ANNUAL REVIEWS **Further**

Click here for quick links to Annual Reviews content online, including:

- Other articles in this volume
- Top cited articles
- Top downloaded articles
- Our comprehensive search

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Environmental Dimensions of Migration

Lori M. Hunter,[1] Jessie K. Luna,[1] and Rachel M. Norton[2]

[1]Institute of Behavioral Science, CU Population Center, Department of Sociology, University of Colorado, Boulder, Colorado 80309; email: Lori.Hunter@colorado.edu, Jessica.Luna@colorado.edu

[2]Department of Health & Behavioral Sciences, University of Colorado, Denver, Colorado 80262; email: Rachel.Norton@ucdenver.edu

Annu. Rev. Sociol. 2015. 41:377–97

First published online as a Review in Advance on April 16, 2015

The *Annual Review of Sociology* is online at soc.annualreviews.org

This article's doi: 10.1146/annurev-soc-073014-112223

Copyright © 2015 by Annual Reviews. All rights reserved

Keywords

adaptation, climate change, environment, migration, mobility, livelihoods, vulnerability

Abstract

Research on the environmental dimensions of human migration has made important strides in recent years. However, findings have been spread across multiple disciplines with wide-ranging methodologies and limited theoretical development. This article reviews key findings of the field and identifies future directions for sociological research. We contend that the field has moved beyond linear environmental "push" theories toward a greater integration of context, including micro-level, meso-level, and macro-level interactions. We highlight findings that migration is often a household strategy to diversify risk (new economics of labor migration theory), interacting with household composition; individual characteristics; social networks; and historical, political, and economic contexts. We highlight promising developments in the field, including the recognition that migration is a long-standing form of environmental adaptation and yet only one among many forms of adaptation. Finally, we argue that sociologists could contribute significantly to migration–environment inquiry through attention to issues of inequality, perceptions, and agency vis-à-vis structure.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

INTRODUCTION

Relocating from challenging environmental settings has been an important survival strategy throughout human history (McLeman 2014). Today, in the context of a changing global climate, the need for improved understanding of migration's environmental drivers is particularly salient. Indeed, the topic is vital for policy (Black et al. 2011) and also holds substantial interest among the public.

Research on the environmental dimensions of human migration has made important strides in recent years. Yet contributions from a sociological perspective have been limited. Human geographers, anthropologists, and scholars focused on livelihood vulnerability and adaptation have predominantly led the charge to better understand natural environment push factors as they relate to migration decision making and migration patterns. Yet evidence has been "varied and patchy," with wide-ranging methodologies, little theoretical development, and myriad geographic foci (Black et al. 2011, p. S3). With a now solid and growing body of evidence from case studies, it is time for sociologists to expand migration–environment inquiry to include issues of inequality, perceptions, and considerations of agency vis-à-vis structure. We argue that sociology has much to contribute to these areas.

The following review of this emergent body of work reveals that the science of migration–environment connections does not yet lead to one central conclusion—perhaps it never will. Even so, the innovative and impressive body of scholarship offers a useful representation of what can happen when the international research machine is mobilized. This machine includes individual researchers, funding and research organizations, and scholarly outlets, all of which provide the tools and motivation to move a research agenda forward.

The machine was mobilized in the 1990s by bold projections of the number of "climate refugees"—projections reaching as high as 50 million environmental migrants by 2010 (Myers 2002). Such projections were not sufficiently grounded in empirical understanding, in part because very little scholarship examined the environmental aspects of migration decision making. So researchers responded. Over the past two decades, empirical research on the topic has burgeoned.

Even so, bringing environmental factors to migration theory and research has required innovation. Most secondary data on migration neither include measures of environmental conditions nor provide geographic identifiers that would allow contextual data to be appended. In this way, "putting people into place" (Entwisle 2007, p. 687) has represented a central challenge for migration–environment theory and research.

Stepping back to summarize an emerging body of research represents an important step in moving science forward. It also represents an opportunity to identify lessons learned as well as gaps remaining with regard to theory, results, and methods. The following review offers this summary with a focus on theory and research on the environmental drivers of human migration. Formal resettlement schemes are not included nor are the environmental effects of migration in destination areas. With regard to gaps, we highlight areas where sociological contributions are particularly critical.

ADVANCES MADE IN MIGRATION–ENVIRONMENT THEORY

As early as 1992, the International Organization for Migration reported that environmental degradation was already resulting in large numbers of migrants, with the possibility of substantial increases due to climate change (IOM/RPG 1992). In that same year, Bilsborrow (1992) put forward an early attempt to theorize the environmental dimensions of migration. He linked demographic changes, namely population growth, with economic motivations for land extensification (increase

in food demand) and therefore out-migration to rural frontier regions (Bilsborrow 1992). Simple bivariate associations between rural population growth, changes in agricultural land, forest area, and fertilizer use were suggestive of associations in this direction, although coarse, since discussion and analyses focused on the national scale. Presaging lessons learned from more contemporary research, Bilsborrow himself ended with a plea for within-country analyses given that the migration–environment association is dramatically shaped by local sociopolitical, socioeconomic, and socio-environmental realities.

Bilsborrow's engagement of Boserup's intensification hypothesis and Davis's multiphasic response led the way for linking migration–environment inquiry with existing theory—a path of potential use to social scientists today. In response to Malthusian arguments of population growth outpacing agriculture production, Boserup (1965) argued that population pressures may intensify rural land use, yielding greater output. Bilsborrow argued that another response to population pressure could be land extensification—the expansion of agriculture—through migration.

Davis's (1963) theory of multiphasic response aimed to explain how rural households adapted to threats to their standard of living due to increases in family size. Per Davis (1963), feasible demographic responses included fertility reduction and postponement of marriage. Building on this theory, Bilsborrow (1992) argued that migration represents another feasible demographic response as households face challenging times.

In an effort to further bridge environmental considerations and classic migration theory, Hunter (2005) reached to, for example, Wolpert's (1966) stress-threshold model and Speare's (1974) thoughts on residential satisfaction. Environmental factors play a role in many of these classic theories, yet details are sparse. For example, the stress-threshold model notes the potential placement of environmental hazards as a stressor; environmental amenities and disamenities were generally considered locational characteristics within the residential satisfaction perspective. Still, Hunter argued that classic migration theory has much to offer in terms of guidance for the emerging migration–environment literature.

These classic theories cannot, however, sufficiently tackle the nuance required for a thorough consideration of environmental factors. Hugo (1996) argued, for example, that environmental factors act on a continuum ranging from slow-onset stresses to rapid-onset disasters. Slow-onset environmental changes, such as drought (Findley 1994) and rainfall variability (Warner & Afifi 2014), can lead to migration (McLeman & Smit 2006), as households aim to change or diversify livelihoods. On the other hand, rapid-onset natural disasters can result in long-term displacement (Sastry & Gregory 2014), although in some cases, such as flooding in Bangladesh, poverty may constrain migration even under such dire circumstances (Gray & Mueller 2012b). This argument further demonstrates that theory must effectively integrate the interactions between environmental factors and other migration determinants operating differentially across scales and across time. Other determinants include regional and national socioeconomic and sociopolitical conditions as well as household compositional characteristics.

Also complicating theory is the issue of internal vis-à-vis international migration in response to environmental challenges. Environmental displacement has been more likely to result in internal migration due to the political and socioeconomic costs of cross-border moves (Hugo 1996). Yet international migration as a household environmental risk diversification strategy also occurs (e.g., Hunter et al. 2013).

A comprehensive migration–environment theory remains elusive, yet an important step toward conceptualization was recently offered by Black et al. (2011) in the interdisciplinary journal *Global Environmental Change.* The framework is influenced by the working paper "Sustainable Rural Livelihoods: A Framework for Analysis" (Scoones 1998) through explicit integration of a variety of household capitals including social, physical, and economic. Yet it also considers

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

the continuum of environmental influence, international versus internal migration, and broader contextual determinants operating at a variety of scales.

CASE STUDIES AND CLUSTERS OF FINDINGS EMERGE

As in the realm of migration theory, the empirical creativity of social scientists became apparent once posed with the challenge of considering environmental dimensions of migration. Some scholars innovatively built on migration and other social data collected prior to the occurrence of unforeseen environmental stressors (Findley 1994). Others identified secondary data sources with sufficient geographic identifiers to append contextual data (Henry et al. 2003). Some collected primary data in individual areas of stress (Meze-Hausken 2000); others undertook comparative analyses across a variety of settings (Warner 2011).

