored the efforts, looking especially for theft; and officials visited flood areas frequently. Success can be measured by the very few flood related deaths (and none from hunger) and that the rural economy had recovered 6 months after the flood.

If efforts to avoid permanent migration exacerbated by climate change fail, then most

of those people who move will be poor. Therefore, they are most likely to move within their existing countries, or if they cross a border it will most probably be to a neighbouring country. In most cases, then, the countries that receive increased flows of permanent migrants will be developing countries whose ability to meet the needs of these migrants is limited. It will be important for the international community to support these countries to meet the short term humanitarian and longer term settlement needs of migrants. Such support can make the difference between increased security and sustainability of livelihoods for both migrants and people in host areas, or increasing conflict, poverty and associated environmental degradation (Sorensen at al. 2003b).

As is the case with all migrants, the benefits of people who move permanently to places of origin and destination are maximised when they are entitled to the same freedoms and opportunities as people in their host community. Ensuring this is the case is an important task for governments and where necessary international agencies. Interventions designed to assist people who have moved, and who may not move back, will be most successful when they work to support migrants to establish new livelihood strategies. Where international agencies are involved in such efforts, partnering with organizations that understand the local social and environmental context, including land tenure systems and labour markets, is critical (Jacobsen 2002).

The ingredients required for successful re-establishment of livelihoods vary from location to location and group to group. In many cases secure access to land is a critical factor, and efforts to provide this can challenge local land tenure systems (Jacobsen 2002). It is important that local hosts are encouraged to see the benefits of new migrants, and to provide them with the same rights and freedoms as local people. Services that can help migrants and host communities develop include short term job creation to assist with immediate needs (for example as labourers in public works developments), micro-finance, skills training, health care, and agricultural extension (Hill et al. 2006). The provision of such services can have the effect of attracting further migrants (Sorensen et al. 2003a).

There may be a need to explore possible new migration regimes to respond to permanent displacements arising from climate change (Smith and Vivekananda 2007). There are few precedents to guide this endeavour. Beyond the labour migration arrangements that have emerged among members of the European Community, there are few agreements among countries relating specifically to migration. Indeed, it is remarkable the degree to which regional agreements seeking to affect liberalisation in the movement of goods and capital do not address liberalisation in the movement of labour, and in so doing sustain asymmetries in the supply and demand of labour and associated inequalities in returns to labour between countries. To address this, many developing countries are seeking increased access to

developed country labour markets under new trade liberalising agreements such as the Economic Partnership Agreements being developed between the European Union and the African, Caribbean and Pacific Countries. However, even if such nascent agreements result in increased labour mobility, they may not be equipped to accommodate demands for international migration arising from climate change (although they may contribute positively to adaptive capacity for all the reasons outlined in this report). There is, however, a precedent about deferral of deportation emerging as in recent times developed countries have tended to defer the deportation of illegal migrants back to countries that have recently experienced a disaster, as occurred after the Asian Tsunami (Laczko and Collett 2005), and Hurricane Mitch (Brown 2008).

Box 8. Suggested policies with respect to people permanently displaced

1. Facilitate adaptation among communities where livelihoods are now or are projected to be stressed from climate change, including the poor living in drylands, low-lying coastal areas, and areas exposed to damage from extreme wind and flooding events

2. Develop systems to deliver well timed and effective disaster assistance

3. Facilitate secure access to land in places at risk

4. Facilitate secure access to land for migrants

5. Create short term jobs to help migrants meet their immediate needs

6. Provide micro-finance, skills training, health care, and agricultural extension to migrants and host communities alike

7. Encourage local hosts to see the benefits of new migrants, foster cultural awareness

8. Ensure migrants have the same rights and freedoms as local people

9. Plan for developments that can boost employment of both people in the host community and migrants

10. Increase efforts to build and broker peace to avoid civil wars

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Resettled communities

The costs of community resettlement can be minimised by allowing adequate time for community consultation and planning, so that people can adjust to the idea of moving, and do as much of the planning as possible. Compensation for lost houses and assets is important, but that compensation should be paid at the level that is equal to the standard of housing and materials in the host community. Ensuring that the money and resources made available to assist communities to relocate is spent on those communities is important. Among other things, this means avoiding payments to intermediaries, and employing the people being moved wherever labour is required. Rebuilding the migrant community as a community is

important, as it helps keep social capital intact. As with all forms of migration, encouraging the hosting population to be receptive to migrants, and respect their rights and freedoms, is also very important.

