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Abstract

Purpose – This paper aims to present a critical review of some literature on climate change and migration through conceptualizing and contextualizing the linkages between the two topics. Much literature on links between climate change and migration tends to downplay ambiguities in the terms and the limited empirical evidence. Conceptualizing refers to the knowledge gaps and the need to understand and detail (even if not agreeing on) conceptual issues such as terminology, definitions,

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linkages, drivers, thresholds, implications, data requirements and methodologies. Contextualizing refers to understanding the climate change and migration debate within wider topical and geographical contexts. Results identify major qualitative and quantitative gaps. Qualitatively, limited material exists on why people react differently to similar environmental stressors and why certain outcomes may arise. Quantitatively, credible and verifiable measures are not always available for assessing the climate change impacts on migration. This paper recommends a stratified, multi-disciplinary approach to facilitate policies regarding climate change and migration connections.

Design/methodology/approach – Illustrative literature review, clustering important themes found in published research and policy documents. First, qualitative aspects are covered, particularly in terms of definitions and terminology. Second, quantitative aspects are detailed, particularly in terms of data available and estimates made. Further, the paper is organized around two distinct areas, i.e. conceptualizing and contextualizing climate change and migration links.

Findings – Results identify major qualitative and quantitative gaps. Qualitatively, limited material exists on why people react differently to similar environmental stressors and why certain outcomes may arise. Quantitatively, credible and verifiable measures are not always available for assessing the climate change impacts on migration. This paper recommends a stratified, multi-disciplinary approach to facilitate policies regarding climate change and migration connections.

Originality/value – Without being comprehensive in the literature covered, this paper provided a critical overview and synthesis of climate change and migration work through the lens of conceptualization and contextualization. Major gaps in the literature were identified through an illustrative, not complete, review. Qualitative and quantitative aspects were covered including definitions, terminology, data available and estimates being made.

Keywords Climate change, Displacement, Migration, Adaptation

Paper type Research paper

1. Introduction

It is widely recognized that changes in the environment can influence human movement patterns and behavior (ADB, 2012; Foresight, 2011). Human migration has long been a voluntary and involuntary strategy in response to environmental change (McLeman and Smith, 2006; Foresight, 2011). In the past few decades, potential linkages and implications of climate change on human mobility have taken hold in the literature. Yet, significant debates exist regarding the climate change and migration topic (Bettini, 2013; Hartmann, 2010). Most of these discussions revolve around "how many" migrants, "where" they move from and to and "what" consequences could result. "Why" it happens, especially exploring climate change in wider migration contexts is less frequently explored, meaning that policy and politics do not necessarily need to address or admit the fundamental causes. Even when comparatively comprehensive overviews, such as Foresight (2011), tackle some of the "why" questions based on extensive literature analysis, a pattern still emerges of neglecting underlying, long-term political drivers of assumptions behind the analysis (Felli and Castree, 2012).Consequently, there is a lacuna in climate change literature on the direct and indirect factors that shape migration decisions which, in turn, limits policy responses while providing a political excuse not to raise some difficult questions.

The objective of this paper is to critically analyze literature on climate change and migration to indicate points of contention, to identify areas where more knowledge is needed and to recommend possible policy-related actions that could be pursued. This paper aims to extract the main opportunities and challenges that have emerged from the literature, using illustrative references, rather than providing an exhaustive review.

Given the large corpus of publications available, there are inevitably exceptions to some of the conclusions drawn and they are indicated in many instances throughout this paper.

Sections 2 and 3 provide an illustrative literature review, clustering important themes found in published research and policy documents. First, qualitative aspects are covered, particularly in terms of definitions and terminology. Second, quantitative aspects are detailed, particularly in terms of data available and the estimates being made. The review leads to two major gaps being identified. Qualitatively, many questions regarding the terminology used and the meaning of terms are rarely asked and many concepts are discussed with unclear definitions. That leads to limitations in conceptualizing the meaning and applicability of "climate change and migration" discussions, policies and actions. From the quantitative work, many questions are rarely asked regarding what data are needed and available, meaning that numbers are often presented without context. That leads to limitations in contextualizing the meaning and applicability of "climate change and migration" discussions, policies and actions.

Sections 4 and 5 then lay out these gaps in terms of how climate change migration has been conceptualized and how there is need to contextualize the linkages between the two and not approach them in a generalist manner. The Conclusion section provides recommendations to contribute toward better understanding how to analyze and address the concepts and contexts within "climate change and migration" work.

2. Qualitative dimensions: definitions and terminology

Studies on migration, both voluntary and forced, have a long history involving much terminology (Petersen, 1958). The common literature on climate change and migration revolves around themes of "environmental refugees", "climate refugees" or "climate change refugees". These terms are often used with limited agreement on definitions and with inadequate conceptual explication.

The International Organization for Migration (IOM) considers migration linked to climate change as a sub-set of environmental migration, defining it as:

> […] persons or groups of persons who, for compelling reasons of sudden or progressive changes in the environment as a result of climate change that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad (IOM, 2008, p. 31).

The purpose of this definition is to try to encompass population movement or displacement, whether temporary or permanent, internal or cross-border and regardless of whether it is voluntary or forced, or due to sudden or gradual changes to the climate. Thus, climate change migration becomes a sub-set of environmental migration and most of the terminology used tends to flow from the broader scope of environmental change.