Of course, generalization is challenged by the wide variety of theoretical and conceptual frameworks, study settings, methodological approaches, and focal environmental factors. Still, the following represent clusters of findings suggested by the emerging body of case studies.

Environmentally Related Migration Is Often a Household Strategy to Diversify Risk

The new economics of labor migration (NELM) theory posits migration as a household strategy of livelihood diversification aimed to minimize risks associated with lack of credit, capital, and insurance markets (Stark & Bloom 1985). The motivations of Mexico–United States migrants, in particular, have often been usefully explained through the NELM framework, as households send migrants to garner remittances that diversify household income sources (Lindstrom & Lauster 2001, Massey & Espinosa 1997, Taylor & López-Feldman 2010).

In relation to environmental factors, rainfall and temperature stress and change may impact livelihood viability, especially in rural settings characterized by agricultural or natural-resource-based livelihoods (Eakin 2005). Rural households, particularly in settings lacking insurance mechanisms, may allocate part of their labor supply to urban or foreign labor markets (Massey et al. 1993). Indeed, studies in several settings have found that migratory responses to environmental strain appear to be strategies of household risk diversification, consistent with the NELM position.

As specific examples, in rural Cambodia, migration is a replacement strategy for agricultural livelihoods as environmental uncertainty increases perceptions of risk (Bylander 2013). Frequent hot shocks in northern Nigeria resulted in an increased probability of migration, particularly among men, also supporting a risk diversification strategy (Dillon et al. 2011).

Migrant remittances sent to origin regions play a key role in risk diversification, and some studies have included specific consideration of remittance impact. During the Mali drought in 1983–1985, 63% of households relied on remittances from family members for income diversification (Findley 1994). Studies in Ecuador (Gray 2009) and Brazil (VanWey et al. 2012) also suggest that remittances augment agricultural production and investment, respectively. Scheffran et al. (2012) also raise the possibility of remittances as a support structure and conduit for knowledge and resources for adapting to a changing climate in West Africa. Specifically, through three case studies in West Africa, Scheffran et al. (2012) demonstrate that international emigrants leverage their newfound financial, social, and cultural capitals to help their home communities build wells, irrigation systems, and renewable energy grids.

Drought represents an often-studied environmental stress related to migration, and it fuels both long- and short-term movement in a variety of settings. In some cases, households send family members away to reduce household food demand such as during the drought in Mali

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

in 1983–1985 (Findley 1994). In vulnerable drought-prone areas of Ethiopia, highly vulnerable households are more likely to send migrants to feeding camps or urban areas during periods of famine (Ezra & Kiros 2000, 2001). In other cases, such as in Burkina Faso, residents of dry regions are especially likely to engage in both temporary and permanent migration to other rural areas with better agricultural prospects (Henry et al. 2004).

The above examples align with the environmental scarcity hypothesis, that environmentally related migration can be due to environmental degradation, variability, and/or unpredictability. This reallocation of household labor supply helps alleviate losses from lower natural capital ex post (Hunter et al. 2014, Nawrotzki et al. 2013). On the other hand, several migration–environment case studies support the environmental capital hypothesis, which predicts that the availability of natural resources provides capital that may support migration, particularly more costly long-distance, long-term, or international moves. Such long-distance migration has been identified in some cases as an ex ante strategy, designed to spread risk related to future stressors (Riosmena et al. 2013, Stark & Bloom 1985).

In support of the environmental capital hypothesis, in rural Ecuador the availability of land and abundant rainfall, both of which reflect higher natural capital, tend to increase international migration (Gray 2009, 2010). Similar findings emerge from rural South Africa, where households harvest from communal landscapes both for household consumption (e.g., wild foods) and for income generation (e.g., baskets/mats for market). Migration appears more common from households in villages with greater access to natural capital, reflected by the relative abundance of vegetation on their communal lands (Hunter et al. 2013).

Environmental Factors Interact with Other Macro-Level Determinants to Shape Migration

Empirical evidence increasingly reveals that environmental factors in combination with numerous other micro-level, meso-level, and macro-level contextual factors shape human migration patterns, as reflected conceptually in **Figure 1**. Macro-level factors include social, cultural, economic, and political structures at multiple spatial and temporal scales. A region's historical-political context also interacts with environmental conditions and changes to influence migration.

Within this wide variety of contextual forces, several key dimensions have emerged in the literature, including histories of colonialism and related discrimination/persecution; state development policies and programs; international policies shaping, for example, supply/demand; and domestic policies such as land tenure systems. Although we highlight these particular factors, the question of context is prevalent throughout the migration–environment literature.

Colonial histories have shaped settlement patterns, political borders, and crop systems in ways that influence contemporary migration–environment associations. For example, in Niger, colonially imposed cash cropping in the early 1900s led to soil degradation and food shortages that established a pattern of regional, circular migration that continues to characterize today's migration streams (Afifi 2011). In other cases, colonization and state formation brought efforts to sedentarize previously mobile groups that used migration as an adaptation to harsh environments. These efforts, as well as the closing or opening of political borders, have resulted in new patterns of movement in response to environmental change (Barrios et al. 2006, Gila et al. 2011, Marino 2012, Sporton et al. 1999).

Land tenure, often shaped by these colonial histories, has also emerged as a key variable influencing decisions of individuals and/or households to move in response to environmental conditions. For example, in Guatemala, the combination of soil degradation, lack of available land, and lack of secure land tenure is a driver of out-migration (López-Carr 2012). In Ethiopia,

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

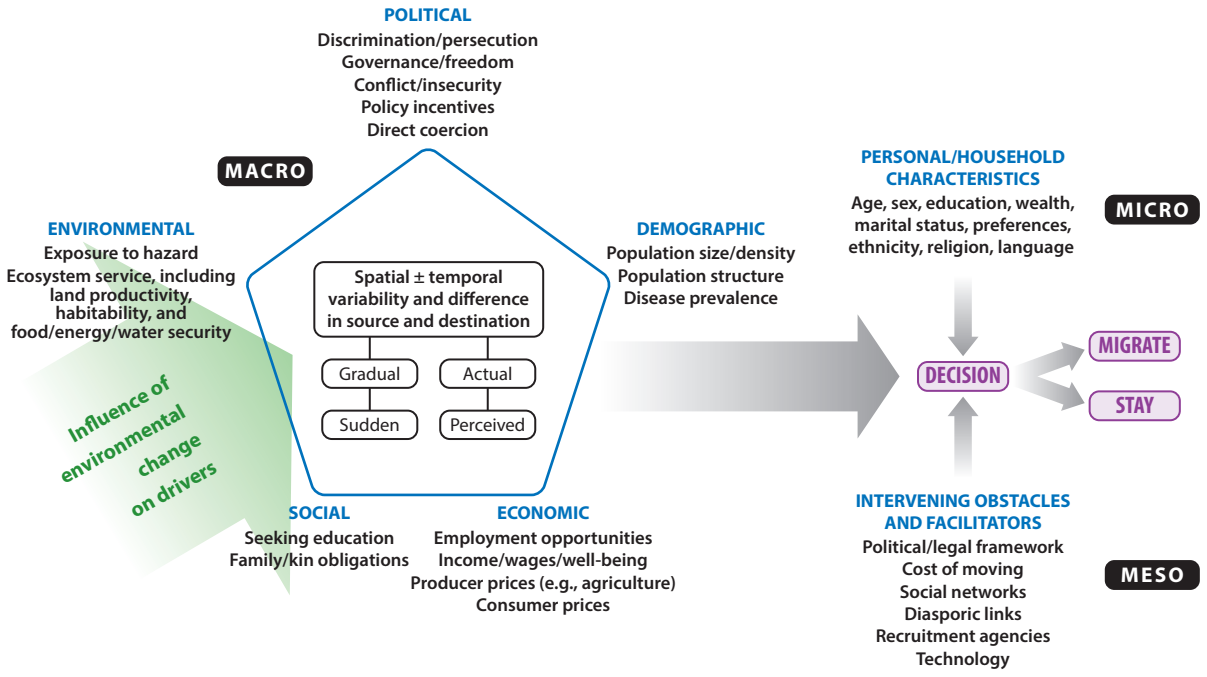

Figure 1

A conceptual framework for the drivers of migration as presented by Black et al. (2011, p. S5). Reprinted from *Global Environmental Change*, Vol. 21S, Black R, Adger WN, Arnell NW, Dercon S, Geddes A, Thomas D, The effect of environmental change on human migration, pp. S3–11, Copyright (2011), with permission from Elsevier.

young people without land are more likely to move in times of environmental stress (Morrissey 2013). And in Benin, land tenure shapes patterns of ongoing migration due to migrants' conflicts with landowners in destination areas (Doevenspeck 2011).

