



## MIGRATION INFORMATION SOURCE

FRESH THOUGHT, AUTHORITATIVE DATA, GLOBAL REACH

### Climate Change and Migration: Sorting through Complex Issues without the Hype

By Carolina Fritz  
Migration Policy Institute

March 4, 2010

Most scientists agree that global warming affects ecological systems, but there is less certainty about its social effects, especially regarding human mobility.

Yet this has not prevented a number of scholars, multilateral agencies, and nongovernmental organizations from making alarming predictions that climate change processes will trigger historically unprecedented waves of mass migration.

The more widely cited estimates for the number of people displaced by 2050 range from 50 million (UN University's Institute for Environment and Human Security) to 200 million (International Organization for Migration (IOM) and Stern Review). If the higher estimates pan out, climate change-related migration could dwarf current numbers of refugees and internally displaced people — about 45 million and 9 million by United Nations estimates, respectively.

While there are no scientifically verified estimates of the number of people that will be displaced by climate change, several studies by UN agencies, IOM, and NGOs, including an influential report published in 2009, already show evidence that environmentally induced migration is occurring. Also, despite controversy surrounding the specifics of climate change data, there is no evidence to contradict the expected trend of continued global warming for at least a few decades to come.

This article will examine the complex links between climate change and migration, how and where these links influence current and future migration patterns, and some of the problems with predicting future flows. It will also outline some current policy approaches and look at where the debate is headed.

#### The Climate Change–Migration Nexus

Migration has helped humans cope with environmental changes, such as droughts and floods, for centuries. The frequency, severity, and duration of such changes affect the broad types of migration patterns — temporary, permanent, internal, or international — that take place.

The prevailing tendency thus far has been toward more circular, internal movements of people from mostly rural to urban areas and within national boundaries or regions. These trends are evident, for example, in the seasonal labor migration of Central American, Mexican, and West African farmers to compensate for lower agricultural productivity in rural areas, as well as in the temporary displacement of thousands of Bangladeshis to their capital, Dhaka, in response to annual monsoon floods.

However, severe environmental damage, whether natural or manmade, can leave populations with little recourse but to move permanently and en-masse. This happened in the 1930s Dust Bowl in the Great Plains of the United States. Below-average rainfall, accompanied by the Great Depression, resulted in the widespread failure of small farms and the migration of about 300,000 "Okies" to California.

Currently, people are beginning to leave some small island nations in the Pacific with low elevations because the islands are suffering high rates of coastal erosion and experiencing rising sea levels. Environmental degradation is also increasingly common in those areas, such as in West Africa and Haiti, where depleted agricultural land can no

longer produce crops sustainably and is abandoned.

Scientific evidence shows a trend toward rising sea and air temperatures. Manmade environmental degradation, which includes everything from fuel emissions to deforestation, is accelerating this trend.

Global warming is expected to affect the climate through gradual processes, such as glacial melting, as well as through an increase in extreme weather events like cyclones.

Both gradual changes and extreme weather events can heighten pressures on land, food, and water resources. In turn, these pressures can contribute to existing problems, including food insecurity, malnutrition, poverty, the spread of disease, rapid urbanization, and political instability, in areas of the world that already struggle with some of these issues. Add to the mix likely population growth, which demographers expect in places like Bangladesh and sub-Saharan Africa, and the chances of new or intensified migration patterns increase.

### **Types of Environmental Change and Places They Could Affect**

The Fourth Assessment by the Intergovernmental Panel on Climate Change (IPCC) in 2007 highlights four zones as among the most susceptible to environmental change: low-lying coastal settlements; rain-fed farm regions and those dependent on rivers fed by snow and glacier melt; subhumid and arid regions; and humid areas in Southeast Asia vulnerable to changes in monsoon patterns.

The climatic changes that threaten these four zones — rising sea levels, changes in rainfall, glacial melting, and extreme weather — are outlined here, along with the places that would see change. It is important to note that often a combination of these changes, for example flooding from glacial melt and rising sea levels, is present throughout the regions described, thus complicating the course of action.

#### *Rising Sea Levels*

Rising sea levels, caused in part by glacial and ice cap melting, are perhaps the most widely cited impact of climate change. IPCC predicts that sea levels will rise worldwide by 0.18 to 0.59 meters (between 7 and 11 inches) by the end of this century.

