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Environmental migration

Nature, society and population movement

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Migration, whether permanent or temporary, has long been a response or survival strategy for people experiencing environmental change (Hugo 1996). Throughout human existence, adapting to environmental fluctuations, sometimes expressed in 'natural' disasters, has been a consistent necessity for societies around the world. In some cases, migration has been seen as an adaptive option. Environmental changes have opened up new, more inviting prospects in other climes. Indeed, anatomically modern humans migrated from Africa in the middle Palaeolithic as the northern regions of the world warmed in the late Pleistocene (Templeton 2002). In other cases, environmental changes propelled the abandonment of environments. The last ice age, between 22,000 and 10,000 years ago, saw the depopulation of much of Northern Europe, Asia and North America (Stringer 1992). In addition, seasonal environmental fluctuations guided the movements of Neolithic hunters and gatherers as they harvested both plants and animals. Among the complex societies of prehistory, changes in rainfall regime over a 200-year span contributed to the massive depopulation of the Yucatan peninsula (Medina-Elizalde and Rohling 2012).

Nonetheless, the role of environment in migration, particularly in the modern era, cannot be reduced to a simple cause and effect relationship. In most circumstances, environmental, social, economic and political forces combined to increase the risk of uprooting for many vulnerable populations in exposed regions. In recent history, for example, the Great Flood of 1927 in the lower Mississippi Valley displaced nearly 700,000 people, approximately 330,000 of whom were African Americans who were subsequently interned in 154 relief 'concentration camps', where they were forced to work. However, the flood and its aftermath were only some of many reasons for African Americans to leave the South (Barry 1997: 417). Dust bowl migrations to California were due as much to the economic depression of the 1930s as they were to drought (Egan 2006). In Hurricane Katrina, the displacement of hundreds of thousands of people, many of them permanently, was due as much to human destruction of the environment's natural protections and inadequate local, state and federal policy and practice as they were to the hurricane itself (Elliott and Pais 2010).

Today the impacts of societal development are driving environmental changes that are potentially more extreme than at any time in recorded history, bringing with them a serious potential for uprooting large numbers of people. The complex interplay of social and economic

factors in the environment has resulted in greater environmental change and vulnerability of people to those changes. The linkages between environment and society have grown ever more complex, making it difficult to speak of direct environmental causality in human migration. The relationship between environmental change and migration is embedded in the complexity of both and in the nature of causality between such complex phenomena. And, as with all things human, culture and society play crucial mediating roles between a population and the environment it inhabits (or leaves) (Oliver-Smith 2009). Indeed, local culture derived from lived experience with their surroundings is fundamental to understanding how environmental change is perceived, responded and adapted to (Enfield and Morris 2012).

The issue of environment and migration is among the most discussed and debated dimensions of the impact of global environmental change on human beings. The contingent nature of prediction of environmental impacts, the complex question of causality, the elusive nature of definitional issues, the vast disparities in predictions of numbers of people to be affected, and the overall complexity of human–environment relations, all present serious challenges to researchers attempting to analyse the relationship between environment and migration.

Environmental change and the potential for displacement and migration

Although environmental change does take place through natural disturbances and cycles (Holling 1994), the enormous impact of modern industrial societies on the environment over the last 200 years is especially well documented. The structure and organization of Western economic institutions, in particular, ideologically buttressed by concepts of the human domination and rational control of nature, essentially entrained a process of global environmental transformation. The result of embracing the rationality of pursuing self-interest in the use of natural resources and the mobilization of human labour has been unprecedented extremes of wealth and poverty, unprecedented levels of environmental destruction and the rapid amplification of socially constructed vulnerability (Oliver-Smith 2002).

