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Migration, immobility and displacement outcomes following extreme events[☆]

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ABSTRACT

There is growing international concern at the rise in the severity of impact and frequency of extreme environmental events, potentially as a manifestation of global environmental change. There is a widely held belief that this trend could be linked with a future rise in the migration or displacement of human populations. However, recent approaches to migration influenced by environmental change call into question the notion that migration can be ascribed in a singular way to particular environmental causes or events. This paper undertakes a systematic review of evidence on population movements associated with weather-related extreme events. The paper demonstrates that in the face of extreme environmental events, it is important to distinguish between three outcomes – migration, displacement, and immobility – each of which interact and respond to multiple drivers. It also proposes a further insight: that both those who move, and those who do not move, may find themselves trapped and vulnerable in the face of such extreme events. A review of evidence suggests that short-term displacement that goes hand-in-hand with loss of life, destruction of property and economic disruption poses significant risks not because it is environmental migration, but because it represents a failure of adaptation to environmental change.

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1. Introduction

There is growing concern internationally about extreme environmental events, including their frequency, severity, and the damage that they cause to life, property and economic activity. One element of this concern is a growing scientific literature on the potential links between global environmental change, extreme environmental events, and human migration. This interest is fuelled in part by a series of high profile weather-related disasters in the past decade including floods,

hurricanes, typhoons, cyclones, droughts and heatwaves. Displacement from floods in central Europe, Brazil, Mozambique, Thailand and Kenya has been well-documented, while widespread floods affected many millions in Pakistan and China in 2010. In addition there have been direct impacts of hurricanes and typhoons across the tropics, such as in Burma, Philippines and in the Caribbean basin. Droughts, for example in sub-Saharan Africa, are reported almost annually and are seen to lead to displacements. Hurricanes Katrina and Rita in the US in 2005, and the 2003 heatwave in France and parts of southern Europe have highlighted the vulnerability of even the

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most technologically advanced regions in the world. All of these high profile events have had widely reported displacements of people or in some cases demonstrate that individuals can become trapped without recourse to movement, leading to an increase in mortality rates, as reported, for example, in Paris in 2003 (Prioux, 2004; Carens, 2010; Poumadere et al., 2005; Bezirtzoglou et al., 2011).

Perceived links between environmental extreme events and migration are also driven by a perception – and some empirical evidence reviewed here – that extreme environmental events are becoming more frequent and more intense; and by scientific predictions that suggest they are likely to become more so over the next 50 years as a result of a changing climate driven by human action and other human-induced environmental degradation (Goodess, 2011).

Whilst these concerns are real, there is a resurgent literature that questions a simple relationship between global environmental change, including climate change, and human migrations (Afifi and Jäger, 2010; Black et al., 2011a,b). This raises the question of whether there is a simple relationship between displacement of people and extreme environmental events. After all, when a flood, storm or wildfire occurs, people are often forced to move directly as a result of that event, even if it is well-established that structural factors in economies and societies make some people more vulnerable to such displacement than others (Wisner et al., 2004).

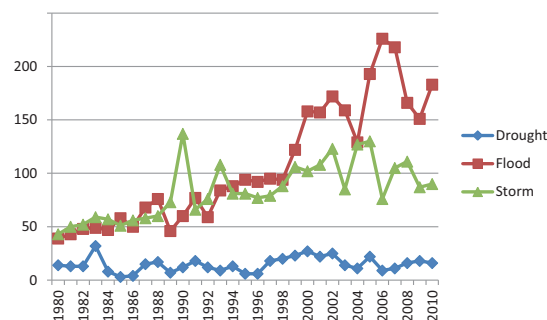
Of course, a distinction can be made between such ‘rapid-onset’ extreme events, and more ‘slowonset’ events such as droughts or disease outbreaks, where the latter might involve population movement that is broader in terms of its overall ‘drivers’, and possibly more extensive (Laczko and Aghazarm, 2009). Yet environmental change, including long-term climate change, will likely be experienced in the main as changing variability and hence as a series of extreme weather events. As Hulme and colleagues (2009) note, shifts in climate can take generations to be observed and are embedded in cultural and economic practices, but policy and adjustments to climate change in the public and private sphere often happen in episodes of crisis (e.g. Pelling and Dill, 2010).

In this paper we propose a new conceptual framework, outlining the relationships between migration, displacement and trapped populations on the one hand and the

characteristics of extreme events on the other. We distinguish between three outcomes, those of migration, displacement and immobility, all of which are possible outcomes of extreme events such as flood and drought, and each of which interact and respond to multiple drivers. We propose that it is necessary to consider how displacement is embedded in wider socio-economic, political and demographic processes. Yet a focus on these processes and connections leads to consideration of a wider range of outcomes, which are interconnected, and as valid for rapid-onset extreme events as they are for gradual environmental change. The paper proposes relationships between these phenomena on the basis of a systematic review of literatures on vulnerability and resilience to global change; disaster risk reduction; migration theory; and social science of natural hazards. The following section outlines the scope of migration and displacement associated with the increasing global trend to weather-related disasters. We then develop a framework and subsequently discuss the policy and research implications.