Sea-level rise can contribute to greater erosion and flooding in coastal wetlands and delta regions and, more dramatically, the gradual disappearance of small island nations in the South Pacific and Caribbean (where the process is slower due to higher elevations and larger land mass).

According to IOM, approximately 44 percent of the world's population lives within 150 kilometers (about 93 miles) of a coastline, with a number of some of the most densely populated cities — New York, Singapore, Bangkok, Shanghai — possibly affected.

The 2009 report *In Search of Shelter* finds that 1 meter (about 3.3 feet) rise in the sea level could affect nearly 24 million people in the densely populated Ganges, Mekong, and Nile river deltas, and significantly reduce land available for intensive agriculture. In a World Bank study, environmental economist Susmita Dasgupta and her co-authors predict that rising sea levels will displace hundreds of millions of people in developing countries by the end of the century.

Sea level rise has also been linked to more frequent seismic activity and volcanic eruptions, according to researchers at the University of Oxford. Even small changes in sea level, they suggest, can create enough added pressure to the seabed that can have a significant effects.

#### *Changes in Rainfall: Desertification and Flooding*

Changes in rainfall patterns can make some areas drier and more prone to drought, while subjecting other areas to increased precipitation and flooding. Both situations can destroy crops and make it even more difficult for people, especially those dependent on rain-fed agriculture, to have access to safe and sufficient amounts of food.

The 2007 IPCC report estimates that a global temperature rise of 2 to 3 degrees Celsius (3.6 to 5.4 degrees Fahrenheit) could contribute to lower crop yields in Africa, the Middle

East, and Southern Asia by 30 to 40 percent. The same report also finds that yields from rain-fed agriculture could fall by up to 50 percent by 2020.

The Sahel belt in sub-Saharan Africa, which stretches from Senegal and Mauritania in the west to Sudan and Eritrea in the east, is historically prone to low rainfall, prolonged periods of drought, and desertification. Groups in this region have traditionally depended on a lifestyle of pastoral nomadism and long-distance trade to cope with scarcity.

In the last three decades, following one of the worst droughts in the region from 1982 to 1984, West African households have increasingly turned to temporary migration as a way to cope with more frequent periods of drought and the pressures that a growing population place on the limited availability of agricultural land. As an adaptation strategy, these households send young adults in search of wage labor after each harvest, with the distance traveled (including to Europe) dependent on the bounty of the harvest and perceived risk of travel.

A study on the impact of climate change in Africa predicts that the Sahel will experience an estimated 10 percent reduction in annual rainfall in its interior by 2050. Decreases in rainfall have already reduced the amount of land suitable for agriculture, the length of the growing season, and crop yields, according to the 2007 IPCC report. Since much of the population depends on rain-fed agriculture, crop yields are expected to fall by more than 50 percent in some of the poorest African countries as early as 2020.

South Asia, on the other hand, is predicted to experience higher-intensity precipitation within an even stronger monsoon season. While annual flooding is already embedded in the cultural and livelihood traditions of many South Asians, climate change is expected to worsen these conditions.

In his briefing on global warming, scientist John Houghton estimates that India and Bangladesh will experience up to 20 percent more rainfall by 2050. Already, over 500,000 Bangladeshis are displaced by floods every year, and more are likely to face the devastating loss of home, incomes, and life from cyclones and floods.

#### *Glacial Melting*

Glaciers serve an important ecological function in regulating the flow of rivers and the agricultural cycle by storing water during winter months that then feeds rivers in the summer months. However, over the last century, glaciers have been shrinking at a fast rate; winter snow packs are no longer sufficient to replace the summer melt.

Glacial melting, shrinking ice cover, and thawing permafrost can contribute to the risk of flooding, mudslides, and avalanches in the near term, but also to more permanent loss of agricultural land and means of livelihood.

In the long term, as glaciers continue to shrink, they will no longer release sufficient water to support the growing populations of the regions that depend on this runoff. Water shortages can hamper crop production in irrigated lands, reduce hydroelectric power generation, and hurt traditional forms of livelihoods, such as small-scale fishing and aquaculture.