Through misguided or various forms of direct and indirect coercion, human exploitation of the environment has severely impacted many environments. Most recently, the Millennium Ecosystem Assessment (MA 2005a) concluded that 15 of 24 assessed ecosystem services were being degraded or used unsustainably, with serious effects for poor, resource-dependent communities. Among the issues the MA calls attention to is the fact that 10 to 20 per cent of drylands are already degraded, affecting as many as two billion people. Increasing pressure on dryland ecosystems will affect the provision of ecosystem services such as food, and water for humans, livestock, irrigation and sanitation. There will likely be increases in water scarcity, as well, due to climate change in highly populated regions that are already under water stress. Droughts are also increasing in frequency and their continuous reoccurrence can overwhelm community coping capacities. When coping capacities and adaptation strategies of communities are overcome by the loss of ecosystem services, droughts and loss of land productivity can act as triggers for the movement of people from drylands to other areas (MA 2005b; Renaud and Bogardi 2007; Warner et al. 2010).

Furthermore, the Intergovernmental Panel on Climate Change (IPCC 2007a, 2007b) asserts that human-induced factors are generating significant increases in temperatures around the world, producing increases in the rate of sea level rise, increases in glacial, permafrost, Arctic and Antarctic ice melt, more rainfall in specific regions of the world and worldwide, more severe droughts in tropical and subtropical zones, increases in heatwaves, changing ranges and incidences of diseases and more intense hurricane and cyclone activity. Data from the Emergency Events Database (EM-DAT) at the Centre for Research on the Epidemiology of Disasters

(CRED 2008) suggest that floods, droughts, storm surges and other natural and technological agents are impacting greater numbers of people and increasing damages globally, although fatalities are reportedly on the decline (CRED 2008). The real and potential impacts of these changes are also predicted to generate natural and social processes that represent a significant potential to displace large numbers of people, obliging them to migrate as individuals and families or permanently displacing them and/or relocating them as communities.

The 'nature' of socio-ecological systems

Partially as a result of these interlinked changes, it is an increasingly accepted scientific tenet that nature and society are no longer seen as separate interacting entities, but rather as mutually constituting components of a single system, often referred to as a socio-ecological system. Understanding environmental change and its effects, such as population displacement and migration, therefore requires recognition that nature and society are inseparable, each implicated in the life of the other, each contributing to the resilience and vulnerability of the other (Oliver-Smith 2002). Some have suggested that human action now dominates and that we are living in a new geological epoch referred to as the Anthropocene (Crutzen and Stoermer 2000; Vitousek et al. 1997). Global climate change, driven by excess production of greenhouse gases, would appear to support that assertion. In effect, for all intents and purposes, natural processes are now in interaction with social processes in the production of global and specific vulnerability, environments and problems. The recognition of the human influence on global climate patterns now confirms that human action both purposefully and inadvertently shapes natural systems into human constructed, although not entirely controlled, environments. Human action notwithstanding, however, we still have to contend with forces within nature, albeit inflected profoundly by human processes, that clearly transcend any social efforts to transform or control. The agency of a nature that has been profoundly socialized complicates an adequate theorization of the relationship between environment and migration. Developing an appropriate theoretical framework for this task is difficult because the behaviour of socio-ecological systems cannot be understood unless both sides are treated as endogenous (Kotchen and Young 2007: 150).

The endogeneity of both sides is the challenge. Both society and nature are highly interactive, incorporating dimensions of the other in their own processes. Therefore, environmental features and ecological processes – such as earthquakes, hurricanes, floods, soil erosion or climate change – must be recognized as features of social life; and social and cultural elements – such as racism, religion and politics or commodities, land markets and currency circulation – must be seen as functioning ecologically (Harvey 1996: 392).

The endogeneity of socio-ecological systems further complicates seeking single-agent, direct causality in the environment, since it tends to elide the fact that environmental resources, as well as hazards, are always channelled for people through social, economic and political institutions and practices. Thus, it is difficult to point to the environment, even in natural agent disasters, as the single cause of anything. Seeking single-agent causality to such complex phenomena would seem a doomed effort in any context. By the same token, eliminating environment factors as the single cause of forced migration hardly warrants discounting them as part of a multiplicity of interacting drivers, or in some cases the triggering event, that combine to generate forced migration.