Yet, the terms "climate" and "environment" are sometimes used interchangeably. Similarly, the terms "refugees" and "migrants" are frequently used interchangeably. It is common to see, for example, reference to climate change, leading to "the increase of migrants and refugees" (Non Governmental Organization (NGO)/Committee on the Status of Women (CSW) Taskforce on Women and Climate Change, 2009, p. 2), without acknowledging that the term "migrant" usually refers to "cases where the decision to migrate is taken freely by the individual concerned, for reasons of 'personal convenience' and without intervention of an external compelling factor" (UN

Commission on Human Rights, 1998, p. 9). For comparison, the United Nations (UN) Refugee Agency – United Nations for the High Commissioner for Refugees (UNHCR, 1951/1967, p. 14) defines "refugees" as people with:

> […] a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion is outside the country of his nationality and is unable or, owing to such fear, unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence […] is unable or, owing to such fear, is unwilling to return to it.

Environmental factors, such as climate change, do not enter the definition of "refugee". The term "refugee" is legally defined and, under international law, the receiving country is obliged to protect anyone with refugee status.

To try for increased legalization and legal status of those stating that climate change forces them to migrate, or others aiming to identify them as such, many initiatives have been proposed for governance systems to cover "climate change refugees". The main examples are a protocol (Biermann and Boas, 2008a, 2008b) and a convention (Hodgkinson *et al.*, 2010), leading to critics and ensuing debate (Hulme, 2008).

Bates (2002) discusses a significant term which is relevant to climate change: "anticipatory refugees". These refugees recognize that their situation will eventually deteriorate and that they have the ability to relocate voluntarily before they are forced to do so (Kunz, 1973). Many climate change migration estimates largely reflect this hypothesis.

Despite the above definition of "migrant" referring to voluntary movement, conceptual haziness emerges while examining other motivations for migration. Other migrants are stated to be forced or compelled to relocate by natural hazards such as storms, floods and droughts (IPCC, 2012). IOM (2011) defines "forced migration" as:

> […] a migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes (e.g. movements of refugees and internally displaced persons as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects).

Note the peculiar phrase "migratory movement" at the definition's beginning. This type of movement can also be referred to as "displacement". IOM (2011) notes how "at the international level, no universally accepted definition for 'migrant' exists".

Figure 1 outlines some conceptual, not legal, terminology used for forced migration contexts. This conceptual approach maps the differences between people migrating due to situations recognized by international law, such as conflict or persecution, and those migrating due to non-conflict disasters or hazards, which could include climate change but which are not fully recognized legally. It should be noted that legal terminology also varies amongst jurisdictions making terminology difficult to adopt universally and leads to challenges in determining what is and is not accepted legally.

The legal definition of "refugee" does not cover individuals or groups of people who leave their country due to environmental reasons such as desertification or environmental hazards. El-Hinnawi (1985, p. 4) thus defined "environmental refugees" as:

> […] those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life.

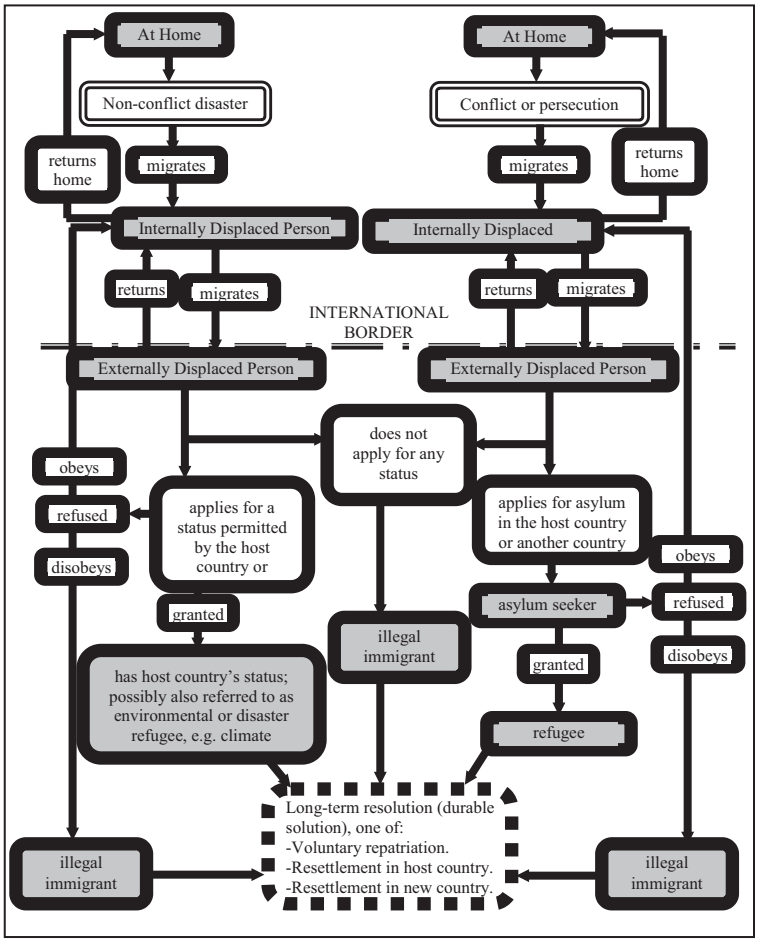


Figure 1.
Conceptual, not necessarily legal, terminology used for forced migration

Source: Author's own

He used the term to highlight the adverse impacts of unchecked development and pollution. Similarly, the term "climate change refugees" is used to draw attention to the potential consequences for human mobility due to climate change. Castles (2002, p. 8), echoing earlier cautions (Ramlogan, 1996), argues that "the term 'environmental refugee' is simplistic, one sided and misleading. It implies a mono-causality which very rarely exists in practice". Hartmann (2010) notes that the term has many shortcomings in that it masks the role of institutional processes, oversimplifies the economic and political drivers and collects every person moving (from dam developments to flooding) under the same umbrella. Brown (2008) also explains reservations in using the term "climate refugees". Hartmann (2010) and Ferris (2011) note that UNHCR and IOM are not in favor of the terms "environmental refugee" or "climate refugee" due to the possibilities of causing problems within

international law. Instead, rights-based approaches are being investigated (Saul and McAdam, 2010; Hartmann, 2010; Ferris, 2011).