Some scholars have argued that global development inequalities are one of the root causes of vulnerability to environmental changes and hazards (Black 2001, Wisner et al. 2004). For example, Lonergan (1998) notes the impacts of displacement from large development projects such as dams, irrigation systems, and land reforms. Wisner et al.'s (2004) pressure-and-release model posits neoliberal reforms, structural adjustment programs, and foreign debt as dynamic pressures that influence vulnerability to environmental hazards. Other scholars, including those in the political ecology tradition, have emphasized the importance of local power inequalities in determining how environmental change affects particular groups (Marino 2012, Zetter & Morrissey 2014). In Ghana, for instance, Carr (2005) found that gender and age inequalities in land tenure shaped who benefited from migration.

Finally, scholars are connecting political contexts across scales—a critically important reflection of contemporary realities. For example, in Botswana, international treaties such as the EU Lomé Convention shaped national agricultural policies that in turn affected migration patterns in times of environmental stress (Sporton et al. 1999). Environmental change also affects people through multiple scalar pathways, such as through global commodity prices (Kniveton et al. 2012, Morrissey 2014). These insights regarding the multiple scalar interactions of historical and political context with environmental change represent important contributions to the field.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Household Composition and Individual Characteristics Also Shape Migratory Responses to Environmental Factors

Of course, macro-level factors interact with household and individual characteristics to shape migratory responses to environmental conditions. For example, within particular political-economic systems, household life cycle, as well as gender and educational composition, shapes migration decision making.

The importance of household life cycle is usefully illustrated by migration's links to land use decision making within the Brazilian Amazon. In this region, household demography influences the available labor pool and therefore livelihood strategies. Initial migration to the forest frontier tends to occur among younger households that have shorter time horizons and typically, given that shorter horizon, more annual crops (VanWey et al. 2007, Walker et al. 2002). Older, more labor-rich households are more likely to engage in perennial cropping (Perz 2001). Yet research clearly demonstrates that household demography influences not only farming patterns, but the potential to engage in migration for off-farm employment, which in turn shapes farming patterns. Households with young adults are more likely to make circular or rural-urban moves as an additional livelihood strategy. Such migration, including among women, generates cash so that agricultural land may be expanded or production increased through hired labor and/or technological inputs (VanWey et al. 2007).

In general, and as described above, nonagricultural labor, often resulting from migration, can provide income to ex ante or ex post buffer households from environmental shocks. Yet households are not equally likely to engage in the same forms of livelihood migration or, indeed, to engage in livelihood migration at all. For example, in response to the severe drought in Mali in the 1980s, migration was differentiated along socioeconomic lines: The poorest households engaged in shorter-distance migration encompassing shorter time periods (Findley 1994). On the other hand, disasters sometimes undermine the ability of the poorest households to engage in migration as a coping strategy at all, as demonstrated during floods in Bangladesh (Gray & Mueller 2012b).

In addition to migration's variation across households, variation also exists as far as who within a household may migrate in response to environmental conditions. In rural Ethiopia, for example, the likelihood of an individual moving in response to drought is greatly shaped by his or her relationship to the household head; unrelated household members are more likely to migrate (Ezra & Kiros 2001).

Gender also shapes the environment–migration association, with Bangladeshi women more likely to migrate in response to crop failure and flooding, perhaps due to their less secure access to land within this cultural setting (Gray & Mueller 2012b). In Ethiopia, drought as an environmental force shapes women's marriage-related migration, reducing such moves by half (Gray & Mueller 2012a). Even so, the opposite occurred in Mali, where marriage-related moves doubled during a period of drought (Findley 1994). Also demonstrating gendered migration responses to environmental stress, deforestation in Ghana's central region increased rural-urban migration particularly among young men, who are more likely to find new employment opportunities after relocation (Carr 2005).

Educational levels shape employment options and thus impact the likelihood of migration by specific individuals within a household. Although very few studies have focused explicitly on education's influence on the migration–environment association, recent work in Mali and Senegal provides initial insight. In these settings, when livelihoods come under environmental stress, migration is a livelihood strategy particularly for the lower educated since these individuals tend to be more dependent on agriculture and other environment-dependent activities (Van der Land & Hummel 2013).

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Social Networks Shape the Migration–Environment Association

Just as socioeconomic and household contexts shape the migratory response to environmental change, so too does social capital. Indeed, migration researchers have long recognized the centrality of social networks to understanding migration patterns and processes (e.g., Massey & Espinosa 1997). We can look to long-standing migration streams from rural Mexico to the United States as an example.

Many regions of rural Mexico have strong migration histories that yield translocal connections between sending and destination communities (Massey & España 1987). These connections—social capital—reduce the costs of migration by facilitating housing, employment, and other important aspects of settling into destination communities. In relation to environmental conditions, in general, drought conditions tend to yield higher levels of Mexico–United States migration (Feng et al. 2010), although this is true particularly in communities with strong migration histories (Hunter et al. 2013). In regions lacking such social networks, rainfall deficits actually reduce migration propensities (Hunter et al. 2013).

Other research demonstrates the importance of social networks in a variety of African settings (Doevenspeck 2011, Gila et al. 2011, Jónsson 2010, Sporton et al. 1999) and in rural Cambodia (Bylander 2013). In the case of migration from the small island nation Tuvalu, keeping social groups intact is a key motivation in the face of dramatic declines in living conditions due to sea level rise and natural disasters (Shen & Gemenne 2011). A similar concern emerges in rural Alaskan communities facing village relocation due to erosion (Marino 2012).

PROMISING DEVELOPMENTS IN MIGRATION–ENVIRONMENT RESEARCH

The clusters of research findings highlighted above provide a useful foundation from which migration–environment research continues to move forward. Here we highlight several areas of promising developments.

Moving Beyond Environmental Determinism

Early quantitative exploration of the migration–environment association often sought simply to test for the statistical significance of a particular environmental variable as a predictor of typical household-level migration. The environmental measures themselves varied widely, for example, reflecting rainfall recently, historically, or its variability. Other measures reflected temperature trends, and other research focused on migration following natural disasters. In most cases, though, the environmental signal was represented on its own without consideration for how the environmental stress interacts with other factors at micro-, meso-, and macroscales to differentially affect individuals and households.

Not surprisingly, results from these early studies varied substantially and the most common answer to the research question "Do environmental factors influence migration?" was actually "It depends." As noted above, environmental factors interact with a complex array of contextual factors as well as individual- and household-level characteristics to ultimately shape migration decision making. Given this, rather than asking whether drought causes migration, for example, researchers are beginning to ask, In what combinations of contexts does drought increase or decrease migration? What are the key micro-, meso-, and macroscale interactions that predict migration–environment associations? This growing attention to context has helped move the field away from environmental determinism and toward a more nuanced exploration of human–environment interactions.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

An example of this increasing nuance is Morrissey's (2013) study of the drought-prone highlands of Ethiopia. Morrissey conducted interviews in both sending and receiving communities, paying attention to how environmental changes such as rainfall shortages interact with livelihood strategies, household composition, land tenure, poverty, education, and government food-aid policies. In the end, he posits a typology of interactions, which he classifies as additive, enabling, vulnerability, and barrier effects that ultimately impact the migration–environment connection. This type of context-specific and nuanced study reflects a promising direction in the field.

Migration Is a Long-Standing Form of Environmental Adaptation, and Yet Only One Among Many Adaptations

Humans have long responded to environmental conditions through migration, and population movement is increasingly being seen as a long-standing adaptive response (McLeman 2014). Examples of migration from both environmental hardships, such as the drying of the Great Plains in the 1930s, and environmental calamities, such as Hurricane Katrina in 2005, can be found in the United States (Gutmann & Field 2010).

And yet migration is but one form of adaptation, and with this recognition, migration–environment researchers have begun integrating constructs from the hazards research community. In consideration of adaptive capacity in relation to migration, vulnerability, an integral concept within the hazards field, has become a particularly important lens through which to examine migration–environment linkages.

