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Introduction: migration and climate change

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Climate change has become a major concern for the international community. Among its consequences, the impact on migration is increasingly attracting the attention of policy-makers and researchers. Yet knowledge in this field remains limited and fragmented: there are uncertainties surrounding the actual mechanisms at stake, the number of persons affected and the geographical zones concerned; there are debates between those who stress the direct impact of the environment on population flows and those who rather insist on the social, economic and political contexts in which such flows occur; different disciplines make their respective inputs to the literature, ranging from empirical case studies to analytical discussions. Moreover, the available information is heterogeneous, as research outcomes coexist with numerous 'grey' publications, such as policy reports (Barnett and Webber, 2009; WBGU, 2008; IPCC, 2007; Stern, 2007), advocacy brochures by IGOs and NGOs (Jakobeit and Methmann, 2007; Christian Aid, 2007; CARE et al., 2009) and conference proceedings (IOM/UNFPA, 2008; IOM, 2009; Afifi and Jäger, 2010).

This volume therefore provides a comprehensive overview of the climate change–migration nexus. It presents empirical insights on the links between climate change, the environment and migration, while bringing together case studies and synthesis from disciplines such as anthropology, climatology, demography, geography, law, political science and sociology. It investigates the key issues raised by the climate change–migration nexus, including the social and political context in which the topic emerged; states' policy responses and the views of different institutional actors; critical perspectives on the actual relationship between the environment and (forced) migration; the concepts most adequate to address this relationship; gender and human rights implications; as well as international law and policy orientations.

Two major interconnected arguments arise in the contributions. The first concerns the weight of environmental and climatic factors in migration and their relationship to other push or pull factors, whether of a social, political or economic nature. Understanding the role of the environment in migration dynamics implies analysing how and why people are vulnerable to climate change, as well as examining the different strategies they develop to cope with (or adapt to) environmental stress – migration being one among other such strategies. The second argument is about the political framework in which such migration flows should take place and how to treat the people who move in connection with environmental factors. This implies a discussion of the possible protection to be granted to those in situations of vulnerability and the responsibilities of states and of the international community in providing such protection. The two issues are deeply intertwined, as the extent to which the environment determines migration is intimately connected to the status associated with the people concerned.

This introduction first provides a short historical overview of the debate, then discusses the impact on migration of three major environmental factors linked to climate change (tropical cyclones, heavy rains and floods; drought and desertification; and sea level rise). The following sections explore the core issues that run through the volume: the plurality of factors that shape migratory dynamics, the social determinants of people's vulnerability to climate change, the diversity in the migration patterns associated with climate change, and issues of data collection and methodology. The different concepts used by researchers in the field, along with their analytical and political implications, are reviewed, which leads to a discussion of the legal implications of environmental migration and the responsibilities of states. The last section explores the possible policy orientations to address the climate change–migration nexus.

A short history of the debate

Environmental migration is an issue that is commonly presented as 'new' or as part of 'future trends'. Yet, as several chapters recall, it is a long-standing phenomenon: for example, Michelle Leighton (Chapter 13) provides evidence that desertification and droughts have always been closely associated with the movement of people (see also Jane McAdam, Chapter 5, and Anthony Oliver-Smith, Chapter 7).

Environmental factors ranked highly in the first systematic theories of migration. In 1889, Ravenstein (1889, p. 286) mentioned 'unattractive

climate' as 'having produced and still producing currents of migration' (along with 'bad or oppressive laws, heavy taxation, uncongenial social surroundings and compulsion' and, most importantly in his view, economic motivations). The American geographer Ellen Churchill Semple later wrote that 'the search for better land, milder climate and easier conditions of living starts many a movement of people which, in view of their purpose, necessarily leads them into an environment sharply contrasted to their original habitat' (1911, p. 143). However, despite these early historical insights, references to the environment as an explanatory factor were to progressively disappear from the migration literature over the course of the twentieth century. Indeed, core publications such as J. W. Gregory (1928), Donald R. Taft (1936) or Julius Isaac (1947) do not mention environmental factors. The same applies to Zelinsky's hypothesis on 'mobility transition' (1971) and to Stouffer's 'intervening opportunities' approach (1940; 1960). The environment is also absent from neoclassical economic theory (Harris and Todaro, 1970), as well as from the so-called 'ecological models' (Sly and Tayman, 1977).[1] Since the late 1980s, there have been numerous theoretical publications on migration, but without any mention of environmental factors.[2]