Box 9. Suggested policies with respect to community resettlement

1. Do not resettle communities unless it is absolutely necessary

If resettlement is absolutely necessary,

2. Provide adequate time for preparation, if feasible
3. Assist the migrant community to do as much planning of the move and reconstruction as possible, and avoid using outside contractors and agencies
4. Provide compensation for losses at the average standard and prices of the receiving region
5. Do not pay funds to intermediaries (whether a government department, government officials or developers / contractors)
6. Where possible use the migrants' own labour for the reconstruction of the community infrastructure
7. Rebuild the migrant community as a community
8. Provide resources sufficient for the migrants to have the average standard of living of the receiving region
9. Respect existing decision-making structures within the community
10. Make sure that the host region is compensated for resources lost on account of the migrants

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Cross cutting suggestions

There are a number of things that governments can do to minimise the costs and maximise the benefits of migration exacerbated by climate change. Principal among them is to reduce emissions of greenhouse gases. Stabilising greenhouse gas emissions to avoid 2°C of warming above pre-industrial levels may now be all but impossible, and therefore 'dangerous' climate change is almost certain to occur. However, deep cuts in emissions can minimise the danger, and in terms of this report, minimise the number of people whose movements would constitute an impact of climate change, and maximise the scope for more voluntary migrations to contribute to adaptation. Stern (2008) suggests stabilising concentrations of greenhouse gases in the atmosphere at 500ppm CO_2 e is not impossible, even though this would mean global emissions need to fall by at least 50% relative to 1990 levels by 2050.

There is a need to consider those who cannot or will not migrate, such as the elderly and the very poor, for whom the barriers to migration may be unsurmountable. In so far as development tends to increase migration from an area (because it increases the capacity of

people to afford to move), it may be that climate change reverses this process, because it decreases the ability of people to pay for migration (by reducing income earned from, say, the sale of fish, agricultural commodities, or work in resource dependent sectors). In low income areas, a lack of a migration in response to environmental change may well be an indicator of extreme vulnerability. Such communities should be priority recipients of programmes to assist them to adapt, which may involve, for example: diversification of crops or the planting of more suitable cultivars; diversification of income streams; income support in times of crisis; access to health care and education; access to micro-finance; the provision of climate forecasts; and assistance to overcome barriers to migration.

Secure entitlements to land and natural resources seem to mitigate against migration in response to environmental change. They also seem to minimise conflicts in areas to which migrants move, enhance the likelihood that such movements will not increase environmental degradation, and help protect the rights of the temporarily displaced to lands they leave behind. So, there is much to be gained through processes to clarify property rights. However, this does not mean creating systems of inalienable title, but rather a process that recognises and supports rights systems in whatever form they take, including – most importantly – customary and communal rights to property (Mason and Muller 2008).

Finally, it is important that information about changes in environments and livelihoods is collected on a regular basis so that decision makers can respond to emerging problems in a timely manner. This is also true of migration, where there is a need to monitor population movements so that increases can be detected and responded to in a measured way.

Box 10. Cross cutting policy suggestions

1. Stabilise concentrations of global greenhouse gas emissions at 500ppm CO^2e by 2050
2. Prioritise adaptation efforts to assist the most vulnerable
3. Be alert to populations that are not moving, and be prepared to respond
4. Establish participatory processes to clarify property rights wherever such rights are undefined
5. Monitor changes in environments and livelihoods in regions at risk
6. Monitor population movements, particularly along existing migration routes

Conclusions

There is enormous scope to minimise the risks associated with migration that may be exacerbated by climate change. There is also much that can be done to maximise the opportunities migration presents for enhancing adaptation to climate change. Box 7 summarises the policy responses that could be considered according to each type of migration likely to be associated with climate change. Common themes emerging from the many suggestions made are the need to: ensure that migrants have the same rights and opportunities as their host communities; reduce the costs of moving money and people between areas of origin and destination; appreciate the benefits of migration; facilitate mutual understanding among migrants and host communities; clarify property rights (including informal and customary rights) where they are contested; ensure that efforts to assist migrants include host communities; and strengthen regional and international emergency response systems.

There are many lessons to be learned from existing best practices with respect to both minimising risks and maximising opportunities arising from migration in response to climate change. There are of course political and economic barriers to implementing these responses, such as difficulties in forming and international responses to localised problems, government reticence to accept assistance from the international community, and funding, information and capacity deficits at all levels of decision making. These barriers are well understood, and the struggle to overcome them is one that efforts to ensure sustainable development, human rights, and peace all share. It is for these reasons that multilateral action is required, and it is required to tackle climate change and its demographic consequences as well.