At its most basic definition, vulnerability implies the potential for loss (Cutter 1996). Wisner et al. (2004, p. 11) further specify that vulnerability consists of those "characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard." With regard to migration and the environment, Marino (2012) uses the concept of vulnerability in her examination of an Alaskan community's susceptibility to climate change. In this case she finds that historically rooted power inequalities exacerbate the community's vulnerability to the impacts of erosion and flooding. On the other hand, in their examination of displacement following the Indian Ocean tsunami of 2004, Gray & Sumantri (2009) find that traditional views of vulnerability along gender and age lines are only somewhat supported. Instead they find that the degree of damage wrought by the tsunami, as opposed to gender per se, played a key role in influencing mobility.

Resilience represents yet another concept from the hazards community that has been usefully integrated into recent migration–environment research. Resilience is often defined as "the ability of communities to absorb external changes and stresses while maintaining the sustainability of their livelihoods" (Adger et al. 2002, p. 358). Scheffran et al. (2012), who hail from a geographic tradition, focus on the impacts that migration can have on contributing to the resilience of communities of origin. Such impacts include the reduction of population pressures on scarce resources, in addition to resilience enhancements due to remittances. Less obvious impacts include the contributions of emigrants in developing community projects within their origin communities (Scheffran et al. 2012).

Even so, some scholars are wary of seeing migration as demonstrating resilience or successful adaptation; research by de Bruijn & van Dijk (2003) on Fulbe pastoralists in Mali shows a cycle of increasing marginalization in which migrants are too poor to send remittances and origin communities suffer from labor shortages followed by new waves of migration. These findings echo concerns that discourses of resilience may place a disproportionate responsibility for self-help onto vulnerable or marginalized communities and people (Reid 2013).

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Increasing Evidence to Critique the Simplistic Proposition of Mass Movements of Environmental Refugees

The growing attention to complexity and context reflects the shifting course of debates over environmental refugees. The specter of floods of refugees was raised by some who assumed a direct, causal link between environmental change and forced migration (Myers 2002). Critics, however, argued there was far more to the story (Bilsborrow 1992).

Early on, this debate was characterized by many as the maximalists (the proponents of the environmental refugee construct) versus the minimalists (the construct's critics) (Suhrke 1994). In many ways, the maximalist position resembled a linear "push-pull" model of environmental degradation, which would posit that humans will migrate from environmentally degraded places toward less environmentally degraded places (Lewin et al. 2012, van der Geest 2011). In contrast, the minimalists, and those who emphasized multilevel contextual drivers, argued for greater attention to historical, political, economic, and social contexts (Black 2001, Doevenspeck 2011, Lonergan 1998, Morrissey 2012). They critiqued the maximalist position as static, deterministic, ahistorical, and neo-Malthusian, arguing that the relationship between environmental change and migration is neither linear nor direct.

Fortunately, the field has largely moved beyond polarized debates owing to the growing collection of case studies, such as those reviewed above, documenting environmental influences on migration but also revealing difference across settings and complexity in influence. This shift from simplistic conceptual linkages fueling the environmental refugee debate indicates how far the field has come.

Migration–Environment Data and Methodologies Are Becoming Increasingly Sophisticated

As illustrated by the wide-ranging research settings reviewed above, much migration–environment research represents geographic case studies, often focused on regions typically characterized by livelihood reliance on proximate natural resources. Studies have tended to engage either quantitative or qualitative methodologies, although quantitative approaches—often at the household-level—have thus far dominated. Other work taps into historical analogs, such as the Great Plains example, to consider what future climate change might mean for population mobility (e.g., McLeman & Hunter 2010). Migration in relation to natural disasters also provides a lens through which to examine the migration–environment connection (e.g., Black et al. 2013), and scholars have also engaged a macro perspective to yield empirical simulations of population movements particularly in light of climate futures (e.g., Curtis & Schneider 2011).

Surveys are a commonly used form of data collection for migration–environment scholarship, and Bilsborrow & Henry (2012) offer methodological recommendations based on years of fieldwork. They review and provide examples of three methods of data collection and integration for migration–environment research: (*a*) merging existing population and environmental data from different sources, (*b*) adding questions to a survey developed for another purpose, such as the Demographic and Health Surveys, and (*c*) designing and fielding a new survey. A similar overview by Fussell et al. (2014) offers additional examples of quantitative research approaches, including multilevel and event history models applied in rural South Africa, Burkina Faso, and the US Gulf Coast following Hurricane Katrina.

Researchers have also promoted agent-based models (ABMs) as useful tools for examining population-environment interactions, including those related to migration (Auchincloss & Roux

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

2008, Evans & Kelley 2008). An ABM simulates human behavior and allows individuals (active agents) to interact with the environment (passive agent) in complex ways, including environmentally motivated migratory behavior (e.g., Mena et al. 2011). A key strength of the ABM's utility is for the study of feedbacks, adaptations, and nonlinear relationships within coupled natural and human systems (O'Sullivan 2008). In addition, predictions of human behavior can usefully generate understandings of the implications of potential policy interventions (Miller et al. 2010). As an application-based example, Mena et al. (2011) developed an ABM to simulate environmental change (e.g., deforestation) associated with land use patterns of frontier migrant farmers in the northern Ecuadorian Amazon. They combined sociodemographic and socioeconomic data from a household survey with longitudinal satellite images of land cover and ultimately created spatially explicit representations of land use/land cover for the region.

Finally, recent advancements in spatial modeling hold promise as they draw on long-standing scholarship on hazard vulnerability (McLeman 2013). County-level data for the United States, merged with spatial estimates of sea level rise, reveal the scale of coastal population vulnerability, demonstrating that over 20 million residents of low-elevation coastal zones in the continental United States will be affected by sea level rise by 2030 (Curtis & Schneider 2011). Such innovations shed light on potential migration in the face of contemporary climate change. And using geographically referenced household data merged with satellite imagery allowed Leyk et al. (2012) to calculate household-level natural resource availability on communal landscapes in rural South Africa. Their results demonstrate how conclusions regarding migration–environment connections can vary according to study-area boundaries (regional, village, or subvillage level). The environmental capital hypothesis finds support at the most fine-grained scale, the subvillage level (approximating a community), because households with more local natural resources have a higher likelihood of sending a migrant in search of labor opportunities elsewhere.

GAPS REMAINING

Although substantial, promising inroads within migration–environment scholarship have been made in the past decade, the topic remains an emergent area of research (McLeman 2014). Important theoretical, topical, and methodological gaps persist, several of which are highlighted here, particularly as they relate to potential contributions from the sociological perspective.

Integrating Environmental Factors Within Mainstream Migration Theory Remains a Challenge

Human migration is a well-theorized social process, with decades of research guided by a variety of perspectives on the determinants and consequences of migration processes. Yet environmental factors remain peripheral within mainstream migration theory. Lifestyle migration represents the area most likely to integrate environmental considerations, but with a greater focus on how amenity and quality-of-life factors shape relocation decisions among relatively affluent and privileged populations (Benson & Osbaldiston 2014). We contend that, especially in the midst of contemporary climate change, environmental considerations should play a more central role in migration theory, particularly in relation to livelihoods and environmental conditions (both amenities and disamenities) in both urban and rural settings.

Exactly how to integrate the environment, however, raises important theoretical questions. We have demonstrated a lack of empirical support for approaches that treat the environment as a simple causal driver. New approaches such as NELM and livelihood perspectives (de Haas 2010) have

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

integrated context but have yet to fully theorize the role of the environment. Simply adding the environment as an exogenous variable fails to fully engage with the ways in which human actions shape and are shaped by environmental processes and forces. Oliver-Smith (2012, p. 1,063) argues that the failure to recognize the complex mutuality of nature-society relations "lies at the heart of much of the environmental migration debate." As scholars in diverse fields have argued (e.g., Descola 2013, Freudenburg et al. 1995, Watts 2005), retheorizing nature/culture dualism is a critical task for social theory that will have important outcomes for empirical research.

An example of this stumbling block in migration–environment research is the frequent distinction between the economic (human) and the strictly environmental. The migration–environment literature has focused largely on rural people whose livelihoods are often based in agriculture or natural resource economies. Recognizing this close intertwining, many scholars have used the concept of environment-induced economic migration (Afifi 2011, Lilleør & Van den Broeck 2011, Scheffran et al. 2012).

