

## Introduction: The United Nations, Natural Resources, and Human Mobility

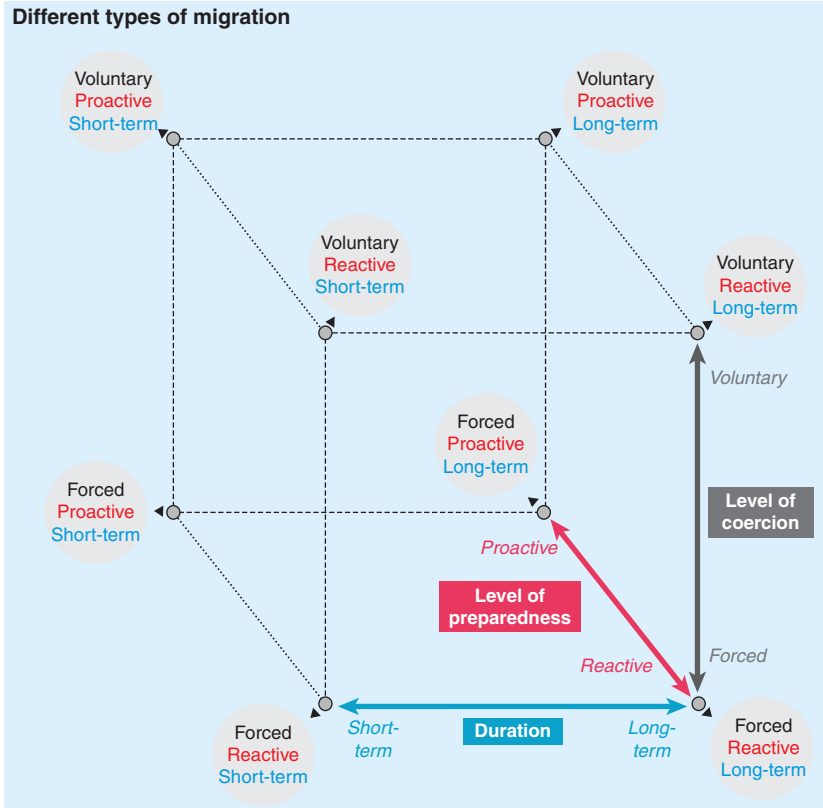
For much of modern humanity's existence, the mobility of our populations was strongly linked to resource access, with migrations being often seasonal and exploratory for hunters and gatherers. While such nomadic lifestyles are now increasingly rare (or unfeasible), they have been the hallmark of many indigenous cultures worldwide. In a more modern context, the unprecedented scale and speed of global environmental changes linked to human-induced factors that are and will affect ecological ranges, land surface cover and condition, levels of aridity and desertification, and predictability and extremity of weather patterns are almost certainly going to have strengthening impacts on human mobility and distribution. The connection between resources and migration, then, fits within a wider question of how environmental change relates to human movement and mechanisms by which such a nexus can be governed.

Figure 1 gives an indication of the scale and scope of the complexity of the migration–mobility nexus as envisaged by the United Nations' International Organization for Migration (IOM). We will use the terms 'migration', 'movement', and 'mobility' interchangeably throughout this Element. This is to convey the movement of people for a variety of reasons over a range of temporal and spatial scales with a variety of outcomes and impacts. Our varied use of terms is deliberate. Some scholars state a preference for the use of the term 'mobility' over 'migration', suggesting that the latter term has too often been used to carry unfairly negative political connotations and also semantically fails to capture the full fluidity of human movement. The stance we take is that, while we wish to be reflective of terminology in the contemporary literature and research on the topic, we should also not allow ourselves to be held hostage to the weaponization of perfectly serviceable terminology.

