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## Can environmental migration be measured?

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In recent years, extreme events have triggered considerable population mobility. Rising sea levels and ever more frequent natural disasters are raising concerns about an increase in “environmental” or “climate” migration. But can such migration be measured? Jacques Véron and Valérie Golaz take a closer look at this question.

The latest report by the Intergovernmental Panel on Climate Change (IPCC) has confirmed that environmental changes are transforming our planet. The international community is now seeking to contain and anticipate future changes in the world climate that may, over time, displace large sections of the world population.

### Environmental migration is difficult to identify

Is it possible to distinguish between migration for environmental reasons and migration related to other factors? Migration is “environmental” when a population is displaced primarily (if not solely) because of a change in the environment. If climate change is involved, the term “climate migration” is used, and the people who move under such circumstances are often referred to as “climate refugees”, though the term “refugee” may not be entirely appropriate in this case (Box 1). From the beginning of human history, environmental changes have forced people to leave their homes, but in recent decades the number of potential migrants has risen sharply because populations are increasingly concentrated in zones now at risk from climate change.

Whether or not migration is linked to environmental degradation, it results from complex decision-making processes. The decision to leave may well be linked to the environment, but people contemplating a move also

### Box 1. “Climate refugees”: a misnomer

People whose movements are caused by environmental change are often called “environmental refugees”, or “climate refugees” for those who move in response to climate change. But the parallel with political refugees implied by these terms is inaccurate. Political refugees have a legal status defined by the Geneva Convention of 1951 and the 1967 Protocol; this is not the case for individuals who leave an environment so degraded that it is impossible to live there any longer or who are forced to leave by climate change. “Political refugee” is a precisely defined term, though it may be difficult to determine who should be entitled to such a status. To qualify as a political refugee, an individual must live outside the country he or she usually resides in (whereas environmental migrants may well move within the same country). Though the situation of persons affected by environmental events may be drastic and they may have lost everything they own, they have no internationally defined or recognized legal status. It is therefore preferable to speak of them not as environmental refugees but as environmental migrants, and of their movements as environmental migration.

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(1) Not all forms of mobility are migrations. Migration occurs when people settle in a different place and take up new residence; it may be “internal” (within a single country) or international. In United Nations terminology, persons who live away from their usual place of residence for at least a year are “long-term migrants” while those who do so for three months to a year are “short-term migrants.”

consider other aspects of their situation that may be economic (resources for the journey, prospects for employment at their destination), social (opportunities for integration at their destination) or even symbolic (attachment to their home, anticipated improvement in their social status). In situations other than sudden natural disasters, it may be hard to distinguish migrations due primarily to the environment from those with mainly economic or political causes (Box 2).

The environmental factors involved in population mobility are also multiple. As Jason Bremner and Lori M. Hunter note,<sup>[1]</sup> there is a “continuum of environmental pressures that contribute to migration”. These include long-term changes, such as soil degradation and decreasing land availability which result in gradual out-migration over time; medium-term pressures such as prolonged drought, leading to large-scale out-migration; and sudden, violent events resulting in the forced but perhaps temporary displacement of an entire population.

### Migration is not the only response to environmental variations

Even in cases of extreme environmental change such as severe drought or flooding, the people directly affected may not migrate but rather receive assistance from family

#### Box 2. Two examples of migration that was not exclusively environmental

##### Migration triggered by the Irish potato famine in the nineteenth-century

In 1845, when the population of Ireland stood at slightly over eight million, potato blight caused an unprecedented farming and food crisis. From 1846 to 1851, the country suffered a terrible famine, with estimated excess mortality of 1 to 1.5 million and mass emigration of over 2 million people. In a ten-year period, Ireland lost 40-50% of its population. However, the crisis cannot be understood without taking into account the political context in which it occurred, namely the exploitation of Ireland’s Catholic small farmers by a British and Protestant landowner class. Irish emigration was therefore simultaneously environmental, economic and, above all, political.