1.1. Trends in frequency and severity of extreme environmental events and in resulting displacements

A tentative answer to the question of whether extreme environmental events are becoming more frequent or severe can be sought both from existing trends, and from models of future change, especially climate simulations. The recent IPCC SREX report (IPCC, 2012) concludes that there is limited to medium evidence for changes in the frequency of floods, low confidence in any increase in the frequency of tropical cyclones, but medium confidence that some regions – including southern Europe and west Africa – have experienced more frequent droughts. The OFDA/CRED International Disaster Database EM-DAT data base, however, shows an increasing frequency in recorded extreme events that affected people, especially for floods and storms (which include, but are not limited to, tropical cyclones) (Fig. 1). Whilst this may be because events happen to be occurring more frequently in populated areas, it is much more likely that the trends in Fig. 1 are due to a combination of improved reporting over time (there are known measurement biases in the reporting of extreme events) and increases in exposure to damaging



Source: "EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be - Université Catholique de Louvain - Brussels - Belgium. Created on: Oct-13-2011. Data version: v12.07

Fig. 1 – Trends in ‘natural disaster’ events, 1980–2010 (events/year).

Source: “EM-DAT: The OFDA/CRED International Disaster Database, www.emdat.be – Université Catholique de Louvain – Brussels – Belgium. Created on: Oct-13-2011. Data version: v12.07.

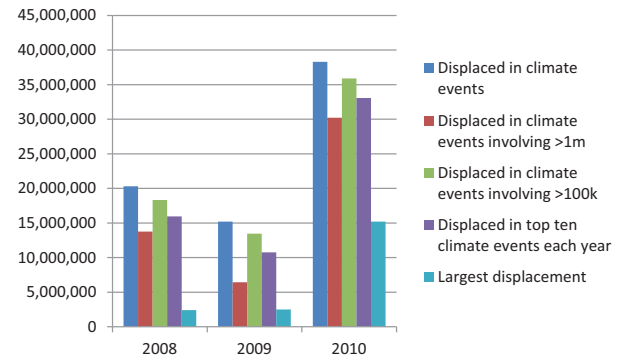
events. In essence, the scale of populations within hazardous zones and the insured property and economic assets within such areas are both growing over time, enhancing the risks of serious economic disruption as well as risks for population displacement. This increasing exposure has been the dominant cause of long-term increases in economic losses from extreme events (IPCC, 2012), which are increasing at a greater rate than the apparent number of events. Several quantitative assessments of change in historical disaster loss have shown no discernible effect of changing frequencies of extreme events, using a variety of methodologies and data sets (e.g. Bouwer, 2011; Neumayer and Barthel, 2011). Nevertheless, there are significant risks of displacement, particularly in poor countries (Kellenberg and Mobarak, 2008) where large populations have not yet invested heavily in protection against climate variability.

Turning to climate model projections of trends over the next five decades and beyond, these also suggest an increased frequency of heavy precipitation events at global scale, and in certain regions, although in some regions – notably West and Central Africa – predictions are weak and inconsistent between different models (Goodess, 2011). Whilst the intensity of the strongest tropical cyclones is predicted to increase on average to the end of the century, the globally averaged frequency of tropical cyclones is predicted to fall; again there is inconsistency in predictions for particular regions (IPCC, 2012). However, higher sea levels will lead to an increased frequency of coastal flooding even if cyclone frequency or intensity remains unchanged. The critical area on which there is model agreement is that global temperatures will rise as a result of increased radiative forcing, so that looking to the future, an increased exposure to both temperature extremes, and severe droughts, might be expected (IPCC, 2012).

However, even if there is evidence that extreme environmental events are increasing, and are likely to do so in the future, it is not easy either to calculate the number of people who have been displaced by such events, nor to project or estimate migration or displacement into the future. First, systematic recording of ‘displacement’ as a specific outcome of extreme events dates back only three years, to 2008, when the Internal Displacement Monitoring Centre started to collate data from the OFDA/CRED International Disaster Database EM-DAT and a range of other sources. Even over this three year time period, the method of counting has varied from one year to another, with unresolved debates over definitions (Naik, 2009). For example, there is inconsistent recording of three categories of people – “homeless”, “evacuated”, and “displaced”, all of whom could be considered as displaced by disasters in a real sense, but each of which might not involve population displacement over geographical space in the way that ‘displacement’ is generally understood.

Moreover, overall displacement figures both for the last three years, and for the longer period covered by EM-DAT, are heavily influenced by a very small number of very large cases (Fig. 2).

Thus the equivalent of three disasters per year over the last three years contributed well over half of the total number of displaced people during this period. The most significant of these were severe floods in China in May 2010, and Pakistan in July/August 2010, each of which were reported to have



Source : compiled from (Yonetani 2010; OCHA and IDRC 2009)

Fig. 2 – Climate-related displacement, 2008–10.

Source: Compiled from Yonetani (2010), OCHA and IDRC (2009).

displaced over 10 million people, and which together accounted for a third of all displacement globally over the entire three-year period.

In addition, displacement figures refer to the peak of displacement at the height of the emergency phase of a disaster, rather than to any longer-term phenomenon, as systems are rarely in place to monitor return, or to calculate numbers still displaced after a number of months or years. Thus comparisons of the numbers displaced by climate or other environmental disasters, with stock data on, for example, refugees or economic migrants are not valid. For example, whilst a significant proportion of those displaced by conflict and political violence experience protracted periods of displacement (Adelman and Taylor, 1989; Crisp, 2003), such protracted displacement appears relatively rare amongst those affected by extreme environmental events (Naik, 2009: 289). Indeed, a recent inter-agency assessment of the humanitarian response to the 2010 floods in Pakistan noted that by the time most international agencies started providing assistance, about a month after the initial floods in Sindh province, most displaced people had already returned to their villages. Such rapid return is frequently observed, but not systematically documented; it is also far from inevitable.