In line with gloomy proclamations that have often accompanied discussions of migration in popular discourse and media, 'environmental migration' and 'environmental migrants'<sup>1</sup> have both been portrayed as a failure to adapt to environmental stress. The environmental governance arena has often seen migrants as 'symptoms' of detrimental global change processes (e.g. particularly around sea-level rise due to global warming). In this analysis, we seek to add to the questioning of the dominant policy orthodoxy of pathologizing human mobility as a manifestation of a stressed environment akin to a disease

---

<sup>1</sup> 'Persons or groups of persons who, predominantly for reasons of sudden or progressive change in the environment that adversely affects 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, 2019: 64).

**Figure 1** Different types of migration.

**Source:** Ionesco et al. (2017).

of the body. Instead, we seek to exemplify mobility in the Anthropocene as an integral element of a wider, more nuanced, complex adaptive (socio-ecological) system which by definition is dynamic and emergent in nature and, in turn, requires equivalent policy structures.

An Earth Systems Governance (ESG) approach conceptually lends itself to such holistic understandings of mobility. By Earth Systems Governance, we follow the established definition of ‘the interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development’ (Biermann et al., 2010). This Element provides a preliminary exploration of how the nascent discourse on developing international mechanisms to manage migration such as the Global Compact for Migration might be operationalized within the framework of ESG.

Such a paradigm is intuitively appropriate for dealing with migration, which we see as an example of a complex adaptive response to a series of nested systems in which humans interact with the environment. We deliberately use the plural ‘systems’ rather than ‘system’ to indicate this nested nature of our analytical frames.

Underlying empirical evidence surrounding mobility within changing environmental conditions around the world also supports an Earth Systems Governance approach to looking at resource influences on migration. There is a strong consensus that migration and displacement are multi-causal. Adding to this complexity, natural resource availability and use, populations’ livelihood dependence, and resource management are often intermediaries in the environment–migration nexus, if not always the primary ones (Ionesco et al., 2017). This is the case at points of origin for movement, but also in transit and at destinations. The role of resources in triggering a spectrum of human mobility – either by necessity, opportunity, or a combination thereof – has an important bearing on the forms of migration and displacement that result, and subsequently, the impacts of those movements (Brown & McLeman, 2013). This is not a teleological process in which mobility or displacement ‘ends’ upon arrival that the overwhelming emphasis on drivers of migration might imply. Rather, the impacts of mobility feed back into socio-ecological systems and affect resources of migrants, communities of origin, and destination communities (Guadagno, 2017). This underscores the need to investigate resource use, change, and management within socio-ecological systems at macro-, meso-, and micro-levels, and the role of human mobility within them, including its impact on the system in a web of causalities and feedbacks.

Within our ESG framing, we aim to introduce and examine the validity of using natural resources as a key intervening variable through which to understand, analyze, and govern local-to-global-scale relationships between environmental changes and movement of people. A focus on natural resources aims to add a conceptual and methodological shift in prevailing approaches: to date, the connections between environmental change and mobility have been typically dealt with on a ‘high level’, with climatic trends and projections being regressed onto regional population/demographic dynamics. Natural resources could act as an intuitive and more empirically grounded way of both exploring the linkages between the two aspects and placing them appropriately and contextually within wider earth systems debates. Yet literature and research specifically exploring resources against mobility is currently limited, as is our ability to accurately capture resource dynamics in the very places that observers cite as being most vulnerable to resource pressures in the coming century. Methodologically, including natural resource variables in regression analyses

can be problematic because of the possible circularity of the relationship of the variables (e.g. migration being both a symptom and cause of resource depletion). In this context, this Element serves in three equal parts: firstly, a foundation for seeing resources as an appropriate framing of environmental changes as they manifest themselves ‘on the ground’ and their relationship to other sociological factors influencing mobility; secondly, an exploratory examination of where ‘blind spots’ currently exist in terms of our ability to understand these connections; and, thirdly, what our current and potential future options might be for better governing the nexus between resources and mobility. Importantly, the inclusion of natural resources and their management helps move the environment–migration policy conversation from being focused on climate change mitigation and adaptation to include local, national, and international governance of natural resources.