Debating environmental migration

Despite the fact that the reality of environmental change, and specifically climate change, is generally accepted, the impacts of actual and projected effects are still much debated in both

scientific and political forums. There is considerable uncertainty about local manifestations of global environmental change and what necessary adjustments will be induced in natural and human systems (Dessai et al. 2007: 1). The uncertainty, in fact, characterizes the problem both at the level of physical impacts and at the level of responses and adaptations in human communities. Indeed, the projected effects of environmental change, particularly as they pertain to specific human communities, have entered as much into political controversy as they have into academic and scientific debate.

The research and scholarship focusing on the relationship between environment and migration is shot through with controversy due to this uncertainty, centring largely around the issues of predicted numbers, appropriate terminology for people uprooted by environment and the political implications of both research and policy pertaining to environmentally displaced people. There is considerable debate about what exactly constitutes an environmentally induced move and how to measure and explain it. The actual processes through which major population dislocations might occur are still only partially understood (Adamo 2008: 2). The United Nations High Commissioner for Refugees (UNHCR 2009: 4) sees five displacement scenarios emerging in the near future: hydrometeorological disasters, population removal from high risk areas, environmental degradation, the submergence of small island states and violent conflict.

However, some scholars assert that it is erroneous to attribute causality to the environment, since migration is always the result of multiple factors, including social, economic and political as well as environmental forces, underscoring the fact that human demographic movement is both a social and an ecological phenomenon, both impacted by and impacting the environment (Black 2001; Castles 2002; Kibraeb 1997). There are legal objections to the term 'environmental refugee'. The 1951 United Nations Convention Relating to the Status of Refugees legally defined a 'refugee 'as a person who flees their country of nationality for fear of persecution based on race, religion, nationality, ethnic or social group or political opinion. People displaced by environmental causes do not qualify under the UN convention definition of refugee. Moreover, critics also fear that applying the term 'refugee' to environmentally displaced people will mask the political causes of displacement and allow states to evade their obligation to provide asylum. Other scholars object to the term politically, because of instances when the term 'refugee' has nourished xenophobic and racist perspectives, pointing to the fear of climate-induced migration that has recently entered European and North American political discourse (Hartmann 2009; Wisner 2009).

Complexity and causality in environment and migration

While the substance of all these assertions, both pro and con, on environmental migration, may be questioned, the concerns they express are valid and reflect the difficulties of developing appropriate political, policy and practical responses for environmentally displaced peoples in the near future. The relationship between environment and migration is far from linear or straightforward and understanding it presents a number of conceptual challenges. These challenges are embedded in the complexity of the relationship between social and ecological systems and in the nature of causality between such complex phenomena. It is also clear that the 'environmental refugee' controversy is both highly charged and deeply embedded in the way complex human–environment relations are understood by scholars, politicians and the general public.

The complexity of socio-ecological systems and environmental migration necessarily obliges us to deal with the issue of causality. Causality is a much-discussed and -disputed concept whose mathematical and philosophical parameters have been debated since Aristotle. Direct relationships of causality are hard to come by. In the strictest sense of the word, if A causes B, then

A must always be followed by B. In common parlance, when we say A causes B, as in smoking causes cancer, what we should really say is that smoking causes an increase in the probability of B (Spirtes et al. 2000). In other words, A increases the risk of B. In this case radical environmental change increases the risk of displacement and the incidence of migration. Migration research has shown that the reasons for migration are highly complex, often combining a variety of social, economic, demographic and political factors, acting either to push or pull, and sometimes both, people from their original location towards another. In effect, drivers may be multiple and often intertwined. The complexity of our social and psychological makeup makes reducing human behaviour to single causes always risky.