A small number of studies have sought to show a relationship between extreme environmental event occurrence and levels of migration. A spatial regression analysis conducted by Saldaña-Zorilla and Sandberg (2009) for Mexico shows that emigration rates were higher between 1990 and 2000 for Mexican municipalities that had a higher frequency of disasters (droughts, floods, hurricanes) during that period, but lower in surrounding municipalities. However, this analysis does not show increasing displacement directly associated with disaster events, nor a causal link. More convincing is a paper by Carvajal and Pereira (2010) which shows that households exposed to heavy rains associated with Hurricane Mitch in Nicaragua were more likely to have migrated afterwards than those who were not exposed to heavy rains. Numerous case studies of post-disaster migration also exist (Naik, 2009), although these often point to complexity rather than simple correlations (Piguet, 2010).

Overall then, there remains cause for concern about the potential for increased frequency and intensity of extreme environmental events into the future, even if caution needs to be exercised in terms of how this will likely play out in particular circumstances. There is also some concern around rising levels of displacement, although data on this needs to be treated with considerable conceptual and empirical caution. The following section turns to the question of whether there is anything exceptional about the way in which migration and displacement might be linked to such events, compared to global environmental change more generally.

2. Framing the debate: a multi-causal approach

2.1. Theoretical perspectives

As noted in Section 1, recent literature on migration and environmental change has shifted, from a debate between advocates of the idea that there are growing number of ‘environmental refugees’ (Myers, 1997), and those challenging such a view (Black, 2001; Wood, 2001), towards an increasingly shared recognition that migration is caused or ‘driven’ by a range of factors, in which environmental change can play an important and sometimes pivotal role. Such a ‘multi-causal’ approach is encompassed by a number of contributions to a recent edited collection on migration and climate change by Piguet et al. (2011a,b), as well as the recent report of the UK Government Office of Science on migration and global environmental change (Foresight, 2011).

In some respects, this emerging understanding has much in common with writing about ‘natural’ disasters. There are two major competing paradigms of vulnerability to hazards (reviewed in Cutter, 2003; Adger, 2006). The behaviouralist paradigm, building on the work of Gilbert White and others, suggests that natural disasters are a failure of planning response and rationality. They suggest that natural disasters occur due to a lack of planning and foresight from actors in the public and private sphere. An alternative paradigm, sometimes labelled as a political ecology or structuralist view, suggests that it is deep seated structures in society that explain who and what is vulnerable to natural and human-made disasters. These structures include the uneven distribution of wealth and power at all scales, and the resulting dependencies within the global and local economies. Hence human decisions create vulnerability to natural events which result in these events being hazardous – to humans (Hewitt, 1983; Lewis, 1994; Wisner et al., 2004). Indeed, more than 35 years ago, O’Keefe et al. (1976) noted a rise in the impact of disasters up to 1970s that they argued could not (simply) be a result of climate change, and could only be understood in terms of human vulnerability, although clearly at the time the insights of climate science were much more tentative.

The competing explanations of vulnerability to natural hazards are, of course, mirrored in migration studies, with behaviour and agency of migrants or deep economic structures competing as explanations of observed migration outcomes (Massey et al., 1993). Yet the natural hazards literature has only superficially engaged with migration

theory. The key focus in natural hazards studies has been on displacement associated with disasters, and both paradigms have tended to assume a relatively straightforward causal link between disaster events and subsequent movements. It is common to refer to migration and displacement as a ‘last resort’, when other strategies to build resilience to, or respond to disasters have failed (Baro and Deubel, 2006; Watts, 1993). For example, Autier et al. (1989) noted an association between abandoned households and reduced malnutrition during a period of severe drought in Mali in 1987, concluding that this was because those suffering with malnutrition had been forced to leave. Pyle (1992) noted that people migrated away from drought-affected areas of Sudan in the mid-1980s before, during and after the worst periods of famine, but concluded that this diversity reflected different levels of tolerance of famine rather than anticipatory strategies embedded in a more multi-causal environment.

A distinction is drawn more explicitly by Hammond et al. (2005: 21) in relation to humanitarian emergencies, where they contrast migration as a ‘strategy for coping with livelihood stress’, and displacement as a ‘survival tactic employed in reaction to disaster or imminent threat’, which they link explicitly to rapid onset events such as floods or military invasion. Yet they go on to point out the difficulty of differentiating the two. At the same time, there frequently remains an assumption that a severe enough shock will lead to displacement and migration, rather than a concern to unravel the causal connections.

There are of course some more sophisticated analyses, particularly into the relationships between drought and migration. This has focused, however, on the diversity of migration responses to drought in countries such as Sudan (de Waal, 1988), Mali (Findley, 1994) and Burkina Faso (Henry et al., 2004), rather than the diversity of causes of such migration. In the case of flooding, the literature is much more sparse, but includes some important work in Bangladesh that stresses the social and political context of adjustment to flooding and associated riverbank erosion (Zaman, 1989).