## 1 The Resource–Mobility–Governance Nexus

### The Growth of Writing on ‘Environmental Migration’

Our past experiences of and future projections for human-induced environmental change and sudden disaster events have undoubted implications for resource management and, in turn, human mobility. The governance nexus *between* these temporal scales in terms of resources and mobility has, however, been largely neglected in academic and policymaking arenas. In this opening section we present concise highlights of relevant literature since the turn of the millennium in order to highlight what could (and should) constitute the key features of this nexus.

An initial key aspect in discussing connections between environmental pressures and migration is to avoid a polemic and/or linear mindset. While a gradual or rapid debasement of environmental conditions is often depicted as a driver that ultimately leads to social instability and forced displacement, the two parameters are by no means related in a linear fashion. For example, this context can also spur the development of capacity for *more* sustainable resource management. Indeed, mobility is already considered by many as a form of adaptation to the impacts of climate change (Foresight, 2011; Ionesco et al., 2017; Renaud et al., 2011; Salerno et al., 2017). Unfortunately, major public-facing policy platforms such as the Global Centre on Adaptation have largely presented migration as a symptom of crisis rather than an adaptive strategy that could be leveraged for more effective resource management and ecological efficiency. Popular coverage and traditional policymaking surrounding international human mobility have also been and are, broadly speaking, based on a relatively binary understanding of why people move: they are either forced to

move as a result of conflict or political persecution – and seen as ‘refugees’ or enticed to move by the promise of better living conditions elsewhere – and labelled as ‘migrants’ (Ionesco et al., 2017). The reality, of course, is more nuanced and complicated. Human mobility has existed throughout history, with people moving for, or being displaced by, a diverse range of interconnected factors that have been well documented (Black et al., 2011; Van Praag & Timmerman, 2019).

Aligned with emerging concerns over the various socio-economic and environmental impacts of anthropogenic activity in other fields of study, the potential implications of resource access, economic opportunity, and environmental degradation on migration and displacement have been the subject of study for more than two decades (e.g. Döös, 1997). As we can gauge from the contents and citations of this Element, the literature has expanded dramatically in the last twenty years (see Piguet, 2021 for an informative review), particularly as research has begun to uncover the potential ramifications of climate change on population distribution (McLeman & Gemenne, 2018). Over this time period, scholars have developed different narratives to explain the causes, forms, and impacts of migration, which in turn have sometimes been employed as a means to propose or justify various policy interventions (Vlassopoulos, 2013). There have been increasingly interdisciplinary attempts to reassess the framework of migration research and bring in new perspectives from social and cultural geography (Felgentreff & Pott, 2016). Piguet (2010), for example, identifies six distinct ‘families’ of research methods that have endeavoured to understand ‘environmental migration’: ecological inference based on area characteristics, individual sample surveys, time series analysis, multilevel analysis, agent-based modelling (ABM), and qualitative/ethnographic studies. This is along with the emergence of meta-studies of the existing literature to identify gaps in the empirical coverage (Cattaneo et al., 2019; Obokata et al., 2014; Piguet, 2021; Upadhyay et al., 2015). Yet much of this work remains diagnostic rather than prospective in terms of governance.

### The Case for a Natural Resources Lens

Conceptual questions of when and how broader environmental change contributes to migration, displacement, or relocation are, then, now relatively established. Increasingly, so are observed instances: reports like the *Atlas of Environmental Migration* (Ionesco et al., 2017) and *Groundswell* (Rigaud et al., 2018) show a varied picture of migration outcomes within the wider context of environmental change. Yet specific focus on types, stocks and flows of resources, and their availability and management, that could provide

potentially pivotal factors in mediating such linkages between environmental change and human mobility, have been given scant attention. This is somewhat surprising: when one talks of potential causal (rather than proximate) connecting forces between movement of people and climatic or environment changes, we are, intrinsically, referring to the available resource base. That is to say, it is not prevailing conditions or anomalies in temperature and rainfall that might directly account for movement of people: it is the impact that temperature and rainfall have on interconnected resource systems like agricultural land, water availability, and biomass for fuel and food. A connecting lens of resources works in precisely the same sense that it is the outcome of human overexploitation of natural materials that has resulted in altered prevailing climatic conditions in the first instance.