As a majority of migration linked to environmental reasons (including natural hazards) tends to occur within countries (Hugo, 2008) rather than between countries, internally displaced people (IDP) are part of the discussion:

> IDPs are persons or groups of persons who have been forced or obliged to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border (UNOCHA, 2004, p. 1).

The definition of IDP is descriptive and does not confer a legal status in the same sense that recognition as being a "refugee" does.

Overall, it can be difficult to categorize displaced people not only in terms of attribution to climate change, but also due to the combined impacts of conflict, the environment, inability to deal with natural environmental fluctuations and economic or livelihood pressures (Ferris, 2011; Oliver-Smith and Hoffman, 1999). Due to these limitations, any climate migrants who do exist are almost invisible in the international legal system and in reality because no institution is responsible for collecting data on their numbers and no institution might have the capability of collecting such data.

3. Quantitative dimensions: estimates and data issues

3.1 Estimates

Various estimates over the years report that climate change will be one of the key drivers of population movement and displacement, even where empirical evidence is lacking. The estimates range from 200 million by end of twenty-first century (Myers, 2005) to 1 billion by 2050 (Christian Aid, 2007). The figure by Myers has become the generally accepted figure, even though it has no empirical basis (Brown, 2008). Similarly, Lambert (2002) reported that there will be 20 million people displaced by climate change in China, without explicitly giving a timeframe and without supporting the statement with empirical evidence. The Stern review noted, "Greater resource scarcity, desertification, risks of droughts and floods, and rising sea levels could drive many millions of people to migrate" (Stern, 2007, p. 111), so not giving a specific figure, but emphasizing a large, even if indeterminate, number. When the IOM published that, in 50 years, there could be as many as 200+ million environmental migrants (IOM, 2008; Warner, 2010), media, public and research interest in the subject multiplied. The media interest in the issue led to reports from around the world forecasting widespread migration of vulnerable populations fleeing their homelands. These developments have led to debates and controversies regarding the climate change and migration topic (Bettini, 2013; Hartmann, 2010).

Some of the approaches to guesstimates go back decades. Tickell (1989, p. 13) stated with respect to "environmental refugees" that:

> […] plucking a figure from the air, if only 1 per cent (a very low estimate) of a future world population of 6 billion were affected, that would still mean some 60 million migrants or environmental refugees; and 5 per cent (again a low estimate) would produce 300 million.

It is unclear why 1 and 5 per cent are selected as thresholds or why they are immediately labeled to each be a "low estimate". This is not necessarily disputing the estimates, but

merely enquiring why those numbers were selected and promoted as low estimates when they are directly admitted to be entirely guesswork. An analysis of numbers of environmental migrants (Gemenne, 2011, p. 48) found no reliable methods or numbers, concluding that many estimates "have been put forward to generate media attention rather than to provide empirically grounded estimates and predictions". The tone in which these estimates is presented has been criticized by some as "doom and gloom narratives", which risk being a counterproductive (and normatively problematic) strategy for communicating the urgency of any climate-related migration (Bettini, 2013, p. 63).

The above cited estimates on climate change migration implicitly assume that there is a direct link between climate change and migration. They may instead just be indicative of the number of people who are likely to be at risk from adverse impacts of climate change, rather than those who are likely to migrate (Tacoli, 2009). Most of these estimates also fail to take into account the non-linear (and non-gradual) interactions of different factors in migration decisions, despite the widespread recognition of non-linear outcomes in such social phenomena (Foresight, 2011; Laczko and Aghazarm, 2009).

3.2 Data and methodological challenges

Data scarcity often plagues the empirical explanation of climate change and migration links or lack thereof. This leads to creative methods for estimating the magnitude of past, current and future climate-linked migration – methods that are generally controversial (Castles, 2002; Biermann and Boas, 2010). Lack of adequate data, particularly in terms of time series of environmental and demographic variables, is a constraint for methodological innovation, so that conclusive results are still difficult (Perch-Nielsen *et al.*, 2008; IOM, 2008).

Some authors have suggested the use of population censuses (Le Blanc, 2008) relying on base-area information and focusing on flows of migrants from areas of environmental change and degradation. Though migration data are generally available in some censuses, it is rare that climate change (or even the environment) is clearly identified as a key driver for migration. Taking the census of India as an example (Government of India, 2012) wherein key drivers for migration are considered to be "employment", "business", "education", "marriage" and "others". However, reasons such as disasters, social/political problems, housing problems and migration do not find a mention and are likely to be included in the category of "others". That would be the same for any migration linked to climate change, making it questionable to extract numbers for climate change-related migration. For example, perhaps a climate-related event impacted a business, leading to job losses and, eventually, a decision to migrate. The migrants might choose "employment" or "others" as the reason, making it difficult to decouple climate or climate change from other reasons for migrating.