Yet even in rural areas the environment–economic link remains tricky to untangle. Carr (2005) found that in Ghana environmental degradation from logging mattered to people only once logging jobs disappeared. However, Carr noted that people did not move immediately and that age, gender, land tenure, knowledge, and social status affected who moved and who stayed. Massey et al. (2010) found that in Nepal higher-caste Hindus were less affected by environmental change, as their livelihoods were less directly based on environmental occupations. Van der Land & Hummel (2013) found that in Mali and Senegal higher levels of education changed peoples' livelihood strategies, thus changing the environment–economic link. As these diverse findings show, social relations and power structures shape the complex linkages between rural peoples' livelihoods and the environment.

A remaining empirical gap in this literature is to consider how the environment relates to economic drivers in urban contexts, not just rural agricultural settings. The hazards literature could be a useful place to turn because it has offered greater focus on urban vulnerability. Finally, concepts from environmental sociology such as conjoint constitution (Freudenburg et al. 1995) could offer useful theoretical tools for thinking through the mutuality and interrelationships of human livelihoods and their environments.

Consideration of General Social Theory Would Help Generate Broader-Reaching Conclusions Regarding Migration–Environment Linkages

As demonstrated by the lengthy debate over the term environmental refugee and the more widely accepted idea of a spectrum between forced and voluntary migration (Hugo 1996), the issue of structure vis-à-vis agency is a central theoretical concern for environment and migration scholarship. On the one hand, lifestyle migration can be seen as reflecting high levels of agency; on the other hand, refugees from natural disasters may face little choice in relocation. Even so, focusing entirely on environmental drivers, such as a natural disaster, ignores the role of political and economic drivers, whereas a more voluntary model of migration, illustrated by lifestyle migration, fails to recognize the role of broader structures (Oliver-Smith 2012).

Despite these gains, research on environment and migration could benefit from greater integration with and elaboration of more general social theory. Giddens's (1984) classic theory of structuration, for example, which posits a dialectical, ongoing relationship between structure and agency, could help theorize how environmental, political, economic, and social structures are both shaped by and shape actors' agency. In a certain sense, the struggle over how to theorize the environment in relation to human actions shares substantial features with theories of structure and agency: Both are dialectical relations of coproduction.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Drawing from broader literatures in social research could help address the relationships of structure/agency and nature/culture. We highlight here several strands of social science scholarship that could greatly improve theorization in migration–environment research. We also indicate empirical gaps in relation to these strands.

Vulnerability and risk frameworks from both the hazards and political ecology research traditions could help theorize migration and environment. Since its beginnings in the 1980s, vulnerability research has struggled with how to weigh the social in relation to the biophysical (Adger 2006, Bankoff et al. 2004, McLaughlin & Dietz 2008). Models such as Sen's (1981) entitlements approach help demonstrate the importance of social relations of power, whereas models such as Turner et al.'s (2003) vulnerability/sustainability and Cutter's (1996) hazards of place help theorize an integrated socio-ecological system much in line with the calls made by Oliver-Smith (2012). Finally, the pressure-and-release model of Wisner et al. (2004) integrates the hazards and political ecology traditions. This model posits that risk is produced by social vulnerability and physical hazards pressing together. A strength of this perspective lies in its inclusion of historical root causes that produce social vulnerability over time. In this way, it provides a useful example of how to theorize macro-level and meso-level contextual factors in relationship to households' exposures to environmental hazards.

Finally, vulnerability and livelihood frameworks share what de Haas (2010) argues are unrecognized parallels with NELM approaches. These approaches can offer researchers useful tools to understand how and why people either adapt, move, or stay (Warner et al. 2010). This could elucidate an important empirical gap of the migration–environment literature, which is to examine immobility. Why some people stay in one place whereas others choose to leave is a question that is critical to understanding the drivers of migration and the human decisions that may occur amid a complex environmental and social context.

Social theory regarding local power inequalities, social construction of knowledge, and social cleavages such as gender could also enlighten migration–environment research. Rather than assume an integrated, neutral household that makes decisions democratically, we might ask how peoples' actions and even their conceptions of the possible are shaped by local power structures, knowledge, and social categories such as race, class, and gender. Clearly, sociology has a great deal to contribute to this area.

Carr (2005), for example, argues that people have very unequal access to resources owing to local power structures and social relations. He draws upon Foucault's concept of power/knowledge to explore how peoples' actions "are rationalized as part of or as productive of a field of possible actions" (Carr 2005, p. 930). In other words, Carr is asking how agents are shaping and shaped by structures. Carr contends that by exploring local manifestations of power, we can better understand the links between environment, economy, and society in relation to migration decisions, and avoid either overly structural or overly agentic approaches.

In consideration of the above potential connections to social theory, two empirical gaps in the migration–environment literature become apparent. The first empirical gap regards perceptions. How do people perceive and interpret their environments and how do these perceptions relate to migration decisions? Researchers could use Foucauldian approaches as mentioned above, or they could turn to literature on the social construction of knowledge and the social construction of nature (Berger & Luckmann 1991, Hannigan 2006). Research in Cambodia, for example, found that peoples' perceptions of agriculture as risky shaped their decisions to migrate, even if they themselves had not experienced income loss (Bylander 2013). This finding indicates, broadly, that the role of knowledge and the transfer of knowledge need greater exploration.

The second empirical gap regards gender in relation to migration–environment linkages. Gender is often a key axis of local power structures and social relations, and scholars are increasingly

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

recognizing its role in environment-driven migration. However, studies centrally integrating gender are few (Hunter & David 2011). Gray (2010) is an exception. In rural Ecuador, Gray (2010, p. 692) identifies "a significantly gendered migration system in which natural capital plays an important role." On the one hand, access to land resources facilitates costly international migration among men. On the other hand, women are more likely to stay when land conditions are marginal, perhaps providing evidence of the undervaluation of women's labor and the overall lower likelihood of female migration (Gray 2010).

And while Massey et al. (2010) examine the role of land productivity and land use change as drivers of migration in Nepal, they find, similarly to Gray (2010), that the gendered division of labor plays an important role in migration patterns. In rural Nepal, men are more likely to collect fuelwood while women collect animal fodder. Their survey results suggest that each additional 100 minutes of time required to collect fodder increases the odds of leaving the Chitwan District by 14% for women, but has no effect on men's mobility. Agricultural declines affect local movement for both men and women, but long-distance migration only for men (Massey et al. 2010).

Whereas understanding local power inequalities is crucial for unpacking the locus of agency, understanding macrostructures at larger temporal and spatial scales is necessary for unpacking structure. Moving out from the local scale, theories and methods from historical political economy, world-systems theory, commodity chain analysis, agrarian change, and political ecology could help researchers explore interlinkages across scales as they relate to migration and environment. We would warn against seeing these global structures as bearing down unilaterally on the local (Hart 2001). Instead, as we have argued with agency/structure and nature/culture, the global and the local too have diverse and dialectic interactions. If this can be kept in mind, many of these theoretical traditions have a great deal to offer migration–environment research, particularly in their attention to linkages across spatial and temporal scales.

One vivid example is Davis's (2001) comparative historical analysis of Third World famines at the end of the nineteenth century. Davis explores the interactions of El Niño climate variations and global economic processes, highlighting the role of imperial trade relations, commodity markets, and state policies. This sort of comparative historical analysis that incorporates attention to environmental factors could also be used to address migration.

Theories of globalization and agrarian change could equally shed light on the interactions of global political economy, environmental change, and depeasantization (Magdoff et al. 2000). This could help link environmental change as it impacts people across various political and geographic scales. The recent drought in California, for example, will affect global commodity prices and agricultural labor opportunities, which will interact with policies such as NAFTA to shape livelihood decisions for Mexican farmers. A boll weevil (*Anthonomus grandis*) outbreak in India can destroy a cotton crop and affect commodity prices for West African cotton farmers. Most migration–environment literature currently ignores these kinds of interscalar environmental impacts. Social theory that incorporates multiple scalar interactions, including changing economic and political systems over the longer term, may help incorporate these kinds of interactions.