Box 11. Summary of Policy Recommendations	
Type of migrants	**Policy response**
International labour	• Orient recruitment to those from most vulnerable regions • Training packages targeted to encourage the development of skills which are scarce in developed countries • Reduce transaction costs on remittances • Reduce barriers to return migration • Develop migration benefits agreements • Ensure migrants and local peoples have the same rights • Coordinate aid and migration policies • Build networks amongst diaspora to support communities of origin
Internal labour	• Orient recruitment to those from most vulnerable regions • Training packages targeted to encourage the development of skills which are scarce • Ensure migrants and local peoples have the same rights • Reduce transaction costs on remittances • Reduce barriers to return migration • Develop regional labour migration agreements
International displacement	• Increase commitments to the UN Central Emergency Response Fund • Improve the international emergency response system • Promote awareness of the responsibility of governments to protect displaced people • Develop mechanism for triggering an international response to an emergency • Invest in disaster risk reduction in developing countries • Develop bilateral and regional disaster responses systems • After an event, mainstream adaptation into reconstruction activities • Do not encourage or facilitate movement into conflict areas • Allow people the choice of staying in camps or moving

	into settlements and support their decisions. Plan to integrate people with their host populations.
Internal displacement	• Increase commitments to the UN Central Emergency Response Fund • Improve the international emergency response system • Promote awareness of the responsibility of governments to protect displaced people • Develop mechanism for triggering an international response to an emergency • Invest in disaster risk reduction in developing countries • Develop bilateral and regional disaster responses systems • Promote awareness and implementation of the Guiding Principles on Internal Displacement • After an event, mainstream adaptation into reconstruction activities • Do not encourage or facilitate movement into conflict areas • Allow people the choice of staying in camps or moving into settlements and support their decisions. Plan to integrate people with their host populations.
International permanent	• Adaptation among communities where livelihoods are, or are projected to, be stressed from climate change. • Systems for well timed and effective disaster relief • Facilitate secure access to land in places at risk and for migrants • Create short term jobs for migrants • Provide micro-finance, health care, skills training and agricultural extension to migrants and host communities alike • Encourage local hosts to see the benefits of new migrants and foster cultural awareness • Ensure migrants have the same rights and freedoms as local people • Developments that boost employment of both local and migrant peoples

	• Increase efforts to build and broker peace to avoid conflicts
Internal permanent	• Adaptation among communities where livelihoods are, or are projected to, be stressed from climate change. • Systems for well timed and effective disaster relief • Facilitate secure access to land in places at risk and for migrants • Create short term jobs for migrants • Provide micro-finance, health care, skills training and agricultural extension to migrants and host communities alike • Encourage local hosts to see the benefits of new migrants and foster cultural awareness • Ensure migrants have the same rights and freedoms as local people • Developments that boost employment of both local and migrant peoples • Increase efforts to build and broker peace to avoid conflicts

Relocation of communities	• Do not resettle communities unless absolutely necessary
	• If resettlement is absolutely necessary,
	    ○ Provide adequate time for preparation
	    ○ Assist the migrant community to plan and reconstruct
	    ○ Provide compensation for losses at the average standard and prices of the receiving region
	    ○ Do not pay funds to intermediaries
	    ○ Use the migrants' own labour for reconstruction
	    ○ Rebuild the migrant community as a community
	    ○ Provide resources sufficient for the migrants to have the average standard of living of the receiving region
	    ○ Respect existing decision-making structures within the community

	o Make sure that the host region is compensated for resources lost

7. Conclusions

Concern about the effects of climate change on migration is warranted. In the next forty years climate change will expose hundreds of millions of people to increasing environmental and social risks, and in response, some will move. Nevertheless, estimates of the number of migrants likely due to climate change are empirically unsubstantiated, and the frequently cited estimate of 200 million more migrants by 2050 due to climate change is perhaps overly high.

The impacts of climate change will differ from place to place, as will the number of people exposed to them. The nature of subsequent movements exacerbated by climate change will therefore also vary. People may choose to seek work. They may move temporarily in response to increasingly frequent and intense rapid onset extreme events. They may move permanently in response to slow-onset changes. In each of these kinds of movement, people may move within a country, or to another country. It seems most likely that climate-induced migration in the near future will be almost exclusively a developing country problem, most particularly for those countries already struggling to accommodate large numbers of internal and international migrants. These movements are unlikely to increase the risk of violent conflict.

There is growing recognition that migration contributes positively to development in most cases, through many means. Migration most often works to improve the lives of migrants, their families, and the communities from which they come and to which they move. This is not however the case with involuntary resettlements, which may also arise in anticipation of or in response to climate change.

In many ways migration can also contribute positively to adaptation to climate change, notably through the way it can build financial, social and human capital. There are policy measures that can enhance the contribution migration can make to adaptation, and in this report we have outlined many such policies. However, migration in response to climate change also has its risks, and we have also outlined some policies that help to minimise these risks. The extent to which climate change impacts on people and communities will depend in part on the extent to which these and other policy measures designed to improve adaptation are implemented.

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