Consequently, where such data are used, the result must be diluted and the numbers are doubtful for climate change-related migration. A possible reason for censuses seldom investigating the environment or climate as potential drivers for migration could be that the institutions and agencies responsible for census data collection are not yet fully aware of the importance of "climate change migration" in policy discourse. Where data are available and quantitative analyses are completed, they are often imbued with challengeable assumptions. For example, Reuveny and Moore (2009) statistically analyze the possible links between several environmental factors and emigration to

richer countries. They acknowledge the data limitations but do not discuss those in detail. Kniveton *et al.* (2011) echo these criticisms of the literature attempting to analyze migrants due to climate change. They implement agent-based modeling for trying to overcome some of the limitations.

A major methodological challenge is whether or not the needed data are collectable? When trying to determine the role that environmental changes, or just climate, play in a decision to migrate, it might be challenging for the migrants or researchers to extract that from other factors. In some instances, the answer might be clearly "yes" or "no". In other instances, climate might have been the immediate impetus or trigger for migration, but the decision was brewing beforehand for non-climate and non-environmental reasons. Similarly, there could be other factors. Decoupling them, or even indicating the dominant factor(s), is not necessarily easy or non-contentious for migrants or researchers. When being interviewed, the migrants might have an incentive to play up or to play down any climate or environmental factors. That might be based on the interviewees' trust (or lack thereof) of the interviewer or the interviewees' expectations of what the interviewer is trying to glean from the interview. There might also be legal benefits for claiming refugee status, irrespective of the influence of the environment or climate on migration decisions. Given the truism that migration is complex, it will not always be feasible to collect robust, verifiable data that indicate lucidly the climate or environmental component in decisions to migrate.

4. Conceptualization in science and policy: a critical analysis

4.1 Adaptation or the failure to adapt?

The work done on climate change, migration and adaptation broadly falls under two categories:

(1) one which considers migration as a failure to adapt; and

(2) other which promotes migration as a form of adaptation predominance of the first category is exemplified in the absence of mobility as an adaptation strategy under the cases collected by the UNFCCC database on distribution of different kinds and combinations of local coping strategies and adaptation practices (UNFCCC, 2014).

The second category of work has an opposite and positive view on migration, and it considers migration as a chief adaptive response to socio-economic, cultural and environmental change. It also highlights that migration, when planned and voluntary, can serve as an essential strategy for addressing climate stress (McLeman, 2009). Onset of hazards such as floods can lead to people migrating temporarily with the possibility and expectation of returning home, with such temporary movement highlighting migration as a short-term coping or adaptation strategy. These conflicting clusters of work create the need to explore these themes conceptually.

The estimates cited above could be used to reaffirm the first category of work. If the assumption is that involuntary migration occurs only after a specific climate-related event, then the figures have certain underlying assumptions that presume that migration reflects the failure to adapt to climate or environmental changes. Conversely, the estimates cited above might involve large numbers migrating before a specific climate- or environmental-related change has manifested – or voluntarily afterwards as part of adaptation. These numbers could potentially be seen as supporting the second

category, assuming that people are moving to adapt. The reality is likely to be a mixture of both: some migrating because they feel they must, while others choose migration to adapt. The lack of clarity regarding these two categories in many of the estimates further adds to the confusion surrounding them and can permit political interests to promote the numbers they prefer according to their pre-conceived categories of migrants.

4.2 Drivers of migration and climate change emerging as a new driver

Migration is a complex interplay of multiple factors (Foresight, 2011; Lee, 1966; Perch-Nielsen *et al.*, 2008; Petersen, 1958). Among the root causes of migration are economic factors (e.g. poverty, unemployment or desire for better or more livelihood opportunities), social factors (e.g. politics, desire for more education or preference for living in a certain climatic or social/political context), environmental factors (e.g. degradation of ecosystems, local overuse of resources or external overexploitation of resources) and/or degraded security conditions (e.g. disrespect for human rights, persecution of minority groups or armed conflict) (Boswell and Crisp, 2004). Bates (2002) opines that environmental changes affect migration decisions only after being filtered through the local socio-economic context. Suhrke (1993) highlights two schools of thoughts with respect to environment migration:

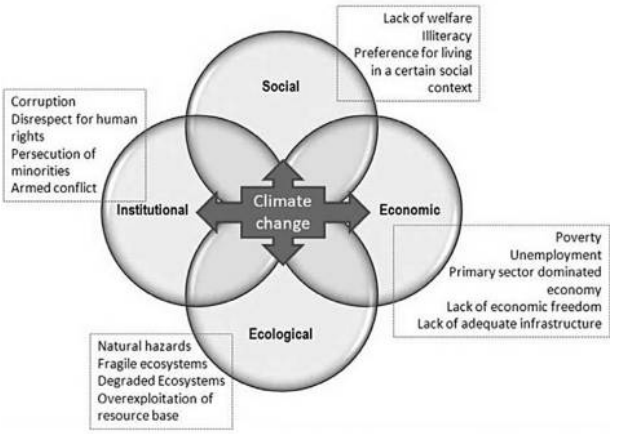
(1) minimalists who suggest that the environment is only a contextual factor in migration decisions; and

(2) maximalists who state that the environment directly causes people to be forced to move.

The decision to migrate, especially permanently, is rarely made due to a single reason. Climate change emerges as an additional driver for already existing migration behavior, amplifying and diminishing some (but not all) push and pull factors. That applies to forced and voluntary migration, either through changing existing trends (e.g. influencing poverty or increasing competition for natural resources) or through creating new ones (e.g. comparatively rapid sea-level rise). Figure 2 illustrates the potential multiplier effect of climate change on some already existing drivers for migration, providing some examples of its influence.