Over one-sixth of the world's population lives in mountain ranges and river basins supplied by water stored in glaciers and snow cover. The Himalayan glaciers are among those in retreat, a situation that will ultimately affect the river flows that support the quarter of the world's population that lives in Pakistan, India, China, and Southeast Asia.

*In Search of Shelter* suggests that the potential for migration out of this region (most likely into urban coastal cities) due to glacial melt-related water shortages is significant, yet the likely destinations currently lack the capacity to absorb a growing number of migrants.

#### *Extreme Weather and Human Disasters*

In addition to these more gradual processes, climate change is also predicted to bring about more frequent and severe disasters, such as floods, storms, and hurricanes (also called cyclones and typhoons depending on where they develop). While extreme weather events can hit any part of the world, their impact is most acute in least developed countries, where the poor often live in marginal lands subject to flooding or mudslides,

and, therefore, are more prone to being displaced.

Hurricanes Katrina and Rita in the southern United States in 2005, the 2007 floods in Burma and Bangladesh, the multiple hurricanes that struck Haiti in 2008, and the numerous typhoons in Asia in 2009 brought catastrophic losses of life and livelihood. The International Federation of Red Cross and Red Crescent Societies noted in a 2006 report that in the past decade, weather-related natural hazards have caused 90 percent of natural disasters and 60 percent of related deaths — the majority in developing countries.

During extreme weather events, sudden and collective displacement is a common, but temporary, survival strategy. The 2000 floods in Mozambique, for example, displaced up to a million people; most returned to their homes within a few months.

However, migration can become permanent if the disaster renders the land unsuitable for return or destroys opportunities to reestablish an economic base. This is evident in some parts of Southeast Asia after the 2004 tsunami (which an earthquake caused) changed fish-stock patterns. As a result, shrimp farmers in some areas of Thailand lost their sources of livelihood and moved inland in search of alternatives.

### **Isolating Climate Change as a Factor in Migration and the Problems with Estimates**

The relationship between climate change and migration is not a linear one, but rather more complex, unpredictable, and influenced by larger social, economic, and political forces that shape how societies interact with their environments.

Consequently, various policy actors are still debating how to treat and measure those facing displacement under changing environmental conditions and the type of migration that is already occurring.

Since the 1970s, a number of terms have emerged that attempt to describe the relationship between migration and climate change. The most widely used, but highly contested, is "environmental refugee." Variations include "climate refugee," "climate change refugee," "disaster refugee," "eco-refugee," and "environmental refugee-to-be (ERTB)." This use of "refugee," however, is only descriptive, and such usage derives no legal status from the 1951 UN Convention on Refugees that places obligations on states.

UN agencies and IOM have instead adopted terms like "environmental migrant," "environmentally displaced person (EDP)," and "environmentally motivated migrant" to describe those who, whether forced or voluntary, experience environmentally induced migration. IOM also suggests a continuum between those who are suddenly displaced by extreme weather events (i.e., forced) to those who preemptively migrate due to deteriorating environmental conditions (i.e., voluntary).

Except in the case of extreme weather events that immediately displace those affected, it is nearly impossible to segregate environmental factors from other variables, such as poverty or demographics, in the decision to migrate. Especially when it comes to gradual processes, such as sea-level rise or glacial melting, a population's ability to cope with and adapt to the changes relies, in great part, on the financial and human resources available, as well as in the strength of government institutions to tackle these issues.

As migration scholars have observed, a person's decision to migrate is based on many factors, including financial capital (can I pay for or find a way to pay for the journey?), social capital (who can help me in the potential destination area?), conditions at home (do I see a future here?), and conditions in the potential destination (will I be able to get a job or find safety there, will it be a good place for my family?) For example, the ability of Bangladeshi and Somali farmers to deal with more frequent floods and droughts, respectively, is vastly different than that of their Swiss and Australian counterparts.

Thus, migration because of environmental change needs to be analyzed in the context of three interrelated characteristics: vulnerability, resilience, and adaptability.

As it relates to climate change, vulnerability is a function of an individual or group's capacity to anticipate, cope with, resist, and recover from adverse conditions.

The degree of vulnerability also reflects resilience, meaning the ability to absorb external

shocks and preserve preferred life-course options in the face of environmental change. Resilience, to a large extent, depends on access to human, social, political, and financial capital that allows individuals, households, and communities to recover from disasters and adapt to permanent changes in environment.