Critically Examine the Definitions of Both "Migration" and "Environment"

As noted above, several summaries of methodological approaches to the migration–environment connection have recently been published (e.g., McLeman 2013). These summaries raise several important questions including, in a seemingly simple sense, the necessity of clarifying the very definitions of both "migration" and "environment." As in migration research generally, the definition of population movement requires spatial dimensions through the establishment of boundaries or distance, thereby allowing categorization of short- and long-distance moves. Temporal bounds are

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

also necessary—does migration require six months, one year, or some other period of time away from the origin household? What about cyclical seasonal migration, where household members circulate between home and short-term labor opportunities? In all cases, the analytical definition of migration must be clearly specified and a more critical examination of what is not included within a particular definition of migration is vital. As many of the studies mentioned above demonstrate, migration is not a static concept and examinations of migration at larger scales may render invisible (Massey et al. 2010) important migration patterns at smaller scales. Also lost in a focus on movement is knowledge on immobility, as noted above.

Complications arise in consistently defining "environment" as well. For example, researchers have explored rainfall through a variety of measurements, including precipitation levels in recent years, trends across longer periods, variability, and through measures that reflect relative rainfall compared with that in other areas. In some cases, temperature is the focal concern, which also offers a wide variety of measures (e.g., minimum/maximum, mean, variability) further complicated by the necessity of choosing the time period for which temperature is calculated (e.g., past year, 2 years, 30 years—a common window to reflect "long term"). Some researchers measure crop yields (and related crop failures) to more directly reflect the resultant livelihood impacts from challenging environmental conditions such as declining rainfall. Researchers have also examined migration following natural disasters, making use of unforeseen environmental shocks to explore the migration–environment connection.

In all, the wide variety of migrations and environments used within migration–environment research certainly challenges the scholarly community's ability to make broad conclusions. Even so, the field has learned many lessons and recent methodological contributions aim to share experiences and enhance the likelihood of more comparable research, and therefore generalizable results, in the future.

CONCLUSIONS

Tremendous advancements in scholarly understanding of the environmental dimensions of migration have been made in the past 20 years. Motivated by scientifically untested claims of mass environmental migrations in the early 1990s, researchers began to question how environmental factors shaped migration decision making. Yet early studies in myriad settings have yielded a variety of answers. Given the known complexity of migration decision making, it is logical to ask why scholars would think environmental factors would influence migration in the same way in different contexts across different times. Still, those were important initial questions, although the research community is now ready to add critical nuance.

Recent results have clearly demonstrated that the migration–environment connection is complex and shaped by micro, meso, and macro influences. Important inroads have been made with regard to integration of key concepts from many scholarly communities, including examining the social dimensions of natural hazards and global environmental change. Concepts such as vulnerability and adaptation are central to this body of knowledge, although other intellectual bridges remain to be built.

The time is now ripe for sociologists to more centrally engage social theory and issues of inequalities, including inequalities in culturally shaped livelihood options and natural resource governance and access. Subjectivities related to environmental perceptions and their role in migration are also areas of potential sociological contribution (Adamo & Izazola 2010). Migration–environment research offers important opportunities for advancements in sociological theorizing through extensions to a variety of frameworks including world-systems theory (Sassen 2011) and ideas of the conjoint constitution of social and natural phenomena (Freudenburg et al.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

1995). Finally, the strengths of qualitative sociologists in ethnographic and comparative scholarship could greatly enhance our understanding of the ways in which context and change influence household-level decision making and well-being, while offering a means of ground-truthing the results of quantitative approaches (McLeman 2014).

Contemporary climate change has spurred keen interest in this topic among both policymakers and the public. Yet policy and programmatic response to migration shaped by environmental factors tends to favor sudden-onset events such as natural disasters where relief efforts have precedence and can be targeted (Mueller et al. 2014). Even so, slow-onset environmental pressures such as drought or heat stress are increasingly likely (IPCC 2013), suggesting important new response mechanisms are required to cope with community strain.

Researchers have thus far been innovative with existing data sources—linking environmental measures to social data as feasible (Fussell et al. 2014). Yet as McLeman (2013b) notes, to date there is no global monitoring system that measures population displacements and environmental changes. Such a system could facilitate and strengthen future migration–environment research and allow for timely methodological, theoretical, and substantive advancements.

Further, although sociologists have offered important contributions, a nontrivial portion of existing migration–environment scholarship is within cognate disciplines, namely, human geography. Yet sociology has much to offer both theoretically and empirically. As research on the environmental dimensions of migration continues to rapidly emerge, sociology ought not be left behind.

SUMMARY POINTS

1. Substantial research progress on migration–environment linkages has been made in the past two decades.
2. Improved understanding of the environmental dimensions of migration is debunking the overly simplistic popular view of climate refugees.
3. A variety of case studies in many geographic settings are yielding clusters of findings and demonstrating that environment-related migration is often a risk diversification strategy.
4. Migration is a long-standing form of adaptation to environmental change, although migration may not be an option for particularly marginalized households and may further marginalize those most impoverished.
5. Environmental conditions interact with contextual factors, such as the political economy, to shape migration probabilities.
6. Household composition and social networks shape households' use of migration as a livelihood strategy in the face of environmental stress.
7. Unfortunately, there are few links to broader migration or social theory within migration–environment scholarship.

FUTURE ISSUES

1. Sociologists are poised to more centrally integrate issues of structure-agency, gender, inequalities, power, and perceptions into migration–environment research.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

2. Researchers continue to innovatively combine data to further our understanding of migration–environment connections, but they should also commit to collect relevant data that would be broadly available and comparable.
3. Given the tremendous policy and programmatic importance of migration–environment linkages, particularly in light of contemporary climate change, researchers should be encouraged to better disseminate their findings.

DISCLOSURE STATEMENT

The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

ACKNOWLEDGMENTS

This research was supported in part by the Eunice Kennedy Shriver NICHD-funded University of Colorado Population Center (grant R24 HD066613).

LITERATURE CITED

Adamo SB, Izazola H. 2010. Human migration and the environment. *Popul. Environ.* 32(2):105–8

Adger WN. 2006. Vulnerability. *Glob. Environ. Change* 16(3):268–81

Adger WN, Kelly PM, Winkels A, Huy LQ, Locke C. 2002. Migration, remittances, livelihood trajectories, and social resilience. *AMBIO* 31(4):358–66

Afifi T. 2011. Economic or environmental migration? The push factors in Niger. *Int. Migr.* 49(s1):e95–e124

Auchincloss AH, Diez Roux AV. 2008. A new tool for epidemiology: the usefulness of dynamic-agent models in understanding place effects on health. *Am. J. Epidemiol.* 168(1):1–8

Bankoff G, Frerks G, Hilhorst D. 2004. *Mapping Vulnerability: Disasters, Development, and People*. London: Earthscan

Barrios S, Bertinelli L, Strobl E. 2006. Climatic change and rural–urban migration: the case of sub-Saharan Africa. *J. Urban Econ.* 60(3):357–71

Benson M, Osbaldiston N, eds. 2014. *Understanding Lifestyle Migration: Theoretical Approaches to Migration and the Quest for a Better Way of Life*. New York: Palgrave Macmillan

Berger PL, Luckmann T. 1991. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Harmondsworth, UK: Penguin

Bilsborrow RE. 1992. Population growth, internal migration, and environmental degradation in rural areas of developing countries. *Eur. J. Popul.* 8(2):125–48

Bilsborrow RE, Henry SJF. 2012. The use of survey data to study migration–environment relationships in developing countries: alternative approaches to data collection. *Popul. Environ.* 34:113–41

Black R. 2001. *Environmental refugees: myth or reality? New issues in refugee research*. Work. Pap. 34, U.N. High Comm. Refug., Geneva

Black R, Adger WN, Arnell NW. 2013. Migration and extreme environmental events: new agendas for global change research. *Environ. Sci. Policy* 27(Suppl. 1):S1–3

Black R, Adger WN, Arnell NW, Dercon S, Geddes A, Thomas D. 2011. The effect of environmental change on human migration. *Glob. Environ. Change* 21S:S3–11

Boserup E. 1965. *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure*. London: Earthscan

Bylander M. 2013. Depending on the sky: environmental distress, migration, and coping in rural Cambodia. *Int. Migr.* In press. doi: 10.1111/imig.12087

Gives an especially useful summary and conceptual framework on migration–environment connections.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Uses a political ecology perspective to explore perceptions, power, and politics.