Suhrke's (1993) categories can be applied to climate change and migration. Instead of referring to any one factor as the key driver, the dominating factors and their links are contextual. For example, a tropical cyclone might be the trigger for displacing people, such as Cyclones Ofa and Heta in 1990 and 2004, respectively, for the Pacific island of Niue (Connell, 2008), yet livelihoods, education, kinship and ecological changes are longer-term background factors that predispose people to migrating, given a particular trigger. Climate change is an additional input, including with respect to sea-level rise in coastal areas. That additional input of climate change varies in importance depending on context. Even in coastal zones, it is not always clear why environmental changes are witnessed and how the population will respond to those changes. After a village in Vanuatu was moved in 2002-2004, ostensibly due to sea-level rise, Ballu *et al.* (2012) demonstrated that geological subsidence was the main cause of the village experiencing increasing flooding.

These multiple factors and contexts do not deny that climate change can and does impact human mobility (Foresight, 2011; McGranahan *et al.*, 2007; Perch-Nielsen *et al.*,



Source: Author's own

Figure 2.
Multiplier effect of climate change on existing factors of migration

2008). It is nonetheless challenging to disaggregate how much it can and does contribute to migration and how it can be theoretically or practically separated from other motives for migration (Flintan, 2001).

4.3 Framing in time and space

What is the conceptual framing for the specific issues and concerns related to different types of environmental change linked to movements in time (e.g. permanent, temporary, long term, short term, transitional, circular or seasonal) and space (e.g. internal, trans-boundary at different boundary scales, rural/urban or coastal/inland)? Migration literature is replete with typologies that differentiate migrants and migrations according to factors such as the relative permanency of the move, the distance traversed, the nature of the boundaries crossed, the causes of the move and the characteristics of the movers, amongst others (Hugo, 1996; Lee, 1966). The classification of migration as forced or voluntary goes back to at least Petersen (1958) who noted the distinction between these two categories (Swain, 1996).

McAdam (2011) describes how, in the context of climate change, the nature and types of the movements will vary greatly. Factors include:

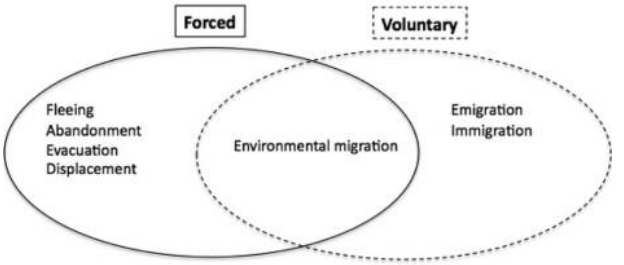
- situations when it is impossible for people to remain in their homes;
- the extent to which mobility is already an adaptation strategy employed by the community (e.g. cyclical movement in flood-prone areas);
- the level of assistance available from different sources, from development aid to remittances;
- pre-existing migration options and experiences for that community; and
- whether movement is initial flight in response to a rapid-onset hazard such as a cyclone or is pre-emptive and/or secondary movement where climate impacts are more slow onset.

McLeman and Hunter (2010) suggest a temporal continuum, from short-term to long-term, involving temporary relocation to permanent migration, with numerous possibilities between these extremes. In considering climate impacts, Schmuck-Widmann (1996) discusses how Bangladeshis temporary relocate around river islands (chars) as flooding occurs and as the river changes its meandering. These char dwellers actively design strategies to live with the floods through their own mobility. An example with migrants having no intention of return was the 1717-1723 Scots-Irish emigration to North America precipitated by the 1713-1719 droughts, but with root causes in social factors including religious discrimination (MacLean, 2010). An example in between these extremes was the Dust Bowl migration in the USA in the 1930s where more than one million people left the American plains for California, uncertain whether or not they would return; some did and some did not (Hook, 2009; Gregory, 1991). In contrast, nomadic and pastoralist communities, such as the Sami in northern Europe and northwestern Russia, use seasonal migration with the expectation of return to adjust to harsh environmental changes and to provide resources for grazing livestock (Fox *et al.*, 2008 for Tibet).

According to Hugo (1996), the decision to migrate is best conceptualized as a continuum ranging from fully forced migration at one end to fully voluntary migration at the other end. Within this continuum sit people with more control or less control over their decisions to migrate. The extremes rarely occur, and would be challenging to prove, especially when considering "why" people end up in situations where they are forced to move, i.e. they feel that they have no other option to move, or "why" they ultimately make the decision regarding voluntarily movements.

Figure 3 displays a simple migration continuum, based on the literature referenced here, adding in some of the words used to refer to migration. As shown, migration due to environmental changes, such as climate change, can be forced, voluntary or a combination. As such, Figure 3 is illustrative, not implying any definitive recommendations or rigid use of words.

Another continuum can occur regarding the speed at which climate and other environmental factors influence migration decisions. Some hazards are relatively rapid onset, manifesting in minutes or hours, such as cyclones (with durations of days but usually passing over locations in hours), hail, flash floods and storm surges. Others can build up over days and weeks, such as some slow-rise floods; droughts can take weeks or months to ramp up before the impacts are experienced.



Source: Author's own

Figure 3.
Depiction of some of the terminology used along the forced-voluntary migration continuum

An important concept that emerges is that of thresholds which, when crossed, may dispose people to migrate. Glantz (1994, 1999) refers to them as "creeping environmental changes", which are incremental changes in conditions cumulating to create a major catastrophe or crisis that becomes apparent only after a threshold has been crossed. A household might realize that a drought is impending, but hope that the weather gets better, until suddenly they become aware that they might not have adequate food to last the season, so they migrate. In such a case, did they choose to migrate to try to avoid a crisis or was it forced because severe hunger seemed likely?