Even in vulnerable communities, not everyone will want to move, and not everyone who wants to move will be able to do so. Though migration has and will continue to be one of the ways people respond to climate change, it is important to recognize that there are other ways of responding to environmental risks and instability (see next section).

Often the poor and less skilled have the fewest options for developing coping strategies and are likely to face the largest obstacles to internal and international mobility. In turn, the more affluent may be better positioned to migrate, but they are also usually better able to adapt and recover from these events.

Hurricane Katrina, which devastated New Orleans in 2005 and displaced about 1.5 million people (about 30,000 families permanently), illustrates this kind of situation. High rates of poverty, failing infrastructure, and poor governance helped make residents of New Orleans, especially those in the poorest Ninth Ward, vulnerable and compounded the storm's impact. Likewise, the effects of cyclones in Bangladesh should also be framed within the context of massive poverty, a corrupt government, and lack of development.

Such complexity makes it extremely difficult, if not impossible, to single out the environmental factors of displacement. In addition, it makes any estimate of the number of current and potential environmentally induced migrants highly contested. Estimates also cannot fully account for future population growth and government policies that could affect the course of climate change.

### **Policy Responses to Date**

Understandably, the principal focus of scientific and policy communities, so far, has been on establishing the current patterns and trends of climate change, rather than on predicting the impact of that change on human societies.

Such varied definitions, underlying assumptions, and estimates of environmentally induced migration have complicated the development of effective policies that can mitigate current or future flows. Nevertheless, the importance of climate change processes and environmental degradation as factors in the decision to migrate cannot be ignored.

In 1990, the First Assessment Report of IPCC noted that the greatest single impact of climate change might be on human migration and displacement. Despite the warnings and statistics that followed, little has been done in national or global arenas to deal with climate-related migration or to bolster international capacity to handle any large-scale movements.

Policy responses have been primarily focused on three areas: the definition of refugees, adaptation, and resettlement.

#### *Seeking official status for "environmental refugees"*

Those who advocate for the legal recognition of "environmental refugees" — either under a broader interpretation of the UN convention or within new regimes and protocols, such as through the UN Framework Convention on Climate Change — cite the need of these displaced populations for legal protection and access to the kinds of assistance that legally recognized refugees receive.

Opponents suggest that this type of classification would have the reverse effect of what its proponents seek: expanding the definition could lead to a devaluation of the current protection for more traditional, "convention refugees" and allow states to reduce their responsibilities even further.

To date, governments have shown more interest in keeping a narrow definition, and attempts to extend the mandate of the UN refugee regime to include environmental regimes have proven largely ineffective.

#### *Adaptation*

As climate changes advance, nations will have to decide who and what they want to protect and how they are going to do so.

Adaptation mechanisms can take a variety of forms, including better education, training and awareness, technical measures, diversification of livelihood options, community-based natural resource management, and natural-disaster risk reduction. The right kind of adaptation strategies can reduce a country's vulnerability and bolster its ability to manage climate change processes.

Cuba, for example, often experiences less loss of life and destruction from hurricanes than some of its Caribbean neighbors because it has a more effective early warning system and preparations for confronting these storms.

The actions taken, however, and the overall impact of climate change on a country, including displacement, are direct functions of the human and capital resources available to individuals and their governments.

The United Nations Framework Convention on Climate Change has supported the development of National Adaptation Programs of Action (NAPA), which are aimed at helping developing countries identify ways to adapt to climate change and access funds with which to implement their plans.

Similarly, the 2009 Copenhagen Accord, negotiated by 194 countries during the United Nations Climate Change Conference in Copenhagen in December 2009, also recognizes the need for greater adaptation actions aimed at reducing vulnerability and building resilience, especially among developing countries.

The accord highlights the responsibility of developed countries to provide financial and technological resources to developing nations so they can build their capacity to adapt to and mitigate the effects of climate change. Presumably, this will be done through the Copenhagen Green Climate Fund, which has received pledges of US\$30 billion for short-term adaptation and mitigation programs, and a further commitment to raise US\$100 billion by 2020 to achieve those goals.

#### *Resettlement and Immigration Policies*

Neither the NAPAs nor the Copenhagen Accord mentions migration or displacement as possible adaptation mechanisms or policy responses.