There are certainly strong indications within existing literature to support a closer and more specific look at the role of resources (and their degradation and unsustainable management) in affecting migration and displacement. A sizable portion of the associated literature since the turn of the millennium has, albeit often obliquely, referred to the diminishment of natural resource systems and connections with mobility. This has been through a focus on the role of localized environmental degradation, and particularly the overshadowing impacts of climate change, and their subsequent role in stimulating movement of varying kinds, from forced displacement through to planned relocation.

Existing commentary and studies on the connections between environment and migration are often (imperfectly) categorized by their temporal scope (Cattaneo et al., 2019). On the one side are the ‘slow-onset’ factors – drought, desertification, sea-level rise, land degradation, and growing water insecurity – that disrupt livelihoods. This is especially prevalent for resource-dependent occupations such as farming, livestock herding, and fishing. Sometimes the process is more immediately evident as being anthropogenic in cause: man-made infrastructure that impacts the environment, such as dams, might also lead to a decline in availability of land and water resources, impacting livelihoods and influencing the impetus to move. On the other side are ‘sudden-onset’ events – flooding, industrial accidents, storms and glacial lake outburst floods – that present more imminent dangers to people’s lives and livelihoods, as well as disruption or destruction to resource and ecosystem services (Brown, 2008). These two types of events can potentially occur in parallel and influence one another, something which has spurred the development of multi-risk scenarios that attempt to capture their convergence (Rigaud et al., 2018).

‘Slow-onset’ erosion of livelihoods in origin locations has been one of the main drivers of migration that has been highlighted. This is often juxtaposed by the pull of relatively (or perceived) better and more secure livelihood

opportunities in destination locations on the other. The reasons for a decline in livelihoods in origin locations are sometimes linked to natural resource degradation: for example, due to the loss of land by riverbank erosion or a lack of investment in soil fertility (Ahmed et al., 2019; Ayeb-Karlsson et al., 2016). Similarly, some quantitative studies have drawn a direct link between the impact of slow-onset environmental change on resources and the overall size of mobility flows. In each mentioned case, it is pertinent to note the connection of mobility to the resource base available for tenable agricultural livelihoods on which many people around the globe are still highly dependent. Feng and Oppenheimer (2010) analyzed the link between crop yields and cross-border Mexico–US migration and estimated that a 10 per cent drop in crop yields would lead to an additional 2 per cent of the population emigrating. A 2015 multilevel event history study of international migration from Mexico between 1986 and 1999 found that warming temperatures and excessive precipitation significantly increased international migration (Nawrotzki et al., 2016). In the Philippines, a rise in temperature and increased typhoon activity appears to be linked to increased out-migration (principally through the mechanism of reduced rice crop yields), though changes in rainfall did not appear to have a consistently significant effect on migration patterns (Ayeb-Karlsson et al., 2022; Bohra-Mishra et al., 2017). Cai et al. (2016) found a statistically significant relationship between temperature and international migration, but only in the most agriculturally dependent countries given the link between rising temperatures and diminishing agricultural yields. A village-level study of the Kilimanjaro district in Tanzania noted a positive relationship between rainfall shortage and out-migration, even after controlling for other important socio-economic variables. The study argues that food insecurity for humans and livestock is the mechanism through which rainfall variability affects human mobility (Afifi et al., 2014). In that vein, household surveys taken in the northern Central American countries of Guatemala, El Salvador, and Honduras identified a notable increase in out-migration following the onset of drought, its impact on agricultural land, and subsequent food security (IOM & WFP, 2022).