Carr ER. 2005. Placing the environment in migration: environment, economy, and power in Ghana's Central Region. *Environ. Plan.* 37(5):925–46

Curtis KJ, Schneider A. 2011. Understanding the demographic implications of climate change: estimates of localized population predictions under future scenarios of sea-level rise. *Popul. Environ.* 33(1):28–54

Cutter SL. 1996. Vulnerability to environmental hazards. *Prog. Hum. Geogr.* 20:529–39

Davis K. 1963. The theory of change and response in modern demographic history. *Popul. Index* 29(4):345–66

Davis M. 2001. *Late Victorian Holocausts: El Niño Famines and the Making of the Third World*. London: Verso

De Bruijn M, Van Dijk H. 2003. Changing population mobility in West Africa: Fulbe pastoralists in central and south Mali. *Afr. Aff.* 102(407):285–307

De Haas H. 2010. Migration and development: a theoretical perspective. *Int. Migr. Rev.* 44(1):227–64

Descola P. 2013. *Beyond Nature and Culture*. Chicago: Univ. Chicago Press

Dillon A, Mueller V, Salau S. 2011. Migratory responses to agricultural risk in northern Nigeria. *Am. J. Agric. Econ.* 93(4):1048–61

Doevenspeck M. 2011. The thin line between choice and flight: environment and migration in rural Benin. *Int. Migr.* 49(s1):e50–e68

Eakin H. 2005. Institutional change, climate risk, and rural vulnerability: cases from Central Mexico. *World Dev.* 33(11):1923–38

Provides a useful overview of context in demographic research—and a call to action.

Entwisle B. 2007. Putting people into place. *Demography* 44:687–703

Evans TP, Kelley H. 2008. Assessing the transition from deforestation to forest regrowth with an agent-based model of land cover change for south-central Indiana (USA). *Geoforum* 39(2):819–32

Ezra M, Kiros G-E. 2000. Household vulnerability to food crisis and mortality in the drought-prone areas of northern Ethiopia. *J. Biosoc. Sci.* 32(03):395–409

Ezra M, Kiros G-E. 2001. Rural out-migration in the drought prone areas of Ethiopia: a multilevel analysis. *Int. Migr. Rev.* 35(3):749–71

Feng S, Krueger AB, Oppenheimer M. 2010. Linkages among climate change, crop yields and Mexico–US cross-border migration. *PNAS* 107(32):14257–62

Findley SE. 1994. Does drought increase migration? A study of migration from rural Mali during the 1983–1985 drought. *Int. Migr. Rev.* 28:539–53

Introduces the concept of "conjoint constitution."

Freudenburg WR, Frickel S, Gramling R. 1995. Beyond the nature/society divide: learning to think about a mountain. *Sociol. Forum* 10:361–92

Fussell E, Hunter LM, Gray CL. 2014. Measuring the environmental dimensions of human migration: the demographer's toolkit. *Glob. Environ. Change* 28:182–91

Giddens A. 1984. *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge, UK: Polity Press

Gila OA, Zaratiegui AU, López de Maturana Diéguez V. 2011. Western Sahara: migration, exile and environment. *Int. Migr.* 49(s1):e146–63

Gray CL. 2009. Rural out-migration and smallholder agriculture in the southern Ecuadorian Andes. *Popul. Environ.* 30(4–5):193–217

Gray CL. 2010. Gender, natural capital, and migration in the southern Ecuadorian Andes. *Environ. Plan. A* 42(3):678–96

Gray CL, Frankenberg E, Thomas D, Sumantri CS. 2009. *Tsunami-induced displacement in Sumatra, Indonesia*. Presented at IUSSP International Population Conference, 26th, Marrakech, Morocco

Gray CL, Mueller V. 2012a. Drought and population mobility in rural Ethiopia. *World Dev.* 40(1):134–45

Gray CL, Mueller V. 2012b. Natural disasters and population mobility in Bangladesh. *PNAS* 109(16):6000–5

Gutmann MP, Field V. 2010. Katrina in historical context: environment and migration in the U.S. *Popul. Environ.* 31(1–3):3–19

Hannigan J. 2006. *Environmental Sociology: A Social Constructionist Perspective*. London/New York: Routledge

Hart G. 2001. Development critiques in the 1990s: culs de sac and promising paths. *Prog. Hum. Geogr.* 25(4):649–58

Henry S, Boyle P, Lambin EF. 2003. Modelling inter-provincial migration in Burkina Faso, West Africa: the role of socio-demographic and environmental factors. *Appl. Geogr.* 23(2):115–36

Henry S, Schoumaker B, Beauchemin C. 2004. The impact of rainfall on the first out-migration: a multi-level event-history analysis in Burkina Faso. *Popul. Environ.* 25(5):423–60

Hugo G. 1996. Environmental concerns and international migration. *Int. Migr. Rev.* 30:105–31
Hunter LM. 2005. Migration and environmental hazards. *Popul. Environ.* 26(4):273–302
Hunter LM, David E. 2011. Climate change and migration: considering gender dimensions. In *Climate Change and Migration*, ed. E Piguet, P de Guchteneire, A Pecoud, pp. 306–30. Cambridge, UK: Cambridge Univ. Press/UNESCO Publ.
Hunter LM, Murray S, Riosmena F. 2013. Rainfall patterns and US migration from rural Mexico. *Int. Migr. Rev.* 47(4):874–909
Hunter LM, Nawrotzki R, Leyk S, Maclaurin GJ, Twine W, et al. 2014. Rural outmigration, natural capital, and livelihoods in South Africa. *Popul. Space Place* 20(5):402–20
IOM/RPG (Int. Organ. Migr./Refug. Policy Group). 1992. *Migration and the Environment*. Geneva/Washington, DC: Int. Organ. Migr./Refug. Policy Group
IPCC (Intergov. Panel Climate Change). 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK: Cambridge Univ. Press
Jónsson G. 2010. *The environmental factor in migration dynamics: a review of African case studies*. Work. Pap. 21, Int. Migr. Inst., Univ. Oxford, UK
Kniveton DR, Smith CD, Black R. 2012. Emerging migration flows in a changing climate in dryland Africa. *Nat. Clim. Change* 2(6):444–47
Lewin PA, Fisher M, Weber B. 2012. Do rainfall conditions push or pull rural migrants: evidence from Malawi. *Agric. Econ.* 43(2):191–204
Leyk S, Maclaurin GJ, Hunter LM, Nawrotzki R, Twine W, et al. 2012. Spatially and temporally varying associations between temporary outmigration and natural resource availability in resource-dependent rural communities in South Africa: a modeling framework. *Appl. Geogr.* 34:559–68
Lilleør HB, Van den Broeck K. 2011. Economic drivers of migration and climate change in LDCs. *Glob. Environ. Change* 21(Suppl. 1):S70–81
Lindstrom DP, Lauster N. 2001. Local economic opportunity and the competing risks of internal and U.S. migration in Zacatecas, Mexico. *Int. Migr. Rev.* 35(4):1232–56
Lonergan S. 1998. The role of environmental degradation in population displacement. *Environ. Change Secur. Proj. Rep.* 4(Spring):5–15
López-Carr D. 2012. Agro-ecological drivers of rural out-migration to the Maya Biosphere Reserve, Guatemala. *Environ. Res. Lett.* 7(4):045603
Magdoff F, Foster JB, Buttel FH, eds. 2000. *Hungry for Profit: The Agribusiness Threat to Farmers, Food, and the Environment*. New York: Monthly Review
Marino E. 2012. The long history of environmental migration: assessing vulnerability construction and obstacles to successful relocation in Shishmaref, Alaska. *Glob. Environ. Change* 22(2):374–81
Massey DS, Arango J, Hugo G, Kouaouci A, Pellegrino A, Taylor JE. 1993. Theories of international migration: a review and appraisal. *Popul. Dev. Rev.* 19(3):431–66
Massey DS, Axinn WG, Ghimire DJ. 2010. Environmental change and out-migration: evidence from Nepal. *Popul. Environ.* 32(2–3):109–36
Massey DS, España FG. 1987. The social process of international migration. *Science* 237(4816):733–38
Massey DS, Espinosa KE. 1997. What's driving Mexico-US migration? A theoretical, empirical, and policy analysis. *Am. J. Sociol.* 102(4):939–99
McLaughlin P, Dietz T. 2008. Structure, agency and environment: toward an integrated perspective on vulnerability. *Glob. Environ. Change* 18(1):99–111
McLeman R. 2013. Developments in modelling of climate change-related migration. *Clim. Change* 117(3):599–611
McLeman R, Smit B. 2006. Migration as an adaptation to climate change. *Clim. Change* 76(1–2):31–53
McLeman RA. 2014. *Climate and Human Migration: Past Experiences, Future Challenges*. New York: Cambridge Univ. Press
McLeman RA, Hunter LM. 2010. Migration in the context of vulnerability and adaptation to climate change: insights from analogues. *Wiley Interdiscip. Rev. Clim. Change* 1(3):450–61
Mena CF, Walsh SJ, Frizzelle BG, Xiaozheng Y, Malanson GP. 2011. Land use change on household farms in the Ecuadorian Amazon: design and implementation of an agent-based model. *Appl. Geogr.* 31(1):210–22

Reviews the place of "environment" in classic migration theories.