A finer-grained understanding of both environmental forces and their effects must be based on an approach that recognizes the environment as a socially mediated context experienced by people both positively and negatively just as society expresses itself environmentally both positively and negatively. Particularly in climate change, people will be displaced by a set of processes created and driven by human agency, specifically massive production of greenhouse gases that have entrained a series of processes that are transforming global climate and therefore nature. The fact that these processes manifest themselves in and as events that transpire in the environments that we live in or in ways that take the form of natural processes (wind, rain, drought, erosion, etc.) obscures their partial human origins. Under no circumstances should they be interpreted as natural. They are most certainly environmental processes that combine human and natural forces and features.

Environment and the multiple drivers of migrations

In effect, rather than trying to identify and isolate environmental factors as single drivers, the more relevant task has become analysing the role that environmental factors play along with other political, economic, demographic and social drivers of migration (Black et al. 2011). Economic drivers, perhaps most often given the greatest importance, can act as both push factors, where local livelihoods or employment become reduced, or pull factors, where economic activities are more vital in other regions. Clearly environmental factors, whether in the form of local hazard impact or better environment services availability elsewhere can interact with economic drivers to provoke migration. Similarly, political factors that run the gamut from policies to reduce social services to the breakout of war can degrade environments inducing people to migrate. Demographic factors also may contribute to migration through increasing densities on available land, reducing surplus carrying capacity and stressing environmental services. Social and cultural features may encourage migration, as well. The so-called 'bright lights' theory refers to the attractions that urban environments represent for rural people who desire to engage in more contemporary lifestyles (Byerlee 1974). And finally, environmental events and processes may also drive migration. The impact of natural hazard occurrence, such as Hurricane Mitch in Honduras, which uprooted thousands, many of whom migrated to the United States in 1998. In some cases emergency evacuation either before or after a hazard event can result in permanent migration, such as occurred in Hurricane Katrina. Slower onset processes such as droughts have also stimulated various sorts of migration in Africa, in some cases leading to the sedentarization of nomadic pastoralist populations, and in others turning seasonal adaptive migrations into permanent resettlement (Kenny 2002; Merryman 1982). Moreover, many environmental impacts that uproot people are often shown to be far from naturally generated, but rather have their origins in human policies and practices, as the environmental destruction in New Orleans tragically demonstrated in Hurricane Katrina. Indeed, in human communities environmental factors are always mediated through social frames.

Therefore, Black's (2001) critique that emphasizing environmental factors diminishes the role played by political and economic factors in migration is well taken, and coincides with the viewpoint of most disaster researchers today that highlights the political or economic forces that together with natural agents produce disasters or, for that matter, any forced migration that might ensue. In the face of such complexity then, the question thus becomes how causality is to be reckoned. Hilhorst (2004) contends that the fact that disasters involve the interaction of multiple adaptive subsystems within social and natural systems renders them acutely unpredictable in their development and outcome, if not entirely so in their occurrence. We now understand that most environmental changes, particularly those generated by climate change, are similar.

Elusive definitions

Compounding the complexity of socio-ecological systems and the often intertwined causal factors of migration, the failure to reach a consensus definition of environmental migration has further impaired efforts to diminish the uncertainty that surrounds the issue. Since the 1980s, researchers have linked the issue of environmental change with human migration, designating as 'environmental migrants', 'environmental refugees', 'climate migrants', or 'environmentally displaced peoples', people who are forced to leave their homes, temporarily or permanently, due to the threat, impact or effects of a hazard or environmental change. There have been many attempts at definition, but none has fully succeeded in being generally accepted. Without the parameters of an established definition, it is difficult to state whether migrating populations are actually environmental migrants or, for example, economic migrants. Most of the definitions offered in the literature address the issue of an environmental disruption, whether a sudden disaster from the occurrence of a natural hazard or a slower onset process of resource degradation of either natural or anthropogenic origin. There has also been debate over the appropriate terminology to use. Are environmentally uprooted people refugees (see below) or migrants, or disaster victims?