These situations mix voluntary and forced movement, substantiated by Petersen's (1958, p. 261) argument differentiating between "*impelled* migration, when the migrants retain some power to decide whether or not to leave, and *forced* migration, when they do not have this power". There could also be a situation wherein the same event could trigger migration of both types, depending on pre-existing conditions of the individuals, households and communities. In such cases, any decision to move would have perceptions of the risks of staying and perceptions of the risks of moving as important variables – for which risk perception is subjective.

4.4 Summary of conceptualization

The overview in this section highlights key discussions (not all aspects) within the literature, as described above, regarding conceptualization of climate change and migration, which are summarized in Tables I and II. Table I provides a summary analysis of quantitative and qualitative topics emerging from the scientific and policy/legal literature, as reviewed above, some of which overlap, extracting key topics that are repeated across many discussions. Table II then summarizes topics suggested as being dealt with less frequently. It is not that these topics are absent from the literature, but that they tend to receive less attention or less detailed analysis than more popular topics.

The studies that do cover some of the topics regarding the main conceptualization issues in Table II tend to indicate that exploring and answering those questions is contextual. As such, a further summary and analysis of contextualization would be useful.

Category	Science	Policy and legal
Qualitative	*Terminology*: Climate, climate change, environment (then specifics, such as drought, flood, earthquake, conflict, persecution [. . .]) Displacement, evacuation, migration, abandonment, emigration/immigration, fleeing, retreat Adaptation, adaptation failure, adaptation strategy	*Terminology*: Refugee, migrant, displaced person Voluntary/forced continuum Description and analysis of existing policy and legal mechanisms and the perception of those mechanisms' relevance
Quantitative	Number of people in locations likely to be affected by sea-level rise Overall estimates of climate change related migration	Numbers of "refugees" and "migrants" (i.e. non-refugees) from different causes

Source: Author's own

Table I. Main conceptualization issues emerging from the literature

Category	Science	Policy and legal
Qualitative	Whether or not the terminological differences are important (they might not be) Why certain populations cannot deal with certain aspects of climate change Why some terminology is selected and the implications of those selections (Farbotko, 2005, 2010 are exceptions providing insightful analysis into these questions for the case study of Tuvalu) Why certain discourses are adopted in science and policy with limited critical analysis (Hartmann, 2010 is an exception) Why certain quantitative estimates enter popular discourse despite challenges to the empirical evidence (Hartmann, 2010 is an exception)	Who has moral and legal obligations to provide resources for addressing climate-related migrants
Quantitative	Number of people in locations likely to be affected by climate change impacts other than sea-level rise Sensitivity analysis of the quantifications Critical analysis of overall estimates	Resources needed and available for addressing climate change related migrants

Table II. Main conceptualization issues not dealt with extensively in the literature

Source: Author's own

5. Contextualization in science and policy: a critical analysis

Given that migration is multi-causal, the situational context influences various aspects of migration. Climate change itself tends not to displace or move people from one place to another; instead, it produces environmental effects and exacerbates current vulnerabilities that make it difficult for people to survive where they are, affecting migration decisions. Climate-related migration is closely connected to social, economic, cultural and institutional contexts.

5.1 Migration choices

Lee's (1966) theory provides a conceptual framework to understand the factors guiding decisions to migrate. He summarized them as:

(1) factors associated with the area of origin;

(2) factors associated with the area of destination;

(3) intervening obstacles; and

(4) personal factors.

This framework can be adapted for migration decisions in the context of climate change.

In the area of origin, why do some communities, families and individuals choose migration based on impacts from climate change, while others choose other forms of responses to changes that they are experiencing? Where the migration appears to be more forced than voluntary, what realities and perceptions dominate to remove choices or perception of choices? A clear example is starvation. If there is no food locally and no

apparent prospects for any (which could be lack of affordability of food rather than lack of food, Sen, 1983), then little choice exists but to migrate or to suffer immensely. Where local crops and livestock have perished due to lack of water, the case is not just about recent rainfall, but is also about long-term decisions related to governance inhibiting relief supplies, water management locally and regionally (e.g. upstream dam-related decisions) and agricultural choices (e.g. cash crops or local diversification including famine foods) (Devereux, 1993; Fleuret, 1986; Mortimore, 2009).

In terms of the migration destination, the routes chosen and places sought are usually not arbitrary, but instead can be based on following the crowd, previous experience, kinship, word of mouth, using standard transportation routes or obeying directions from governments or external organizations – often with a significant emphasis on where previous migrants have ended up or are perceived to have settled (De Haan, 1999; Faist, 2000; Massey and Garcia España, 1987).

Similarly, Lee's (1966) points (3) and (4) may not be especially different for climate change. With all the push and pull factors relating to migration, are there specific ones to which climate change contributes? What time and space scales have been considered and should be considered in trying to understand the climate change and migration links?

Case studies assist in teasing out answers to these questions and indicating how and why choices are made. The literature contains numerous individual case studies, from Kivalina, Alaska (Shearer, 2010) to Tuvalu (Farbotko, 2005, 2010) to the Three Gorges area of China (Stojanov and Novosák, 2009) also labeled as "environmental migrants" and "environmental refugees" by the authors. These examples illustrate migration due to changing environmental conditions or infrastructure development (e.g. the Three Gorges dam); however, it should also be noted that people may migrate, forced or voluntarily, as a result of projects designed to combat climate change. Examples are protected area designation or carbon offset projects such as Reducing Emissions from Deforestation and forest Degradation (REDD+). So far, there are few comparative analyses across multiple case studies using similar factors, but some illustrative examples are given here.