##### The drought that ravaged northern Ethiopia in 1984

The famine that left one million dead and the ensuing mass migration were also due in part to the tax system, restrictions on rural-to-urban migration, and the development of non-farming activities that prevented farmers from adapting to the drought conditions in their usual or traditional ways. They also resulted from the policy of forcibly displacing inhabitants from north to south, and from the deliberate blocking of food aid by the Ethiopian government in its effort to defeat the Eritrean and Tigrayan guerrilla movements. Clearly then, there was a strong political component to the excess mortality and migration caused by the drought.

members settled elsewhere. Monetary transfers from family members who migrated earlier for economic reasons help local populations cushion the shocks of environmental events. The connection between environment and migration is therefore not easy to capture, given that some people can turn to different places or branches of the family for assistance in response to seasonal or exceptional climatic events. Diversification strategies in terms of resources and activities are means of ensuring economic security. The lifestyle of nomadic populations is, by definition, one of mobility, but this is true for other populations too. Fishermen regularly move from place to place, since seasonal or occasional migrations are, for them, a way of preserving spawning zones and maximizing their catch over the long term. Sheep and cattle herders often migrate on a seasonal basis, pasturing their herds over extended territories in the wet season and around watering spots in the dry season. Farmers practice similar systems involving a variety of soils and crops. At the family scale, having activities in different ecosystems is a way of minimizing economic risk. With these facts in mind, how reliable are the estimates of number of persons annually displaced by “disasters”? (Box 3)

### Disasters trigger a wide variety of displacements

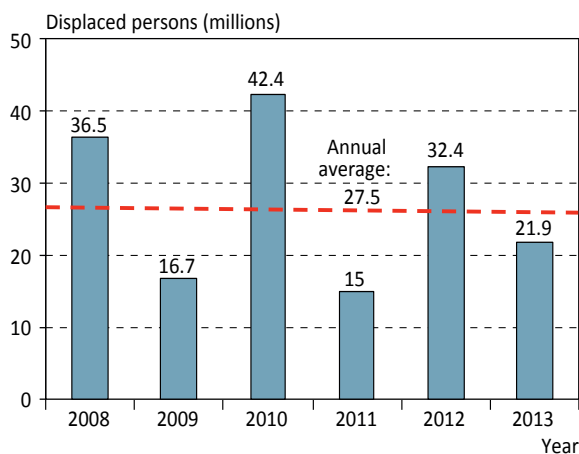
In contrast to gradual environmental changes, “natural” or technological disasters trigger emergency movements. Such movements are more clearly cases of environmental migration, but this does not mean they are easy to quantify.

Some migrations are immediate or, if the population can be forewarned, may actually precede the disaster (this holds for cyclones). In other situations, residents move

#### Box 3. How credible are figures for worldwide numbers of persons displaced by disasters?

Measuring the intensity of environmental migration worldwide is a real challenge. For the year 1995, it was estimated that 25 million persons were displaced for environmental reasons.<sup>[1]</sup> The Norwegian Refugee Council and IDMC (Internal Displacement Monitoring Centre) cross-matched data from different information sources to obtain an estimate of 22 million persons displaced by disasters in 2013.<sup>[2]</sup> The figures for the preceding years show strong year-on-year variation, with an annual average of 27.5 million displaced persons over a six-year period (Figure 1). Displacements in Asia, home to 60% of the world’s population, were much more intense than elsewhere during the period, accounting for over 80% of the total.

**Figure 1. Number of persons displaced by disasters from 2008 to 2013**



Source : Norwegian Refugee Council and IDMC [2]

The authors themselves explain that these figures are likely to underestimate environmental emigration as they are based primarily on large-scale disasters. It should also be noted that estimates for the same disaster may differ substantially. Such figures have a high margin of uncertainty.

out of the affected area some time after the disaster occurs (for example, Fukushima, where the perimeter of the exclusion zone was later extended). Some displacements are short term; others involve movements back and forth; yet others are true migrations. Most – though not all – occur on a local scale. During the 1984 technological disaster in Bhopal, India (toxic gas leakage from a pesticide factory), residents who did not know what was happening stayed put while others fled in panic; many of those who left returned in the next few days without knowing whether it was safe to do so; some then left a second time. The reaction of residents in the northeastern Indian state of Odisha when Cyclone Phailin hit in 2013 was quite different, as they had been forewarned early enough for protection measures to be taken. Nearly 600,000 persons were evacuated – by force in some cases – to nearby areas, still within the risk zone, where they were sheltered in concrete structures built in response to the 1999 “super cyclone” that killed 10,000 persons in the same region. When an extreme event is over, the speed and intensity with which inhabitants return varies by socioeconomic level and the magnitude of destruction, as shown for Hurricane Katrina in the United States.[3] Disasters such as the 2011 tsunami and the resulting nuclear accident at Fukushima, both caused by the Great East Japan Earthquake, gave rise to erratic