The disparate causes of environmental migration, including disasters, environmental degradation, contamination and climate change, as well as the different forms and trajectories the migratory process may take, have proved challenging to bracket within one overarching definition. Some researchers are reluctant to include migrants who were temporarily displaced and those who permanently relocated in the same category. Further distinctions have been drawn between those who leave voluntarily and those who are forced to migrate. Others have objected to the inclusion in one category of disaster victims and people displaced by environmental degradation. While the authors who have advanced definitions for environmentally displaced people number more than a dozen, the following are representative. El-Hinnawi (1985), who first coined the term 'environmental refugee', used it to describe people who had been temporarily displaced, those who had been permanently displaced and those who migrated because their home environment no longer could sustain basic needs. Myers (2002) defined environmental refugees as people who can no longer gain a secure livelihood in their homelands because of drought, soil erosion, desertification, deforestation and other environmental problems, together with the associated problems of population pressures and profound poverty. Renaud et al. (2007) constructed a typology of environmental migrants that distinguishes between: (1) an environmentally motivated migrant who chooses to leave a steadily deteriorating environment to pre-empt the worst outcome; (2) an environmentally forced migrant who must leave to avoid the worst outcome; and (3) those who must flee the worst outcome.

The dynamics of environment and migration

Moreover, efforts to define environmental migration have difficulty accounting for the dynamics of the process. Environmental changes expected to pressure people to migrate may be adapted to through social and cultural means, thereby avoiding the uprooting process. Cultures around the world have adapted to the seasonal environmental fluctuations by expanding their ecological niches, adopting 'famine foods', risk-sharing institutions and seasonal temporary migrations (Torry 1979). Both adaptation and its related concept, mitigation, entail changes in social, technological and environmental relations. Mitigation is proactively concerned with strategies to minimize impact and loss, and to facilitate recovery and thus increasing the resilience of a society. Adaptation, on the other hand, is a process that offers possible adjustments that may enable people to safeguard livelihoods and welfare.

Adaptation, however, because it is deployed in numerous institutional and environmental contexts, is a complex issue. Adaptation is the fundamental conceptual nexus in human–environment relations. It is through the process of adaptation that humans and natural systems conjointly construct socio-ecological systems, or environments. Humans interact with and adapt to both a socio-cultural (institutional) environment as well as a natural environment. That is, our institutions are at once part of our overall adaptation, but must be adapted to as well. These local circumstances of both natural and social nature are the basis of a community's ability to mitigate or adapt to environmental change to avoid displacement or migration.

When used in the social scientific sense, adaptation refers mainly to changes in belief and/or behaviour in response to altered circumstances to improve the conditions of life (or survival). In that sense, adaptation in general is reactive, adjusting primarily to novel conditions. Human adaptations to environmental change are largely social organizational and technological. Faced with environmental change human beings assess options, make decisions and implement strategies, based on existing knowledge and technology for exploiting an environment's energy potentials, or where they are lacking, for abandoning it (Bennett 1996; Holling 1994).

Estimating the hard-to-count

One of the complications of the lack of a consensus definition is the enormous disparity in estimates of people who have been, or will be, displaced by the effects of environmental change. Estimates are at least in part contingent on how environmental migration is defined and who will fall under a given definition. The range of estimates is considerable, as illustrated in Table 12.1.