Provides a state-of-the-art overview of understandings, methods, implications, and gaps.

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Meze-Hausken E. 2000. Migration caused by climate change: How vulnerable are people in dryland areas? *Mitig. Adapt. Strateg. Glob. Change* 5(4):379–406
Miller BW, Breckheimer I, McCleary AL, Guzmán-Ramirez L, Caplow SC, et al. 2010. Using stylized agent-based models for population–environment research: a case study from the Galápagos Islands. *Popul. Environ.* 75:279–87
Morrissey J. 2012. Rethinking the 'debate on environmental refugees': from 'maximilists and minimalists' to 'proponents and critics.' *J. Polit. Ecol.* 19:36–49
Morrissey J. 2014. Environmental change and human migration in sub-Saharan Africa. In *People on the Move in a Changing Climate*, ed. E Piguet, F Laczko, pp. 81–109. New York: Springer

Interviews in both sending and receiving areas add nuance to our understanding of interactions and impacts.

Morrissey JW. 2013. Understanding the relationship between environmental change and migration: the development of an effects framework based on the case of northern Ethiopia. *Glob. Environ. Change* 23(6):1501–10
Mueller V, Gray C, Kosec K. 2014. Heat stress increases long-term human migration in rural Pakistan. *Nat. Clim. Change* 4(3):182–85
Myers N. 2002. Environmental refugees: a growing phenomenon of the 21st century. *Philos. Trans. R. Soc. B* 357(1420):609–13
Nawrotzki RJ, Riosmena F, Hunter LM. 2013. Do rainfall deficits predict US-bound migration from rural Mexico? Evidence from the Mexican census. *Popul. Res. Policy Rev.* 32(1):129–58
Oliver-Smith A. 2012. Debating environmental migration: society, nature and population displacement in climate change. *J. Int. Dev.* 24(8):1058–70
O'Sullivan D. 2008. Geographical information science: agent-based models. *Prog. Hum. Geogr.* 32(4):541–50
Perz SG. 2001. Household demographic factors as life cycle determinants of land use in the Amazon. *Popul. Res. Policy Rev.* 20(3):159–86
Reid J. 2013. Interrogating the neoliberal biopolitics of the sustainable development-resilience nexus. *Int. Polit. Sociol.* 7(4):353–67
Riosmena F, Nawrotzki RJ, Hunter LM. 2013. *Rainfall trends, variability and US migration from rural Mexico: evidence from the 2010 Mexican census*. Work Pap., Inst. Behav. Science, Univ. Colo., Boulder
Sassen SJ. 2011. *Cities in a World Economy*. Thousand Oaks, CA: Pine Forge
Sastry N, Gregory J. 2014. The location of displaced New Orleans residents in the year after Hurricane Katrina. *Demography* 51(3):753–75
Scheffran J, Marmer E, Sow P. 2012. Migration as a contribution to resilience and innovation in climate adaptation: social networks and co-development in Northwest Africa. *Appl. Geogr.* 33:119–27
Scoones I. 1998. *Sustainable rural livelihoods: a framework for analysis*. Work. Pap. 72, Inst. Dev. Stud., Brighton, UK
Sen A. 1981. *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford, UK: Oxford Univ. Press
Shen S, Gemenne F. 2011. Contrasted views on environmental change and migration: the case of Tuvaluan migration to New Zealand. *Int. Migr.* 49(Suppl. 1):e224–42
Speare A. 1974. Residential satisfaction as an intervening variable in residential mobility. *Demography* 11(2):173–88
Sporton D, Thomas DS, Morrison J. 1999. Outcomes of social and environmental change in the Kalahari of Botswana: the role of migration. *J. South. Afr. Stud.* 25(3):442–59
Stark O, Bloom DE. 1985. The new economics of labor migration. *Am. Econ. Rev.* 75:173–78
Suhrke A. 1994. Environmental degradation and population flows. *J. Int. Aff.* 47(2):473–96
Taylor JE, López-Feldman A. 2010. Does migration make rural households more productive? Evidence from Mexico. *J. Dev. Stud.* 46(1):68–90
Turner BL, Kasperson RE, Matson PA, McCarthy JJ, Corell RW, et al. 2003. A framework for vulnerability analysis in sustainability science. *PNAS* 100(14):8074–79
Van der Geest K. 2011. North-South migration in Ghana: what role for the environment? *Int. Migr.* 49(Suppl. 1):e69–94
Van der Land V, Hummel D. 2013. Vulnerability and the role of education in environmentally induced migration in Mali and Senegal. *Ecol. Soc.* 18(4):14
VanWey LK, D'Antona ÁO, Brondízio ES. 2007. Household demographic change and land use/land cover change in the Brazilian Amazon. *Popul. Environ.* 28(3):163–85

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

VanWey LK, Guedes GR, D'Antona ÁO. 2012. Out-migration and land-use change in agricultural frontiers: insights from Altamira settlement project. *Popul. Environ.* 34(1):44–68

Walker R, Perz S, Caldas M, Silva LGT. 2002. Land use and land cover change in forest frontiers: the role of household life cycles. *Int. Reg. Sci. Rev.* 25(2):169–99

Warner K. 2011. Environmental change and migration: methodological considerations from ground-breaking global survey. *Popul. Environ.* 33(1):3–27

Warner K, Afifi T. 2014. Where the rain falls: evidence from 8 countries on how vulnerable households use migration to manage the risk of rainfall variability and food insecurity. *Clim. Dev.* 6(1):1–17

Warner K, Hamza M, Oliver-Smith A, Renaud F, Julca A. 2010. Climate change, environmental degradation and migration. *Nat. Hazards* 55(3):689–715

Watts M. 2005. Nature: culture. In *Spaces of Geographical Thought: Deconstructing Human Geography's Binaries*, ed. P Cloke, R Johnston, pp. 142–74. London: Sage

Wisner B, Blaikie P, Cannon T, Davis I. 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters*. New York: Taylor & Francis

Wolpert J. 1966. Migration as an adjustment to environmental stress. *J. Soc. Issues* 22(4):92–102

Zetter R, Morrissey J. 2014. The environment-mobility nexus: reconceptualizing the links between environmental stress, (im)mobility and power. In *The Oxford Handbook of Refugee and Forced Migration Studies*, ed. E Fiddian-Qasmiyeh, G Loescher, K Long, N Sigona, pp. 342–54. Oxford, UK: Oxford Univ. Press

RELATED RESOURCES

Black R, Arnell N, Dercon S. 2011. Migration and environmental change: review of drivers of migration. *Glob. Environ. Change* 21(Suppl. 1):S1–S130

Bremner J, Hunter L. 2014. *Population Bulletin*: *Migration and Environment*. 69(1), Population Reference Bureau, Washington DC. **http://www.prb.org/pdf14/migration-and-environment.pdf**

Maxmillan M, Billah M, Siddiqui T, Abrar C, Black R, Kniveton D. 2014. Climate-related migration in rural Bangladesh: a behavioural model. *Popul. Environ.* 36(1):85–110

Piguet E. 2013. From "primitive migration" to "climate refugees": the curious fate of the natural environment in migration studies. *Ann. Assoc. Am. Geogr.* 103(1):148–62

Piguet E, Pécoud A, Guchteneire PF, eds. 2011. *Migration and Climate Change*. Cambridge, UK: Cambridge Univ. Press

United Nations University project "Environmental Change and Forced Migration Scenarios (EACH-FOR)." **http://www.ehs.unu.edu/article/read/each-for**

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Annual Review
of Sociology

Volume 41, 2015

Contents

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.

Differentiation and Stratification

Demography

Policy

Sociology and World Regions

Annu. Rev. Sociol. 2015.41:377-397. Downloaded from www.annualreviews.org
Access provided by Montana State University - Bozeman on 12/03/23. For personal use only.