(2) So-called “natural” disasters are not all entirely natural. The windstorm Xynthia that hit the western coast of France in 2010 illustrates how a disaster can be less natural than it may first appear. This disaster was caused not only by the rising waters, but by disregard for age-old knowledge of flood risks in the area, urban development of floodplains, inappropriate building techniques, failure to warn residents of the risk, structural weakness of the dyke in place, etc.

population displacement, especially in Fukushima prefecture because people living near the nuclear plant received only fragmentary information that was constantly being revised. In the contaminated zone, persistently high radiation levels made a return impossible. Elsewhere, residents were only gradually able to return home as reconstruction work progressed. The three disasters of 2011 – earthquake, tsunami and nuclear accident – are estimated to have displaced half a million people, but again the data should be viewed with circumspection (Box 4).

### Is mobility a strategy for adapting to climate change?

With regard to future environmental migration, it is important to distinguish between high levels of risk and high intensities of actual migration.

Global warming is likely to raise sea levels, affecting populations in coastal regions most severely. In the IPCC’s most pessimistic scenarios, the sea will rise by nearly one meter by the end of this century and by over three meters by 2300.[4] Coastal urbanization is a factor of vulnerability: many heavily populated urban areas

#### Box 4. The 2011 tsunami and nuclear accident in Fukushima: inconsistent estimates?

It is not easy to establish the total number of persons displaced by the 2011 disaster on the basis of available sources. Some estimates count persons displaced when the earthquake destroyed their homes; others count persons who left because of radiation in the area surrounding the nuclear plant; still others count both. Because Fukushima is also the name of a prefecture, it is not always clear whether Fukushima refers to the point of departure, the area for receiving displaced persons or the cause of displacement, whatever the prefecture.

Some sources do not distinguish between evacuated and displaced persons. For example, the Cabinet Office’s evacuee estimate for 2011 is 470,000 at most, but 600,000 persons were living in the danger zone. The source is not clear about the situation of the other 130,000 people.

Estimates of evacuees from the same Reconstruction Agency source rose suddenly in November 2011, height months after the disaster. From 125,000 persons in early June and 72,000 in early November, the number jumped to 330,000 in mid-November. This seems improbable.

The total number of evacuees who had not returned was estimated at over 340,000 in late January 2012; it then decreased gradually – as is to be expected – to 321,000 in December 2012, 270,000 in December 2014. According to the minister of reconstruction speaking on the fourth anniversary of the disaster (11 March 2015), 230,000 persons were still unable to return home at that date.

**Figure 2. Examples of heavily populated areas threatened with a 3-meter rise in sea levels**



Source: adapted from <http://flood.firetree.net>

have developed on or near coasts. Of the world’s more than 450 cities with over 1 million inhabitants in 2011, home to a total of 1.4 billion people, an estimated 60%, or slightly under 900 million, are exposed to a high risk of natural disaster. [5] It is now possible to map the areas at risk for probable sea level rises (see the examples of the Gulf of Guinea and the Netherlands in Figure 2). It has been estimated that 10% of the world’s population live less than 10 meters above sea level across a territory representing only 2% of the earth’s total surface. We know that the very existence of some Pacific Ocean countries is threatened, so the question of environmental migration is international in scale.

The causes of global warming are to some degree international, and negotiations to slow down these ongoing processes take place in the international arena; yet the effects of climate change are often quite localized and take numerous different forms: some countries and populations are much more vulnerable than others. The threat of natural disasters may give rise to permanent migration, as in Bangladesh, where families are leaving highly exposed Ganges delta lands for the slums of Dhaka. In northeast India, by contrast, concrete shelters provide short-term protection to local populations during the frequent cyclones. The Netherlands, for its part, is implementing a vast public works programme to combat rising sea levels. Clearly then, migration – whose economic and social costs are immense – is not the only possible response to the effects of climate change.

**References**

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**Abstract**

Though environmental migration is an issue of growing importance, it is often difficult to determine whether environmental change is the main factor involved.

Climate change is likely to result in more frequent and severe “natural” disasters, but mobility is only one possible response; others involve adapting the exposed territories to new constraints. If mobility is to become a strategy for anticipating and responding to the effects of natural disasters, it is crucial to understand the mechanisms at play when populations move.