Four main trends explain this decreasing interest in natural or environmental factors. First, according to a powerful Western-centric idea, technological progress would decrease the influence of nature on human life; Petersen (1958) thus views environmental migration as a 'primitive' form of migration bound to decline as human beings gradually increase their control over their environment. Second, environment-based explanations of migration were progressively rejected for their supposedly deterministic nature, to the benefit of socio-cultural approaches or Marxist/economic perspectives. A third reason is the rise of the economic paradigm in migration theory: while already present in Ravenstein's work, economic factors were given the most central role, whether in Marxism-inspired or neoclassical research (Harris and Todaro, 1970; Castles and Kosack, 1973).[3]

[1] When the term 'environment' is used in this context, it has nothing to do with natural variables but refers to population factors such as the density of habitation, the ethnic composition of neighbourhoods, etc.

[2] See notably Salt (1987); Portes and Böröcz (1996); Zolberg et al. (1989); Massey et al. (1993); Massey et al. (1998); Arango (2000); Geyer (2002); Ghatak et al. (1996); Cohen (1995); Hammar et al. (1997); Brettell and Hollifield (2007). One notable exception is Richmond (1994) (see François Gemenne, Chapter 9).

[3] Note nevertheless that environmental factors are implicit in the new economics of migration; households' collective risk strategies in rural societies include, for example,

Finally, forced migration studies, while they could have included environmentally induced displacements, rather developed upon a strong political premise according to which 'states make refugees' (Marx, 1990).

It is in this intellectual context that 'environmental migrants' came back into the picture, as one of the pressing issues raised by climate change (see François Gemenne, Chapter 9). In the 1980s and early 1990s, a few landmark publications raised the issue and provided alarmist estimates of the number of people foreseen to move; Norman Myers (1993) argued for example that up to 150 million environmental refugees were to be expected by the end of the twenty-first century (see also El-Hinnawi, 1985; Jacobson, 1988). In 1990, the first UN intergovernmental report on climate change stated that 'the gravest effects of climate change may be those on human migration as millions will be displaced' (IPCC-1, 1990, p. 20). And in 1994, para. 10.7 of the *Programme of Action of the International Conference on Population and Development* (held in Cairo and widely understood as the first major occurrence of migration issues in international debates) stated that 'Governments are encouraged to consider requests for migration from countries whose existence, according to available scientific evidence, is imminently threatened by global warming and climate change' (ICPD, 1994).

As Gemenne argues, these early research and policy discussions were heavily embedded in a climate change agenda, characterized by a strategy to raise awareness surrounding the potential impact of climate change on migration – and on security at large. In this approach, 'environmental migrants' were portrayed as forced to leave their country and as moving exclusively for climate change-related reasons, while the tone of the debate was future-oriented – hence favouring usually alarmist predictions rather than empirical analysis of already existing flows. This clearly clashed with most migration researchers' convictions and led to a long-standing divide between natural and social scientists: while the former took for granted the interrelation between environmental deterioration and migration and stressed the very high number of people concerned, the latter considered the environment as, at most, one driver of migration among many others and were very cautious regarding the estimates put forward (Black, 2001; Castles, 2002). As Stephen Castles adds (Chapter 16), alarmist predictions that aimed at sensitizing

droughts or other environmental factors (thus motivating the emigration of part of the household, see Stark and Bloom, 1985).

governments and public opinions rather contributed to further stigmatize migrants from low-income countries, while migration researchers reacted in a very defensive way that did little to favour a sound debate between disciplines.