The EACH-FOR (Environmental Change and Forced Migration Scenarios) project which ran from 2007-2009 involved 23 case studies across all inhabited continents. The case studies were published within the context of forced migration scenarios developed within the project (Warner and Afifi, 2011; Warner, 2011). Little opportunity has existed to compare and contrast the case studies to see if contextual and non-contextual aspects of climate change and migration could be extracted and verified. Tacoli (2011) directly compares mobility for Bolivia, Senegal and Tanzania, demonstrating how environmental factors are just one input into mobility decisions – and they are usually not the dominant input, a conclusion also supported by others (ADB, 2012; Foresight, 2011).

5.2 Impacts from and on migration

Migration clearly influences both the source and receiving communities. What are the implications of different scales of migrants connected to climate change for the source and receiving communities, on topics such as livelihoods, politics, policies, entitlements, access, different forms of security and vulnerabilities?

Much of the research into the population–environment (P-E) nexus has focused on the environment as an outcome of human population-induced changes, the so-called "P-E" studies (Lutz *et al.*, 2002a, 2002b). While they have generated significant insights into the relationship between humans and the environment, the reciprocal impact of the environment on the population tends to be neglected (E-P) (Suhrke, 1993). This reciprocal of linking the environment to migration (E-P) is complex, because environmental conditions are part of a general context in which migration decisions are often made by individuals. As a result, the relationship between the environment and migration is rarely direct, causal or unidirectional, but is instead often indirect, contextual and/or with feedback loops (Lonergan and Parnwell, 1998). That has political implications for trying to assign causes and effects, frequently with the potential to pick a politically convenient choice which is not necessarily incorrect but which does not give the full picture.

Which processes shape and are impacted by migration? Some examples of a categorization to explore for different contexts are:

- *Physical and environmental*: Climate change primarily manifests itself as changes in physical parameters such as temperature, precipitation, sea-levels and changed regimes of environmental hazards. Its role in driving migration is context specific. For instance, a coastal area vulnerable to a physical impact such as sea-level rise could become a hotspot for migration inland, as the challenges manifest of coastal flooding, ecosystem degradation (e.g. wetlands) and increased salinization of low-lying agricultural land and water supplies. Considering another context where land degradation is being exacerbated by climate change, loss of ecosystem services detrimentally affecting associated livelihoods could trigger migration.
- *Social and cultural*: Societal structures and networks (often referred to as "social capital") significantly determine willingness and ability to migrate. While many indigenous peoples have long had traditions for dealing with social and environmental changes, with varying degrees of success, climate change has the potential for undermining those approaches and traditional knowledge might not be able to keep up (McAdam, 2011; Kelman, 2010).

  Cultural and social structures also affect choices of where to migrate, with choices usually being biased toward familiarity with similar cultures. Hodgkinson *et al.* (2010), not necessarily appropriately, use the example of the Maldives considering migration to Sri Lanka and India with the rationale of similar culture, climate and cuisine. But Australia is also mentioned, based on space to migrate. While the principles might be reasonable, caution is needed not to make too many assumptions about cultural similarity. How much of a cultural connection exists in other places for Tuvaluans or I-Kiribati? Certainly, Auckland has strong cultural connections for both due to its large populations from each country, but a city in New Zealand is still not the same as the islanders' home territories. If the country of origin disappears or if the entire population chooses to migrate, it is unclear how long a displaced culture could live unless a specific area was set aside for them with significant autonomy (Kelman, 2006).
- *Economic*: How do economic status and climate change impacts on livelihoods pre-dispose some groups to migrate? If resources exist to make a choice, then the choice could be to stay or to migrate. If resources do not exist, then the default

choice is usually to stay until no option exists but to migrate, even knowing that migration can be fatal as well. Empirical evidence comes from Sahelian farmers for whom shorter migration distances are observed after bad harvests, but longer ones are observed after better harvests (Black *et al.*, 2008). Raleigh (2011), while citing poverty as one of the primary drivers for migration, notes that those most prone to forced migration live in "chronically vulnerable areas", which are characterized by the deterioration, loss or destruction of primary livelihood systems and productive assets.

- *Political*: Government policies to relocate people due to impacts of climate change (e.g. sea level rise in small island developing states) can also be seen as a political driver of migration (Black *et al.*, 2011). Heads of state of some countries including the Maldives and Kiribati have gone on the record to emphasize that they must reluctantly explore relocation due to climate change. Raleigh (2011) notes that conflict can also interact with other drivers to create conditions where political tensions, poverty and environmental hazards together contribute to migration and displacement. In the context of conflict, Lindley (2010) points out that mobility is a central feature of how people living in conflict zones negotiate life in unstable contexts. Meanwhile, political stability can be a source of security for attracting people to immigrate in search of a better life.

5.3 Summary of contextualization

The overview in this section highlights key discussions (not all aspects) within the literature regarding contextualization of climate change and migration, which are summarized in Tables III and IV. Table III provides a summary analysis of quantitative and qualitative topics emerging from the scientific and policy/legal literature, some of which overlap, extracting key topics that are repeated across many discussions. Table IV then summarizes topics suggested as being dealt with less frequently. It is not that these topics are absent from the literature, but that they tend to receive less attention or less detailed analysis than more popular topics.