The literature also describes a number of resource disparities that may encourage people to move in the hope of expanded or more reliable livelihood options in more ‘resource rich’ destination areas. For example, several case studies have looked at the role of mineral resources (particularly informal, artisanal mining) in shaping internal and cross-border migration. In Russia, a study of mining sites across seventy-eight regions between 2004 and 2010 detailed net internal migration rising in mining areas (Sardadvar & Vakulenko, 2017). Nyame et al. (2009) looked at how the different stages of mine



development (growth, stagnation, and closure) in Ghana led to their own characteristic migration patterns. These, they argue, are contributing to the country becoming a transit area for prospective migrant miners in addition to its traditional role of being a destination country for miners. Likewise, large numbers of men migrated from Lesotho to South Africa during the twentieth century to work in the commercial mines, sending remittances back to Lesotho. Since many of these large mines have closed, these men have tended to move across to the informal sector, mining abandoned mines around Johannesburg (Makhetha, 2020). Meanwhile, a detailed survey of nearly a thousand male and female artisanal miners in the eastern part of the Democratic Republic of Congo found that artisanal mining sites were the destination for internal migrants, but that escape from economic hardship was a more significant factor than the perceived potential economic gains (Maclin et al., 2017). Other work has assessed the opportunity of differing resource ownership or management systems (i.e. ability to own land elsewhere, availability of services and resources offered in urban settings, etc.) as being a factor in encouraging resource-related migration. The Mecúfi district of northern Mozambique has seen a significant migration of people to coastal areas since the civil war, in part to access coastal and marine resources (Bryceson & Massinga, 2002).

Very importantly, however, resource-movement linkages that can be teased from the studies also frequently highlight that they are complex and not always consistent. Upadhyay et al. (2015) note that a lot of the literature tends to downplay ambiguities in the terminology and overestimates what is often limited empirical evidence. For example, a study of soil quality in Kenya and Uganda appeared to show that high soil quality reduced migration in Kenya but increased migration in neighbouring Uganda (Gray, 2011). Gray and Wise (2016) used detailed household information to revisit the links between climate change and internal and international migration over a six-year period in five African countries: Kenya, Uganda, Nigeria, Burkina Faso, and Senegal. Their results were mixed: temperature anomalies tended to increase migration in Uganda but decrease migration in Kenya and Burkina Faso. But they showed no consistent relationship in Senegal or Nigeria. Precipitation, meanwhile, showed a very weak and inconsistent relationship with migration across all the case study countries.

There have also been attempts to investigate the impact on human mobility of ‘sudden-onset’ events such as floods, hurricanes, and disaster-induced industrial accidents (Black et al., 2013; Zhang et al., 2014) that have inevitable and immediate impacts on a given area’s resource base. However, the links to natural resources tend to be overlooked or more implicit. In Vietnam, regular flood events were linked to displacement, individual migration decisions, and government-initiated resettlement of households (Dun, 2011). In this case, the



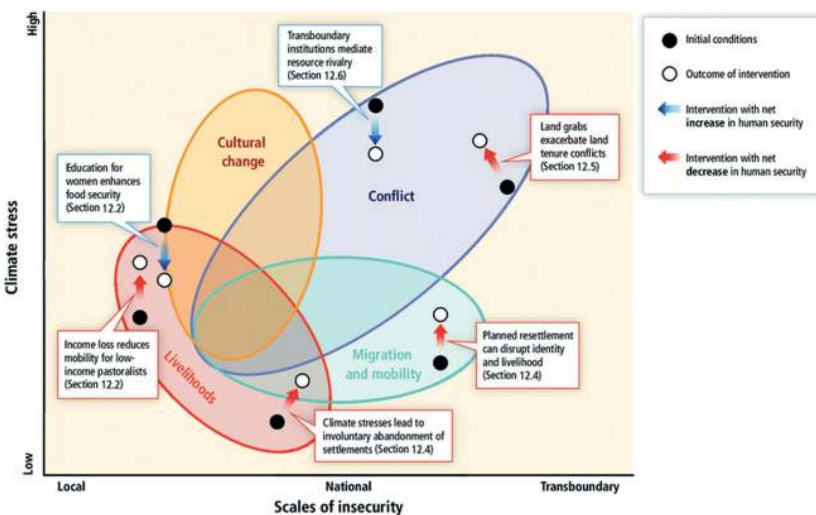
resettlement initiatives moved people only short distances in order to maintain social cohesion and access to agricultural land to decrease poverty (Zickgraf, 2019). A review of select Asian countries for a period between 2005 and 2017 noted that natural hazards such as storms and floods generally increased external migration. The study argued for a direct link to natural resources, noting that ‘natural resource depletion increases external migration’ (Abbas Khan et al., 2019).