2.2. Multiple causes of displacement and migration following extreme events

Some of the more recent writing that has stressed the multi-causal nature of migration influenced by environmental change has developed an argument that would be widely accepted by earlier authors writing about natural disasters – namely that whilst an environmental event may trigger migration, it is likely to be just one of a number of deeper causes. For example, drawing on case study evidence from Bolivia, Senegal and Tanzania, Tacoli (2011) stresses that it is not desertification, soil degradation or disrupted rainfall alone that leads to migration, but rather the interaction of these processes with broader livelihood patterns. In turn, it is also the poorest are most vulnerable to ‘precipitating events’ such as unusually harsh droughts, or epidemics of livestock disease. Similarly Hampshire et al. (2009) focus on how out-migration following the 2004–05 food crisis in Niger was one of a series of responses to the crisis, and clearly embedded in wider socio-economic vulnerability in the region. These are valid and important insights, but in

essence similar to a well-established line of argument in the disasters literature that focuses on disaster risk and vulnerability, where the social, economic or political status of individuals and households experiencing disasters have a clear influence on likely outcomes (Wisner et al., 2004).

Yet some evidence points in other directions. For example, Banerjee (2007) has examined the impact of flooding in Bangladesh on agricultural wages. A key assumption of much writing on the relationship between environmental change and migration is that environmental change in general, and extreme environmental events in particular, lead to a lowering of agricultural productivity or wages, and that as a consequence poor people are forced to migrate in order to find work. Yet Banerjee finds that depending on their timing and severity, floods could depress or boost demand for agricultural labour and unskilled wages, with much depending on whether there is scope for replanting of damaged crops or not. In other words, the assumed direct line of causation from extreme environmental event to migration or displacement does not hold, because the former produces an economic signal that makes migration less likely, or could indeed attract migrants into the area.

There is a broader point here, that ‘reconstruction’ after disasters can lead to considerable economic ‘activity’ and therefore job creation, although those jobs may be in different sectors – and ultimately involve different people – to those initially affected by the event. A seminal general equilibrium analysis of natural hazards originally showed that small scale disasters do indeed stimulate construction and other sectors (Albala-Bertrand, 1993). But the result has been questioned with further evidence of the significant economic costs, particularly of large scale disasters where the economic disruption is not compensated by the reconstruction efforts (Hallegatte, 2011). A case in point is New Orleans after Hurricane Katrina, where at the same time as several ethnic groups have failed to return because (amongst other things) of lack of job opportunities, there has been an influx of new Hispanic workers looking for new employment in construction (Cutter, in this issue).

Meanwhile, an analysis of the impact of extreme climate events from 1970 to 2000 in 15 countries worldwide reported by Hertel and Rosch (2010) shows a particularly severe impact on urban poverty in Bangladesh (as well as southern Africa and Mexico) – interesting because urban areas are the destination of most poor migrants from rural areas of the country. This reflects a further important insight: whilst extreme environmental events may be quite location-specific in their physical effects, their economic, social or political impacts can be much broader, influencing conditions in potential places of destination as well as in the places where they physically occur. However, the broader point is that even in the context of extreme environmental events, there are a wider set of drivers of migration and displacement that need to be taken into account.

2.3. A new model of three mobility outcomes

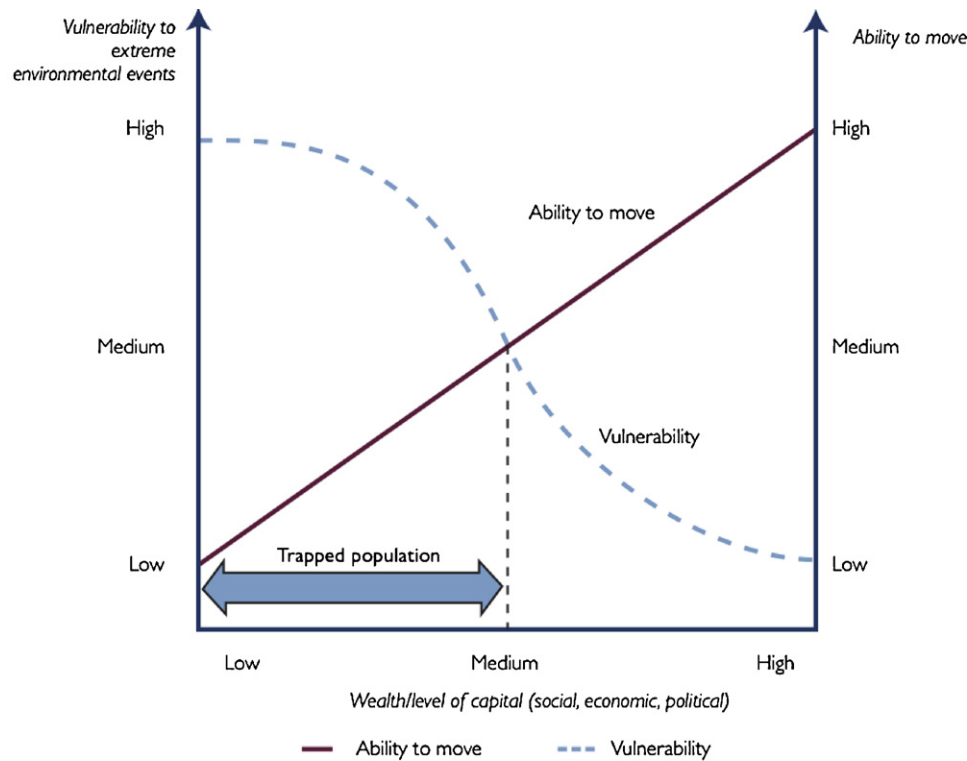
In their discussion of the diversity of migration and mobility patterns associated with climate change, Piguat et al. (2011a,b: 14–15) draw attention to three forms of mobility that need to

be disentangled: temporary displacement (less than three months), short-term migration (3 months to 1 year) and long-term migration (more than 1 year) – involving a definition of ‘migration’ recommended over a decade ago but still not systematically used (United Nations, 2004). They also distinguish between short- and long-distance moves (or internal vs. international migration) and between forced and voluntary migration.