Migration is often mistakenly viewed as a failure to adapt to changing environmental conditions. Historically, though, governments have used resettlement within their own territory. In the 1980s, Ethiopia, for example, resettled thousands of people from drought-stricken highland areas in the east to lowland areas in the west in an extremely controversial program (see [Ethiopians Who Survived the Famine: A Repatriation Success Story](#)).

For some small island states already experiencing the effects of sea-level rise, including Tuvalu, Kiribati, the Carteret Islands, and the Maldives, resettlement has become the likely adaptive response, with governments planning progressive relocations within or outside of their territories.

After the 2004 tsunami, the Maldives decided to organize a "staged retreat" where it would concentrate its 290,000 residents from over 200 outlying islands to about a dozen islands with slightly higher elevations. In 2005, 1,000 residents of the Carteret Islands, administered by Papua New Guinea, were evacuated to the larger island of Bougainville.

Many of these small island states also have temporary labor migration programs with Australia and New Zealand and have been looking into negotiating more permanent settlement options for some of their population.

With nearly 80 percent of Australians living in coastal areas, that government is also contemplating the possibility of banning further coastline development and relocating those in the most vulnerable areas.

In the Northern Hemisphere, shrinking ice cover and thawing of permafrost are threatening the ability of several indigenous Alaskan communities to continue traditional

means of livelihood, and impelling their relocation.

So far these relocation programs have been relatively small in scale and have remained largely internal movements. Should climate change processes advance, they could generate larger-scale displacements that would require more distant migrations.

While no explicit protections exist for those displaced by environmental changes or disasters, some industrialized nations have softened their humanitarian programs to accommodate victims.

The United States, for example, can grant Temporary Protected Status (TPS) to nationals of countries suffering from environmental disasters like earthquakes and hurricanes. Indeed, nationals of El Salvador and Honduras have received TPS and had TPS extended due to such disasters.

After the 2004 tsunami, Swiss and Canadian governments suspended the involuntary returns of asylum seekers from Sri Lanka, Thailand, and other areas the tsunami had devastated.

### **Looking Ahead**

While human mobility issues were not included in the final language, the 2009 Copenhagen Accord lays out a new framework for international cooperation to mitigate the effects of climate change. Member nations agreed to limit the increase in global temperatures to below 2 degrees Celsius (3.6 degrees Fahrenheit); they also recognized the importance of adaptation strategies for coping with climate change.

Beyond such agreements, the international community also needs to construct a long-term policy framework that promotes resilience, expanded livelihood opportunities, and adaptation within the context of sustainable development.

Empirical research and more nuanced case studies are needed to better understand current population movements and their triggers. Current estimates have arguably created more fear around migrants and migration and provide little foundation for effective policy responses.

### **Sources**

Black, Richard. 2001. Environmental refugees: myth or reality? UNHCR Working Paper No. 34. **Available online.**

Bierman, F. and I. Boas. 2008. Protecting Climate Refugees: The Case for a Global Protocol. *Environment Magazine*, Vol. 50, No. 6: 10-16.

Boano, C. 2008. FMO Research Guide on Climate Change and Displacement. Forced Migration Online. **Available online.**

Boano, C., R. Zetter, and T. Morris. 2008. Environmentally Displaced People: Understanding the Linkages between Environmental Change, Livelihoods and Forced Migration. Forced Migration Policy Briefing 1. Refugee Studies Center, University of Oxford.

Bronen, R. 2008. Alaskan Communities: Rights and Resilience. *Forced Migration Review*, Issue 31: 30-32.

Brown, O. 2008. *Migration and Climate Change*. Geneva: International Organization for Migration. **Available online.**

Castles, S. 2002. Environmental change and forced migration: making sense of the debate. UNHCR Working Paper No. 70. **Available online.**

Dasgupta, Susmita. et al. 2007. The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis. World Bank Policy Research Working Paper 4136, February 2007. **Available online.**

Diamond, J. 1997. *Guns, Germs, and Steel: The Fates of Human Societies*. New York: W.W. Norton & Company.

El-Hinnawi, E. 1985. *Environmental Refugees*. Nairobi: UNEP.