Today it would seem that, although the debate still goes on, the disciplinary divide is gradually being overcome: environmental scientists tend to be more cautious while migration specialists do recognize the role of the natural environment in migration dynamics.[4] On the whole, most scholars now dismiss the apocalyptic predictions that used to influence debates; there is also a consensus on the fact that available evidence regarding the processes at stake is still far from satisfactory.[5] Yet, in a context in which climate change has become an overarching priority for a wide range of actors worldwide, the vision of 'climate refugees' escaping environmental disasters remains a powerful way to catch the imagination of the public – hence the numerous initiatives taken by politicians, environmental activists, international organizations and, to a certain extent, by lawyers, climatologists or social scientists (CARE et al., 2009; Biermann and Boas, 2010; Collectif Argos, 2010). Alarmist future predictions thus remain popular; as Nicholas Stern wrote in his 2007 report on the economic consequences of global warming: 'Greater resource scarcity, desertification, risks of droughts and floods, and rising sea levels could drive many millions of people to migrate' (Stern, 2007, p. 20).

In sum, there are at least three lessons to be learnt from this history of the debate. First, the controversy between natural and social scientists is deeply rooted in intellectual history and the weight given to environmental factors in migration dynamics is therefore both a matter of 'hard facts' and of intellectual traditions; thus a single historical migratory event can be initially understood in environmental terms, and be later reframed in economic or political terms.[6] In this respect, the current focus on environmental migration appears less as a 'new' research issue

[4] It is even among social (rather than natural) scientists that some of the most doomsday-like predictions can be found; e.g. Reuveny (2008) writes that rich countries 'may ultimately lose control over incoming migration' because of environmental degradations.

[5] For recent studies and synthesis illustrating these trends, see Hugo (2008), Kniveton et al. (2008), Piguet (2008), Barnett and Webber (2009), Jäger et al. (2009), Morrissey (2009), Tacoli (2009), Renaud et al. (2007), Boano et al. (2008), Brown (2008), Perch-Nielsen et al. (2008), Jonsson (2010).

[6] Examples of this paradigmatic shift include the Irish famine exodus of the mid-nineteenth century and the 1930s droughts in the American Dust Bowl, which are nowadays reinterpreted as complex socio-political processes rather than 'simple' environmental disasters (Scally, 1995; King, 2007; McLeman et al., 2008).

than as an expression of another paradigmatic shift. Second, this field of study is inherently political, which means that research and statements regarding the climate change–migration nexus are very hard to dissociate from the highly politicized debate on climate change itself. Third, as a result of this specific history, this field of study is contested while poor in empirical evidence. The bibliometric study provided in Allan Findlay and Alistair Geddes (Chapter 6) shows how terms such as 'environmental migrants' have been increasingly used over the last two decades, but with a surprisingly low number of in-depth studies; it would seem that many people use the term, but that very few actually do research.

Before proceeding to examination of the core issues raised by the contributions to this volume, the next section reviews the available knowledge on three main environmental factors that are predicted to grow in significance due to climate change in the years to come (see Martine Rebetez, Chapter 2) and that are held to have an impact on migration: (1) the increase in strength and frequency of tropical cyclones, heavy rains and floods; (2) droughts and desertification; (3) sea level rise.

Tropical cyclones, heavy rains and floods

Tropical cyclones,[7] storms and floods are typical examples of rapid-onset phenomena impacting on population displacement. The approximate estimates of the number of persons already affected yearly by flooding (99 million between 2000 and 2008[8]) and by tropical cyclones and storms (39 million) give an idea of the amplitude of the threat (Rodriguez et al., 2009), but the number of people who would be affected by a climate change-induced increase of such disasters is very difficult to estimate. No climate model is indeed able to accurately predict the exact localization and timing of such disasters and there is therefore no certainty as to whether or not the affected zones will be densely populated.

According to a number of detailed studies,[9] rapid-onset phenomena lead overwhelmingly to short-term internal displacements rather than

[7] We use the generic term 'tropical cyclone' to include hurricanes (western Atlantic/eastern Pacific), typhoons (western Pacific), cyclones (southern Pacific/Indian Ocean), tropical storm, etc.

[8] We use the classification of natural disasters from International Disaster Database EM-DAT http://www.emdat.be/classification (Rodriguez et al., 2009). Floods are classified as hydrological disasters whereas hurricanes are labelled as meteorological disasters.