Such distinctions are intuitively and conceptually sensible, even if there may be some blurring of what constitutes ‘forced’ and ‘voluntary’, and some inconsistency with the way that ‘displacement’ is monitored by organisations such as the Internal Displacement Monitoring Centre (IDMC) which count those displaced both temporarily, and for longer periods. However, these typologies omit an additional mobility outcome – that of people remaining in place during an extreme environmental event – which may be just as important in terms of exposure to mortality, morbidity or economic loss, and therefore just as important in public policy terms. This is arguably a more important category than the distinction between short and long-term migration.

The notion of a ‘trapped’ population is not a straightforward one, in scientific terms, not least because it is as difficult to distinguish, either conceptually or in practice, between those who stay where they are because they choose to, and those whose immobility is in some way involuntary. However, without minimising the significance of the ‘right to stay’ even in places that are vulnerable to environmental extremes, it is also clear that ability to move is broadly correlated with wealth, level of capital (financial, human, social), the availability of places to move to, and fear of what would happen to property and assets left behind, so that broadly speaking, poorer people are generally less able to migrate even if they wish to do so. In turn, vulnerability to extreme environmental events is widely recognised to be inversely correlated with wealth, such that poorer people face a double risk: they are more vulnerable to disasters, but less able to move away from them. This lack of choice for vulnerable populations is recognised in both behavioural accounts of vulnerability and by the pressure-and-release structural models of vulnerability (see Wisner et al., 2004). Fig. 3 therefore depicts the two-dimensional space for populations where mobility potential and wealth are generally positively correlated and where vulnerability to stress is inversely correlated to wealth for individuals. Trapped populations are vulnerable to stress but without the ability or resources to move.

To make a simple point, if we compare the numbers of people displaced with those ‘affected’ by natural disasters, those displaced generally make up only a small proportion of those affected, suggesting a much more substantial public policy issue for those remaining or trapped in situ for the duration of an extreme event. Perhaps more importantly, whilst short-term displacement (for less than 3 months) can result in either short or long-term migration, it is also the case that those trapped in the face of an extreme event may become ‘post-disaster’ migrants, whilst those who have already migrated or been displaced prior to an event may find themselves ‘trapped’ in the middle of an extreme event. Thus the relationship between migration, displacement and immobility is multi-directional (Fig. 4).



Source: Foresight (2011)

Fig. 3 – Vulnerability to extreme environmental events and ability to move.

Source: Foresight (2011).

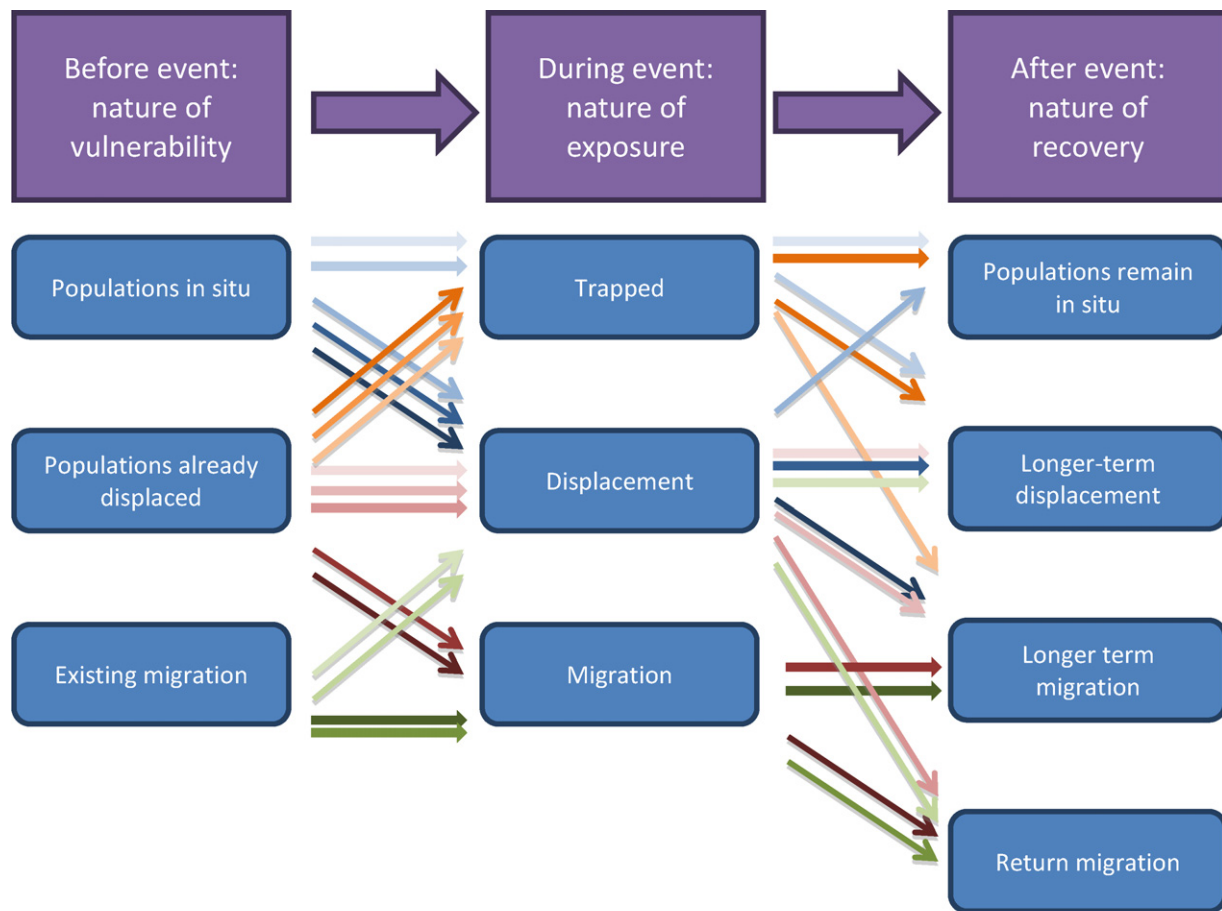
One example is provided by a study of the response to droughts by herders in Kenya in the 1980s, where [Herren \(1991\)](#) identified four wealth ranks – rich, medium, poor and very poor. Migration amongst medium and poor households took off in response to drought in 1964, and proved an effective way of earning money to restock cattle numbers, although it was less effective in response to the ‘double shock’ of droughts in 1981 and 1984, coupled with the collapse of the cattle marketing system. Yet it was the very poor, who remained largely sedentary, who were worst affected by the crisis, most prone to malnutrition and least likely to be able to rebuild their cattle stocks after the rains returned. Their immobility left them exposed to subsequent (and more problematic) displacement than those who moved in response to the initial environmental shock.