Moreover, the failure of most of those who have offered estimates to specify the methods by which they arrived at their numbers has generated significant scientific debate and presented

Table 12.1 Estimates of people displaced by the effects of environmental change

Source	*Estimated displacement*
El-Hinnawi (1985)	50 million
Almeria Statement (1994)	135 million
Myers (2005)	200 million
The Stern Review (Stern 2006)	200 million by 2050
Friends of the Earth (2007)	200 million by 2050
Christian Aid (2007)	250 million
Global Humanitarian Forum (2009)	20 million in 2009

policymakers with confusing data. There is also no commonly agreed upon methodology (Gemenne 2011). Some estimates are based on field reports from relief agencies. Some are based on population figures in areas that are experiencing environmental change. Few have solid bases for the numbers that are estimated. Probably the most reliable figures at present are produced by the International Displacement Monitoring Centre and the Norwegian Refugee Council, which place the number of people displaced by natural disasters at over 42 million people, using a baseline of events from the EM-DAT database to produce a core data-set for events where over 50,000 people were affected. Data on the displaced from each event is then sought from organizations involved in relief for those events (Yenotani 2011).

Most estimates of environmentally displaced people gloss over distinctions that many of the definitions point to, such as the differences between temporary or permanent migration, or between voluntary and involuntary displacement. Nor do most of the estimates establish whether the numbers are for a given year or cumulative for a given time period. Still another problematic dimension is that neither the definitions nor the estimates have captured the fact that most people have been uprooted by a mix of environmental with other economic, political, social and/or demographic factors. The debate over this issue, with claims of millions of environmental refugees being produced versus counter-claims that the evidence is uneven, unconvincing and counterproductive, has been active since the 1980s. However, it is clear that to develop adequate responses to these issues and uncertainties regarding the social impacts of environmental change we must begin by addressing them at the multiple levels at which they exist, and particularly in the complex interrelationships between nature and society, both conceptually and specifically as expressed in local contexts.

Social vulnerability, environmental change and forced migration

Research on social vulnerability since the 1990s has made clear that exposure to hazards alone does not determine where the serious effects of any hazard will most likely be experienced. Social vulnerability refers the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. It involves a combination of factors that determines the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or society (Wisner et al. 2004).

What can we expect from future effects of environmental change for specific regions and communities? To answer that question is difficult because of the numerous variables and the non-linearity of their interactions. The challenge lies in determining not just absolute exposure and absolute exposed population but specific lands and populations in different socially configured conditions of resilience or vulnerability. In fact, in many areas, conditions of vulnerability are accentuating rapidly due to increasing human induced pressures on ecosystems. Moreover, the vulnerability of a nation to environmental change effects is partially a function of its level of development and per capita income (Nicholls et al. 2007: 331). Less-developed countries have a significantly higher level of vulnerability to climate change effects.

However, the problem with assessing the exposure of both lands and people to climate change is that, not only are we dealing with projected environmental change effects, but also with projections about various physical, societal and infrastructural trajectories including greenhouse gas emissions, in the case of climate change, demographic change, migration trends, infrastructural development, mitigation strategies, adaptive capacities, vulnerabilities and patterns of economic change, all of which will play out in different ways, according to the political, economic and socio-cultural dispositions of national governments, international organizations and general populations (Nakicenovic and Swart 2000).

These difficulties in establishing both exposure and vulnerability to specific localities and populations notwithstanding, environmental change and its impacts have serious human rights implications. However, these implications tend to be subsequent to the human rights violations that pre-date climate change (Adger et al. 2006). The problems of Andean agro-pastoralist peasant farmers or the slum dwellers of Mumbai do not start with environmental or climate change, but climate change will make their problems worse by any measure, resulting in many cases in likely displacement and migration.

The politics of environmental displacement

Given the increasing urgency in global climate change predictions and the expansion of hazards and disasters that threaten to generate population displacement, the debate on environmental migration has not only sharpened, but has acquired political overtones. Despite the attention that the issue of environmental displacement has garnered in recent years, there are no legally binding internationally recognized instruments that pertain to the needs of people displaced by environmental causes. Recognition of this lack has prompted a number of proposals for appropriate forms of governance pertaining to environmentally displaced peoples (Biermann and Boas 2010; Koivurova 2007). Recognizing the problem of complicating the status of legally defined refugees, these proposals argue against including environmentally displaced peoples under the 1951 Geneva Convention Relating to the Status of Refugees. Instead, they propose new legal instruments designed specifically to address the needs of environmentally displaced peoples.