Category	Science	Policy and legal
Qualitative	The environment as an outcome of human population-induced changes or human population-induced changes as an outcome of the environment (environmental determinism) Tends to be seeking a direct link between climate/climate change and migration and that is created as the context	Existing policy and legal mechanisms in different contexts Gaps in policy and legal mechanisms in different contexts
Quantitative	Usually aiming for correlations between environmental variables (independent) and human variables (dependent), as part of environmental determinism and without always establishing a causation for a given correlation	No major discussions in the literature

Source: Author's own

Table III.
Main contextualization issues emerging from the literature

Category	Science	Policy and legal
Qualitative	Main ethical questions and how to answer them	Effectiveness of legal mechanisms for current and future situations (Ferris, 2011 is an exception)
Quantitative	Robust, verifiable quantification of actual and potential migrants categorized by different contexts, e.g. location, social contexts, environmental contexts, and climate change impact	Resources needed and available for considering different contexts – and who will and should pay – especially in terms of implementing policy and legal measures
	Connecting quantitative correlations with verifiable qualitative explanations of causations	

Source: Author's own

Table IV.
Main contextualization issues not dealt with extensively in the literature

6. Conclusion

The fundamental relationship between climate change and migration, though frequently presented as urgent for policy development and political decisions, is complex and poorly understood. Migration is and always has been a complicated, highly subjective and context-specific process. Climate change adds to this challenge. However, public policy and research need to deliberate and be prepared to manage these kinds of movements or else potential political implications could be knee-jerk reactions against migrants as well as failure to address the fundamental causes of mainly involuntary migration.

Without being comprehensive in the literature covered, this paper provided a critical overview and synthesis of climate change and migration work through the lens of conceptualization and contextualization. Major gaps in the literature were identified through an illustrative, not complete, review. We suggest some key considerations for research and policymaking emerging from our review which can provide a base for meaningful discussion on the topic and particularly inject into the policy debate some evidence-based recommendations.

The key qualitative gap in climate change and migration work so far does not relate directly to the impacts of climate change and migration, but rather why certain impacts might arise. The "What has happened?", "How has that happened?" and "Where has that happened?" questions are discussed extensively, sometimes speculatively and with limited empirical evidence, especially also when considering those questions for the future. Frequently missing are questions involving "Why?" That is, in considering the underlying long-term factors, leading to situations in which migration might be an option, chosen or involuntary, due to climate change:

- Why have those factors rarely been made explicit?
- Why have those factors not been fully addressed?

More empirical research is needed here which can also contribute to wider theoretical discussions but which might have political implications in terms of indicating true

reasons for migrating, irrespective of some of the populist rhetoric surrounding climate change.

In particular, the review strongly brings out that migration is a very context-specific process. However, the role of context is under theorized and underrepresented in empirical studies. Context here refers to inclusivity of various interacting factors such as social, environmental, political, climate, cultural, developmental and physical aspects. More research is needed to contextualize climate change and migration for an informed understanding as to why certain variables lead to different migration scenarios in different contexts. Further investigating the finer details of a context starting from the community – to household and individual contexts like gender, age, occupation and class – can reveal how varied responses and priorities get shaped while making migration decisions. These types of geographically and culturally nuanced assessments can help decision-makers to recognize the diversity of climate risks and responses at different places and within different cultures, hopefully leading to more informed policies. Public investment is needed to encourage systemic and long-term research on this topic as compared to onetime project exercises that is common practice for most empirical work done so far.

The key quantitative gap in climate change and migration work relates to obtaining credible and verifiable forms of quantitative estimates for climate change impacts affecting migration. Data scarcity challenges the empirical explanation of climate change and migration links. This lack of adequate data, particularly in terms of time series of environmental and demographic variables, is a constraint for methodological innovation and any conclusive results, with implications that policy and political decisions might be made assuming that more is known than actually is known. For any empirical analysis to assist decision-making, policy needs to invest in data collection and management. One recommendation to address this dilemma is to develop strata based on geographical location (e.g. country or other political jurisdiction), by geography type (e.g. cities, coasts, mountains), and by climate change impact (e.g. sea-level rise, fresh water, food, natural hazards) as well as by social and environmental dimensions. Data collection agencies need to be sensitized about climate change as a plausible driver for migration amongst already existing drivers. Institutional capacities need to be strengthened for understanding these issues, so that when data are collected on the ground, there is background and knowledge about this issue.

From a research perspective, one recommendation for closing the qualitative and quantitative gap is adopting a mixed research methods approach, where quantitative modeling results are also supported by ground evidence through qualitative approaches like interviews, community forums or other methods. From a political perspective, it would be useful (even if unlikely) if researchers, policymakers and politicians would shed their pre-conceived notions and instead seek deeper understandings of the fundamentals of the topic, especially regarding what is known and what is not known from an evidence basis.

Climate change and migration is a multi-layered and dynamic process which is far from being completely understood, so political decisions will need to be made without full information, as happens often. Policymaking in this context, where climate change as a cause of migration is uncertain and highly contextual, necessitates inclusivity of local populations in decision-making wherein their views/perceptions and responses are democratically represented and not merely channeled into participatory processes.

Their inclusivity needs to be enacted from the conception stage through to design and implementation of any policy developed. Exchange between scientific research and policy is two-way, with research needing to ensure that the questions are investigated thoroughly and results are relevant and useable, while policymakers and practitioners need to listen to and incorporate the scientific results.

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