2.4. The interaction of migration drivers in determining mobility outcomes

Perhaps the most studied example of an extreme environmental event that has led to migration and displacement in recent years is provided by the experience of New Orleans after Hurricane Katrina. Indeed, this example provides an ‘emblematic’ case of the long-term displacement of people resulting directly from a major storm event. Yet one of the dangers that exists in the study of

‘exceptional’ phenomena is the temptation to draw generalised conclusions from unusual circumstances. In the case of Katrina, whilst estimates of displacement vary widely, a range of authors agree that a significant proportion of especially poorer residents have been unable to return, with particular ethnic groups over-represented amongst those who have remained displaced for longer ([Cutter, in this issue](#)). Yet this longer-term displacement reflects a number of factors – including the focus of reconstruction efforts on home-owners, who could show proof of ownership ([Finch et al., 2010](#)) – that are imbued with the particular racial politics of the region.

A similar picture is gained from another of the major ‘environmental’ displacements of recent times– the 2004 Indian Ocean tsunami crisis that hit Indonesia, Sri Lanka, India and Thailand. In both Aceh, Indonesia, and in Sri Lanka, perhaps more than half of those displaced by the tsunami had been unable to return to their homes two years after the event in early 2007. Yet in both countries, this was not a technical, but political outcome, related in part to the nature of ‘camps’ created to house displaced people, and in part to the creation of an ‘exclusion zone’ along the coast to prevent return to a zone considered vulnerable to future disasters. In Sri Lanka, although officially abandoned within a year of the disaster ([Fernando, 2010](#)), the exclusion zone is estimated to have



Source: Authors

Fig. 4 – Mobility outcomes associated with underlying vulnerability, hazards events, and recovery phases.

Source: Authors.

resulted in 70,000 households being forcibly relocated rather than being able to return home (Muggah, 2008). Meanwhile, in Aceh, so-called ‘barracks camps’ need to be understood in the context of previous conflict and displacement in the region (Hedman, 2009), and helped perpetuate displacement. It is worth noting that those with lower levels of education were significantly more likely to be in camps (Rofi et al., 2006).

In contrast, in the example of the 2010 floods in Pakistan, as noted in Section 1.1 above, return was rapid in Sindh province, but even this was partly as a result of the fact that displaced people had occupied government buildings, schools and hospitals that the Pakistan government was keen to bring back to ‘normal’ use. A rather different outcome emerged in Khyber Pakhtunkhwa (KPK) province, which bore the brunt of initial floods. Here, not only were significant populations *already* displaced ahead of the floods, as a result of counter-insurgency activity by the Pakistan military in the SWAT valley in 2009 – activity which was reported to have displaced 2.3 million people in just two weeks in Spring 2009 (Din, 2010) – but there were reports of significant numbers of people displaced by the floods being prevented from returning by landlords whose

land they had been occupying illegally prior to the floods (Murtaza et al., 2011).

What draws together these examples is not the conclusion that extreme environmental events of sufficient magnitude are likely (or not) to lead to long-term or permanent displacement. Rather, all three events are good examples of how environmental, economic, political, social and demographic drivers combine in determining the ‘mobility outcome’ for different sections of the population, even if the short-term shock of flooding inevitably leads to short-term displacement.

Another example of the inter-related nature of mobility outcomes over time concerns populations that are moving to large cities in developing countries that are themselves vulnerable to extreme environmental events. Such populations may well become trapped if environmental events are severe enough to force a relocation of economic activity away from vulnerable zones, since the economic logic of their initial migration would have disappeared, but their new attachment to their place of destination – in the form of housing assets and social contacts will – very much remain. For example, migrant populations moving to illegal slum areas of large cities may find it impossible to sell houses that they have constructed illegally.