There are other political objections to the linkages being made between environment and migration. Some researchers have concerns that the term 'environmental refugee' is depoliticizing, dehistoricizing and Malthusian (Hartmann 2009). It is felt that its use, particularly by political interests and the media, naturalizes these crises, allowing social factors responsible to escape responsibility. The dangers in the potential misuse of issues of environment and migration are unquestionable. Representations in the media of scientific findings are frequently problematic. Indeed, today in the United States, science reporting is considered to be in crisis (Mooney and Kirshenbaum 2009). In today's journalism, the more dramatically the implications of scientific findings can be framed, the better.

The issue of causality has also been manipulated by politicians for a variety of motives. This would not be the first time politics has misused science, particularly where findings are exploratory and contingent. Environmental migration has been used to alarm the developed nations of the north, particularly Europe and the United States, that they will be inundated by millions of environmentally displaced peoples from the south. Some politicians make these claims to generate support for anti-immigrant policies, with the triage or lifeboat ethic that is covertly associated with that perspective. Others use the spectre of millions of unfortunate refugees rushing over the US borders to generate support for stabilization of greenhouse gases and other forms of climate change mitigation. Clearly related, the distortions that politics and the media engage in when discussing environmental migration constitute a serious concern and it is incumbent on environment and migration researchers to clarify issues of causality when discussing the complexity and interrelationships of drivers in the displacement of populations.

Conclusion

There is little question that some environmental processes force people to migrate, but they do not do so in a socio-ecological vacuum. Both socio-natural and technological disasters, sometimes in combination as recently occurred in Japan, may uproot communities by sudden

destruction (Button 2011). The South Asian tsunami displaced millions and Hurricane Katrina uprooted more than 1 million people and left many hundreds of thousands permanently displaced. Their displacement, however, is not due to environmental causes alone, but also to the political economy of reconstruction.

In climate change, nature will not be displacing people, but rather an array of human-generated forces driven by massive production of greenhouse gases that are transforming global climate and therefore nature. The wind, rain, drought, erosion, etc. that displace people resemble natural forces, but their origins are becoming as much human as they are natural. They are processes transpiring in environments that combine human and natural forces and features. Therefore, although it may seem obvious, environmental change and, particularly, climate change are not things 'out there' but are fundamentally tied to both social and ecological processes driven by human action. Nevertheless, the language often used to discuss environmental migration continues to reflect an interacting but still dualistic separation, eliding the endogeneity of nature and society, particularly when discussing causality.

Although the recent report from the Global Humanitarian Forum (2009) estimated that as many as 20 million people would be displaced by climate change in 2009, at the moment in most cases environmental change effects such as migration are hard to quantify, but there is little doubt that they will make the daily challenges of survival worse for the world's most vulnerable people. Where displacement is occurring, it is generally the outcome of multiple factors, including environmental, political and economic causes. In fact, at present the problems afflicting, for example, people as disparate as the slum dwellers of Mumbai or the pastoralists of the high Andes, are not primarily climate change, but rather the conditions of poverty and exclusion that they are consigned to by the larger political economy encompassing their region, nation and the world.

While the numbers associated with environmentally displaced people are unsubstantiated, it would be incautious to say the least to dismiss environmental migration because of the difficulties in defining it or quantifying its effects. Environmental change and migration is a complex issue, but it is happening. Research on environment and migration is politically volatile and vulnerable to misuse and misrepresentation, but despite that it must be taken absolutely seriously because the potential outcomes are serious. If predictions from the IPCC (IPCC 2007a, 2007b) and other research organizations are even half right, and confidence in estimates for the degradation of fragile environments, sea-level rise, coastal erosion, desertification and other forces that may displace people is considerably higher than that, then we must be prepared for significant increases in the role environmental factors will play in displacement and migration in the relatively near future.

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