[9] See in particular Lonergan (1998), Hunter et al. (2003), Kliot (2004), Paul (2005), Pais and Elliott (2008), Poncelet (2008).

long-term or long-distance migration. This is linked to the fact that victims, who live mainly in poor countries, lack the resources to move. They tend to stay where they live or to move only within a short distance. Moreover, many return and reconstruct their homes in the disaster zone. A synthesis of results on the fate of victims of natural disasters displaced in eighteen sites showed (already twenty years ago) that there are few exceptions to the strong propensity to return and to the weak potential of long-term migration (Burton et al., 1993). Paradoxically, extreme events may even act as *pull* rather than *push* factors: in the case of the Indian Ocean tsunami in 2004, relatives moved to the area to find out whether their family had been affected and to offer support; in addition, reconstruction projects increased the demand for labour and attracted migrant workers from other areas; finally, new economic opportunities arose from the presence of numerous aid-providing institutions (Paul, 2005; Naik et al., 2007). This being said, macro-level investigations that compare rates of emigration with local exposure to disasters lead to more contrasting results. Several studies demonstrate that a high frequency of disasters (including floods, storms, hurricanes, drought and frost) encourages people to move away from their town or country (see Saldaña-Zorrilla and Sandberg (2009) for Mexico, Naudé (2008) for sub-Saharan Africa, Reuveny and Moore (2009) for developing countries and Afifi and Warner (2008) for a sample of 172 countries around the world).[10]

Overall, the potential of tropical cyclones, floods and torrential rains to provoke long-term and long-distance migration, while ascertained, remains limited. As pointed out by Kniveton et al. (2008), the level of vulnerability can be tremendously different from one region to another and it is only if the affected society is highly dependent on the environment for livelihood and if social factors exacerbate the impact of the disaster – as was typically the case with Hurricane Katrina (Reuveny, 2008) – that significant migration takes place.[11]

[10] At a more micro-level, Carvajal and Pereira (2008) show that, in Nicaragua, a household highly exposed to Hurricane Mitch had a higher probability of sending a member abroad than a household with similar adaptive capacity but in a non-exposed area. On the contrary, Neumayer (2005) found no correlation between emigration and natural disasters in the zones of departure, but a significant link to the political situation in his study on asylum-seekers towards Europe.

[11] Even in this often-cited case of long-term displacements, estimates of the number of returnees are still difficult to establish due to a lack of reliable data (Hernandez, 2009).

Drought and desertification

In the recent past, the number of persons affected by climatic disasters such as extreme temperatures, droughts or wildfire is estimated at around 83 million each year (between 2000 and 2008; Rodriguez et al., 2009). The IPCC foresees that 74 million to 250 million people will be affected, in 2020, by increased water shortages in Africa and Asia; it also states that 'freshwater availability in Central, South, East and Southeast Asia, particularly in large river basins, is projected to decrease due to climate change which, along with population growth and increasing demand arising from higher standards of living, could adversely affect more than a billion people by the 2050s' (IPCC, 2007, p. 10).

Compared with cyclones and flooding, a lack of drinking and irrigation water usually generates much less sudden impacts, and thus leads to more progressive patterns of mobility. Empirical evidence is mixed. On the one hand, there are many well-known cases of mass population movements attributed to droughts in Africa (Sahel, Ethiopia), South America (Argentina, Brazil), the Middle East (Syrian Arab Republic, Islamic Republic of Iran), and Central and Southern Asia (Black and Robinson, 1993). The impact of droughts on migration is also documented in the Malian Gourma region by a historical overview over the twentieth century (Pedersen, 1995). In South America, Leighton notes that 'the periodic drought and desertification plaguing Northeast Brazil contributed to factors causing 3.4 million people to emigrate between 1960 and 1980' (Leighton, 2006, p. 47). On the other hand, many researchers question the link between drought and emigration by emphasizing the multiplicity of causes determining migration and the other survival strategies available to affected populations (De Haan et al., 2002). According to Kniveton et al., 'drought seems to cause an increase in the number of people who engage in short-term rural to rural type migration. On the other hand, it does not affect, or even decreases international, long-distance moves' (2008, p. 34). In the absence of a consensus, three broad kinds of results can be identified in the literature (see also Leighton, Chapter 13).