Another notable aspect in reviewing existing information that what could well be classed as resource-related mobility is often labelled *economic* migration, with its environmental roots frequently masked by their entanglement with other issues: the economic impacts of resource use and management in the community of origin, economic opportunities presented in destinations or the legal definitions of the migrants themselves. Afifi (2011) identified a number of internal and cross-border mobility trends in Niger, explicitly including natural resource considerations relating to water (droughts, the shrinking of Lake Chad, problems in the Niger River) and land (soil degradation, deforestation, and sand intrusion). However, the study argued that economic factors are the mechanism through which environmental factors encourage migration, suggesting that the appropriate term for such migration should be ‘environmentally induced economic migration’ (Afifi, 2011). This is to suggest that differentiating between economic and environmental migration, therefore, has little value in countries whose economies are resource dependent: in agriculture-based economies, environmental migration *is* economic migration.

Climate change is, of course, just one of many factors influencing mobility decisions (Kniveton et al., 2008). Resource use and management can affect mobility responses within and outside of climate contexts. Resource depletion through overuse (Bilborrow & DeLargy, 1990), or resource loss as a result of infrastructure projects, conservation measures and land grabbing have also been identified as important in stimulating migration and displacement (Salerno et al. 2014). Hamilton and colleagues (2004) cite the example of the Faroe Islands. An affluent society that is highly dependent on fisheries, the islands experienced a crisis in the 1990s when their fisheries became depleted through a combination of overfishing and environmental stress. The result was unemployment, business failures and out-migration, particularly of young adults, which permanently changed the make-up of the islands’ population. Vigil (2018), meanwhile, provides an analysis into the controversial phenomenon of large-scale land acquisition (described as ‘green grabbing’) in numerous locations by overseas investors, particularly for biofuels and forest carbon projects that, in some cases, have displaced local groups living or working on that land (e.g. Nyantakyi-Frimpong & Kerr, 2017).

Linkages between livelihoods, mobility, and ‘climate stress’ have also been expanded to consider the potential for conflict in the context of ‘environmental migration’. The Intergovernmental Panel on Climate Change has attempted to synthesize these issues conceptually in their fifth assessment report in 2014, as shown in Figure 2.

In fact, Baldwin et al. (2014) argue that the ‘spectre’ of migration framed in such negative ways is playing a crucial role in the securitization of climate change, with climate-induced migration being used as a sort of shorthand to describe the security impacts of a warming climate. Much of the negative framing and fear-based portrayals of human mobility indeed surrounds its potential (adverse) impact on peace and (international) security. In particular, migration and displacement are commonly cited as mediating factors in a pathway towards conflict (Adger et al., 2014). Certainly, there are examples of population movements leading to tensions and conflicts over more scarce resources, often linked to competing livelihoods and/or ethnic groups with histories of tension. For example, Mbonile (2005) noted how people moving to the Pangani River Basin in Tanzania, partially in search of water, led to intensive conflicts between pastoralists and farmers, increasing demand for water, and negatively affecting water availability in downstream areas.



**Figure 2** The conceptual space for migration and mobility as considered by the Intergovernmental Panel on Climate Change with reference to sections in their *Fifth Assessment Report*.

**Source:** Pachauri et al. (2015), Technical summary (p73).