3. Mobility outcomes and public policy

The previous section has sought to establish that migration and displacement related to extreme environmental events are as ‘multi-causal’ as migration influenced by environmental change more generally, and lead to a complex range of mobility outcomes. This is important, since the starting point for much writing in relation to both is the notion that ‘environmental migrants’ or ‘climate refugees’ require legal or international protection (Williams, 2008; Biermann and Boas, 2010). Yet such an argument both presumes that single causes of migration or displacement can be identified; and also prioritises action in relation to a single mobility outcome – migration or displacement that creates a legal protection gap.

In practice, migration, displacement and immobility are all likely to create a range of public policy challenges. Some of these, such as legal protection gaps, are ‘geopolitical’ in the sense that they call MM into question the geographical and/or political reach of existing institutions, requiring anything from international or inter-institutional negotiation or debate, to the development of new structures of governance. Others are more ‘operational’ in character – in other words they are challenges that are well within the planning capacity and remit of existing governance institutions at various levels (local, national, international, including states and non-state actors). The discussion that follows focuses on geopolitical challenges, as these are more complex to conceptualise, with wider ramifications.

3.1. The policy challenges of immobility

At first sight, it might appear curious to focus on ‘geopolitical’ challenges of immobility, when this mobility outcome does not, by definition, involve people moving across borders or other clear challenges to state sovereignty. Yet the challenges are real, in terms of human security, social protection, health, and the provision of services. In turn, in the fields of disaster risk reduction and human rights in particular, international negotiations do take place that are ‘geopolitical’ in nature, even when people do not cross international borders. Most notably, the UN’s Guiding Principles on Internal Displacement have been incorporated into national law in over 20 countries to provide legal protection to those displaced within their own countries, whilst the African Union Convention for the Protection and Assistance of IDPs in Africa (Kampala Convention) holds out the prospect for further protection of those ‘internally displaced due to natural or human made disasters’ (Article 4).

However, the problem is that whilst these legal and regulatory developments extend protection and assistance to those displaced internally, they treat immobility as essentially unproblematic. In contrast, the Hyogo Framework of Action, agreed at the World Conference on Disaster Reduction in 1985 (UNISDR, 2007) makes just one reference to displacement (as a possible additional risk factor in increasing vulnerability), and no references at all to migration. It is also a largely technical, rather than political framework, with international cooperation extending to information

exchange and financing mechanisms, rather than the need for international governance.

In discussing a human-rights based approach to building resilience to natural disasters, Kälén (2011) refers to existing national constitutional or legal guarantees, as well as human rights conventions providing relevant standards, turning to specific standards negotiated in the international arena only in the context of those who are displaced. In turn, whilst the recently-agreed Inter Agency Standing Committee (IASC) Guidelines on the Protection of Persons in Situations of Natural Disasters cover a much wider range of circumstances, they also suggest that those displaced are ‘at particular risk’ (IASC, 2011: 2), and deal with ‘freedom of movement’ as an issue only at a point after people have been displaced, or as ‘provided for by law’ (IASC, 2011: 46).

Such a position implicitly accepts the parameters of existing law on migration, whether internally or internationally, rather than holding these up as a matter for geopolitical scrutiny. This is important, because existing law on migration may or may not enable the kinds of migration – for example, temporary, seasonal or circular – that are undertaken by some people, but allow others, notably in their own families, to remain where they are. Indeed, the ‘right to stay’ or ‘right to remain’ is frequently taken as a given, and where there has been critical academic scrutiny, this has often been in relation to the right of individuals to remain *after* they have migrated or been displaced (Leckie, 2003; Carens, 2010).

To take one example, Lebel et al. (2010), in writing about ‘adaptiveness’ in the shared rivers of Monsoonal Asia, note how migration is one of a series of adaptive measures – alongside building houses on stilts and making seasonal livelihood adjustments – that are part of a strategy of ‘living with floods’ rather than seeking to prevent them. In turn, such a strategy – to live with, and adapt to, floods – is increasingly seen as more viable than engineering solutions such as dams as a way to mitigate flood risk. Thus Etkin (1999) suggested, following Gilbert White in the 1940s, that structural flood mitigation schemes such as dams encourage people to live in places that are more vulnerable should the design capacity of the dam be exceeded, an example of what he terms ‘risk transference’ from more frequent low-impact events to rarer high-impact events in the future.

Put simply, the geopolitical challenge of immobility is the challenge of protection of the rights of people who are trapped – including their ‘right’ to move. In contrast, at present human rights activists and professionals are arguably too quick to see migration as a failure of human rights protection, where those forcibly displaced need to be treated as a special case (de Sherbinin et al., 2011).

3.2. The policy challenges of migration and displacement

As noted in the previous section, migration and displacement are often seen as a policy failure in relation to natural disasters. Yet the potential benefits of facilitating migration as one form of disaster risk reduction or insurance are substantial. For example, Yang and Choi (2007) show for the Philippines how international remittances respond to household income shocks that follow extreme rainfall events, with

such remittances increasing to replace up to 60% of lost income. This empirical evidence supports the broader contention by *Ratha (2003)* that remittances act to buffer economic shocks in migrants' home countries, acting in a counter-cyclical way to other international investments.

Nonetheless, migration, whether it occurs before, during or after an extreme environmental event, frequently remains geopolitically challenging. In addition to raising issues within states of human security, social protection, planning and potentially conflict, it also often involves cross-border movements that are difficult to manage or even monitor. In the Ganges–Brahmaputra river basins, for example, migration is a cross-national issue as geopolitically challenging as water management, which has resulted in inter-state agreements that range from free mobility between India and Nepal to the construction of a border fence between India and Bangladesh.