The first confirms the link between drought and emigration. Barrios et al. (2006) use a cross-country data set of seventy-eight countries over a thirty-year period and observe that shortages in rainfall increased rural exodus in the sub-Saharan African continent (but not elsewhere in the developing world) and thus contributed significantly to urbanization in Africa. In the Americas, Munshi (2003) establishes a correlation between

emigration to the United States and low rainfall in the region of origin in Mexico (see also Leighton Schwartz and Notini, 1994). Van der Geest et al. (2010) use geographical analysis to evaluate the relation between internal migration, rainfall and vegetation dynamics in Ghana. They conclude that migration propensities are higher in environmentally less-endowed districts and that the lack of rainfall is a predictor of migration, but this result does not hold for the region of Accra and signals the necessity to differentiate migration sub-systems. Finally, Afifi and Warner, in their above-mentioned study of 172 countries, find that indexes of desertification, water scarcity, soil salinization and deforestation are all correlated with emigration (Afifi and Warner, 2008).

A second group of case studies, on the contrary, concludes that droughts have minimal impact on migration. The most often cited relies on two surveys (1982 and 1989) conducted in rural Mali with over 7,000 individuals and 300 households before and after a series of droughts affecting the country; a reduction (and not an increase) in international emigration was observed due to the lack of available means to finance the journey, even if short-term internal migration of women and children did rise (Findley, 1994). Smith (2001) also found a limited impact on emigration during the 1994 droughts in Bangladesh, as less than 1% of households had to resort to emigration. This result is coherent with the analysis on interprovincial migrations in Burkina Faso by Henry et al. (2003), where environmental variables and droughts contributed only marginally to the explanation of migrations; the authors conclude that, in this country, even if migration is influenced by biophysical changes in the environment, claims that environmental change alone is causing massive displacements are not supported by the data. Kniveton et al. find a similar result in their analysis of the relationship between climate variability and migration to the United States in the drought-prone Mexican regions of Zacatecas and Durango between 1951 and 1991 (2008, pp. 42–47): they find no significant correlation in Zacatecas whereas, in Durango, more rainfall generates more emigration and not the contrary. In the same way, Naudé finds no correlation between emigration and water scarcity (proxied by the surface of land under irrigation) across forty-five sub-Saharan African countries (Naudé, 2008).

Finally, several studies show contrasting patterns according to the type of migration concerned (long-term versus short-term and long-distance versus short-distance). In another study on Burkina Faso, Henry et al. (2004) collected individual migration histories among 3,911 individuals and environmental data at community level in about 600 places of origin mentioned by migrants; the environmental indicator

consists of rainfall data covering the 1960–1998 period and the dependent variable is the risk of the first village departure. Findings suggest that people from the drier regions are more likely to engage in both temporary and permanent migrations to other rural areas and that short-term rainfall deficits increase long-term migration to rural areas but decrease short-term moves to distant destinations. The research presented by Pratikshya Bohra-Mishra and Douglas Massey (Chapter 4) does not directly address the question of drought but brings comparable results. It shows that if the quality of drinking water has no impact on population displacements, perceived deforestation, population pressure and agricultural decline do produce elevated rates of local population mobility, but no significant increases in internal or international migration. These results partly contradict a previous study using the same method in the same area, but with a smaller sample and a shorter time span (Shrestha and Bhandari, 2007). The evidence that scarcity of water and desertification do have an impact on migration patterns, but that they mainly generate short-distance moves and that their impact is mediated by numerous other variables, is also confirmed by local case studies, among others in the context of the EACH-FOR project (see Warner et al., Chapter 8; Hamza et al., 2008; also Meze-Hausken, 2004).

Again, a link may be assumed to exist between rain deficits and migration, but it remains highly contextual – so that projections of increased migrations linked to drought-related phenomena are hazardous. Just as for rapid-onset phenomena, it would be difficult to provide an estimate of the magnitude of populations at risk and of the potential migration flows arising from droughts induced by global warming.

Sea level rise

In contrast to the two environmental factors discussed so far (tropical cyclones-heavy rains-floods and drought-desertification), the link between sea level rise and migration appears much more straightforward (see Oliver-Smith, Chapter 7). Unlike most other hazards, sea level rise is virtually irreversible and manifests itself in a more or less linear way over a long period. In the absence of new infrastructures such as dykes, this would make definitive out-migration the only possible solution, while allowing for progressive and planned departures. Sea level rise is also at