Friends of the Earth. 2007. *A Citizen's Guide to Climate Refugees*. Australia: Friends of the Earth. **Available online.**

Greenpeace. 2008. Blue Alert. Climate Migrations in South Asia: Estimates and Solutions. Greenpeace India. **Available online.**

Heine, B. and L. Petersen. 2008. Adaptation and cooperation. *Forced Migration Review*, Issue 31: 48-50.

Houghton, J. 2005. *Global Warming: The Complete Briefing*. Cambridge: Cambridge University Press.

Hugo, Graeme. 1996. Environmental Concerns and International Migration. *International Migration Review*, Vol. 30, No. 1: 105-131.

Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Impact, Adaptation, and Vulnerability*. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Geneva: IPCC.

International Federation of Red Cross and Red Crescent Societies. 2003. Preparedness for Climate Change: A Study to Assess the Future Impact of Climatic Changes upon the Frequency and Severity of Disasters and the Implications for Humanitarian Responses and Preparedness. Prepared for the 28th International Conference of the Red Cross and Red Crescent, December 2-6, 2003.

International Organization for Migration. 2008. *Expert Seminar: Migration and the Environment*. International Dialogue on Migration, No. 10. **Available online.**

Itano, N. 2008. Europe fears 'climate migrants.' *Christian Science Monitor*, Vol. 100, No. 76: 6.

Keane, D. 2004. Environmental Causes and Consequences of Migration: A Search for the Meaning of 'Environmental Refugees.' *Georgetown International Environmental Review*. **Available online.**

Kibreab, G. 1997. Environmental causes and impact of refugee movements: a critique of the current debate. *Disasters*, Vol. 21, No. 1: 20-38

Lepage, L. 2008. Migration and Environmental Change: From Science to Policy in the Sahel Region. Keynote Address in *Expert Seminar: Migration and the Environment*. International Dialogue on Migration, No. 10, IOM: Geneva.

Lonergan, S. 1998. The role of environmental degradation in population displacement. *Environmental Change and Security Project Report*, Issue 4: 5-15.

Millennium Ecosystem Assessment. 2005. Living Beyond Our Means. Natural Assets and Human Well-Being: Synthesis from the Board. **Available online.**

Myers, N. 1993. Environmental Refugees in a Globally Warmed World. *BioScience*, Vol. 43, No. 11: 753-761.

———. 2002. Environmental refugees: a growing phenomenon of the 21st century. *Philosophic Transactions: Biological Sciences*, Vol. 357, No.1420: 609-613.

Nyong, A. 2005. Impacts of climate change in the tropics – the African experience. Keynote presentation at Avoiding Dangerous Climate Change Symposium. Met Office, UK, February 2005.

Oliver-Smith, A. 2006. Disasters and Forced Migration in the 21st Century. **Available online.**

Oxfam International. 2009. *The Right to Survive: The Humanitarian Challenge for the 21st Century*. UK: Oxfam International. **Available online.**



Perch-Nielsen, S., M. Battig, and D. Imboden. 2008. Exploring the link between climate change and migration. *Climatic Change*, Vol. 91: 375-393.

Renaud, F., J.J. Bogardi, O. Dun, and K. Warner. 2007. Control, Adapt, or Flee: How to Face Environmental Migration. *InterSecTions*, UNU-EHS, no.5/2007. **Available online.**

Reuveny, R. 2007. Climate change-induced migration and violent conflict. *Political Geography*, Vol. 26, No. 6: 656-673.

Sachs, J. 2007. Climate Change Refugees. *Scientific American*, Vol. 296, No. 6: 43.

Stern, N., ed. 2006. *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press.

Stojanov, R. 2004. Environmental Migration: How Can It Be Estimated and Predicted? *Geographica*, Vol. 38: 77-84.

Warner, Koko, et al. 2009. *In Search of Shelter: Mapping the Effects of Climate Change on Human Migration and Displacement*. CARE International. **Available online.**

Williams, A. 2008. Turning the Tide: Recognizing Climate Change Refugees in International Law. *Law & Policy*, Vol. 30, No.4: 502-529.

Copyright © 2010 Migration Policy Institute. **All rights reserved.**  
MPI • 1400 16th St. NW, Suite 300 • Washington, DC 20036  
ph: (001) 202-266-1940 • fax: (001) 202-266-1900  
source@migrationpolicy.org