Various international fora have discussed migration in the context of environmental change, although progress is slow. The fifth Global Forum on Migration and Development (GFMD) in November 2010 in Mexico discussed the issue in depth but called for just three outcomes: more data and analysis exchange; more dialogue; and for the matter be taken up within the UN Framework Convention on Climate Change (UNFCCC).¹ In turn, whilst the 15th Conference of Parties to the UNFCCC (COP-15) in Mexico the same month focused for the first time in international climate negotiations on migration, the resultant Cancun Adaptation Framework refers (in paragraph 14f) only loosely to three 'actions' – enhanced understanding, coordination and cooperation.

In contrast, the official statement from the Civil Society Days of GFMD 2010 called for states to 'consider ways to help people remain at home when possible and ways to help people move in safety and dignity when they cannot stay in place'.² Meanwhile, a group of academics brought together by the Rockefeller Foundation recently went further, calling for the 'establishment of national legal frameworks for climate change resettlement to protect welfare and human rights of affected populations' (*de Sherbinin et al., 2011: 457*).

However, the logic of building resilience prior to extreme environmental events through facilitated migration is somewhat different to the logic of moving people in safety and dignity when they 'cannot stay in place', or as a 'last resort' (*de Sherbinin et al., 2011: 456*). Anticipatory resettlement requires a scientific, but also highly political decision that remaining in place is impossible; anticipatory migration belies any attempt to assign direct causality in terms of the mobility of those concerned.

4. Conclusion

The multi-causal nature of drivers of migration is increasingly accepted by those concerned with the migration–environment interface. In this paper we examine whether migration might be more directly driven by environmental factors in the context of extreme environmental events. We find, to the

contrary, that migration and displacement associated with natural disasters is just as complex as migration and displacement associated with long-term or slow-onset environmental change. Explaining migration outcomes thus requires a similar approach, which recognises immobility as one of a series of outcomes associated with environmental change and variability. This complexity, exhibited in pre-disaster, disaster and recovery phases has both research and policy implications.

On public policy, the key tenets of disaster risk reduction include (from *Wisner et al., 2004*) policies to put the concerns of vulnerable people at the centre of development policy and improving accountability in disaster planning. These would ultimately promote resilience and adaptation to environmental risks. Such strategies involve evaluating risks as well as forecasting, warning and humanitarian emergency actions that are likely to become increasingly important in the context of environmental change. For example, short-term forecasting of extreme events has improved to the point that the 2010 Pakistan floods were predictable 6–8 days before they happened (*Webster et al., 2011*), a prediction that could have saved many lives. It is already well established that disaster risk reduction, especially related to forecasting and other 'preparedness' actions, are successful only if they take place in a conducive social and political context. Otherwise, warnings may be issued, but ignored, as appeared to happen in New Orleans in the run-up to Hurricane Katrina. Alternatively, measures may benefit some but not others, as in the case of Bangladesh, where in spite of substantial investment in cyclone shelters, these are still seen as inaccessible by many poorer women.

The analysis presented here suggests that public policy in emergency management and in longer term risk reduction needs to recognise the potential for evacuations from disaster zones to become episodes of longer-term and permanent migration. In addition, such planning also needs to recognise the particular vulnerabilities of migrants themselves: migrant populations are often clustered in hazardous areas in cities, and often have less local knowledge of risks and have less access to state-supported recovery investments.

However, the analysis presented here also suggests that disaster risk reduction which seeks simply to reduce vulnerability of populations in situ runs the risk of replicating the same problems of a 'root causes' response to violence and persecution – it can be seen as a policy of 'containment' (c.f. *Hyndman, 2005*). This at best pre-determines the types of 'acceptable' adaptation to extreme events (whether 'natural' or 'conflict'-related); at worst, it leaves people trapped in conditions where they are potentially even more vulnerable if the protection measures fail.

Finally, it is clear that displacement associated with extreme environmental events will remain a significant policy challenge in the future, not least with the likelihood of changes to the climate that may induce significant disturbances and even shifts in climate patterns at regional and global scales (*Lenton et al., 2008; New et al., 2011*). In this context, it is critical that in addition to building resilience prior to events taking place, by drawing on migration and other adaptation strategies, adequate mechanisms must be in place

¹ <http://gfmd.org/mexico-2010/index.php?lang=en>.

² http://www.december18.net/sites/default/files/statementcivilsocietydays_gfmd.pdf.

to ensure rapid emergency responses. Further clear choices need to exist for those displaced as to whether they return home or move more elsewhere. The existence of such choices, more than anything else, will determine whether future governance mechanisms will be needed to give legal protection to displaced populations.

The contribution of this paper is to sharpen the analytical focus of research on environmental risks and hazards by incorporating theoretical and policy insights on migration and displacement. These relationships are incorporated, in Figs. 3 and 4, by recognising how vulnerability can lead to populations being trapped as well as being displaced. The analysis recognises the embedded nature of the causes of disasters: how underlying conditions are structured by economic and political drivers. But we highlight here the interdependencies between demographic factors and those that create vulnerability. The research priorities are therefore to model and understand the resilience of populations moving to hazardous areas where they might be trapped; the sustainability of development and spaces where migrants cluster; and the benefits of interventions that tackle these fundamental causes of vulnerability among people moving as a result of extreme events.

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