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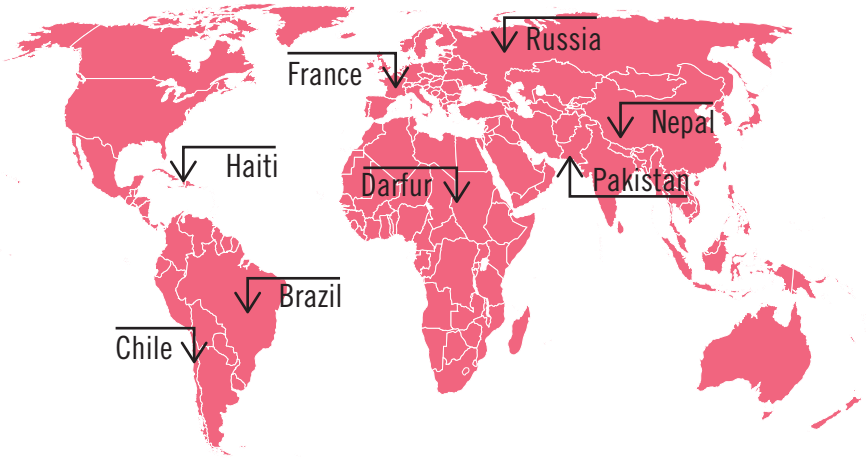
The State of Environmental Migration 2010

Edited by
François Gemenne
Pauline Brücker
Joshua Glasser



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FOREWORD BY LAURENCE TUBIANA

Director,
Institute for Sustainable Development
and International Relations (IDDRI)

It is not so often that a university professor gets the chance to write the foreword of a volume put together by Masters' students. But I have to say that this project is exceptional in many regards.

First of all, this volume does an exceptional job in documenting recent events of environmental migration and displacement. Today, there is hardly a week that goes by without the media announcing significant population displacements due to environmental changes. Yet, beyond the press headlines, little is known about the complex relationship between environmental changes and migration. Through an analysis of a variety of case-studies, this volume highlights the wide diversity of movements that hide beyond the label of "environmental migration". It sheds a new, more complex light on many of the crises that marred the year 2010. It is the first of an annual series, responding to the need to provide a foundation of empirical evidence for the cases that attract high media attention, but also for those that go unnoticed because they are often considered as "not spectacular enough".

But what is most remarkable about this volume is that it is the work of students. When Sciences Po created a course on "Environment and Migration", as part of the Master on Environment, Sustainable Development and Risks, it was the very first university course dedicated to this issue. This volume is first and foremost a testimony of the exceptional potential of the youth to address this issue: they represent the generation that will need to provide leadership on what appears to be one of the defining issues of our time.

Finally, I am very happy that IDDRI has joined efforts with IOM in order to put this volume together. IDDRI has actively engaged in research on this topic since 2009, and it is one of the areas where IDDRI and IOM closely cooperate together, and this cooperation should further grow in the years to come. This volume reaffirms the importance of policy-relevant research – one of IDDRI's core objectives, and it is with great pride that I support the publication of this special volume.

FOREWORD BY MD. SHAHIDUL HAQUE

Director,
Department for International Cooperation and Partnerships
International Organization for Migration (IOM)

Environmental degradation prompted by increased extreme weather patterns such as floods, severe hurricanes, desertification, and melting glaciers have become much more frequent. In 2008, extreme weather events displaced 20 million people compared to 4.6 million people displaced within their own country by conflict and violence. Climate-related disasters are the main sudden onset trigger responsible for displacement in 2009 and 2010 causing the displacement of 15 million people in 2009 and 38 million people in 2010 (IDMC 2011).

The impact of these major environmental incidents demands a broader policy discourse to devise stronger mitigation and/or adaptation capacities. The incorporation of all stakeholders of all ages is central in learning lessons and developing new alternatives. The International Organisation for Migration is therefore pleased to support the innovative student-led project entitled *The State of Environmental Migration* initiated by the Institute for Sustainable Development and International relations (IDDRI).

The IOM and IDDRI have a long history of cooperation on the topics of environmental degradation and migration, collaborating on knowledge creation and devising field projects to better manage the migratory effects of environmental change. The link between IDDRI's experience in governance, climate and agriculture, and IOM's expertise as a leader on migration issues is key for staying abreast of environmentally-induced migration trends. Incorporating student research papers within the wider policy discourse on environmental and climate change is a novel practice which gives our youth a strong voice in the debate.

Migration is a way for people to adjust to a changing environment. The consequence of environmental degradation on migration presents humanity with unprecedented challenges. The number of storms, droughts and floods has increased threefold over the last 30 years with devastating effects on vulnerable communities. Since the early 1990s, the IOM has been particularly committed to tackling the emerging issues of environmental degradation and migration. The IOM has carried out programs to address the challenges in more than 40 countries in the Pacific, Latin America, Asia and Africa, and is or has been present in many of the areas that are described in case studies in this publication, such as Pakistan, Haiti, Nepal or Darfur. In line with IOM's comprehensive approach to human mobility, interventions cover the continuum from emergency preparedness and response to disaster risk reduction and climate change adaptation, contributing to the sustainable development of countries and communities.

As this collection of student research papers and case studies on emerging and ongoing disasters demonstrates, despite the global nature of environmental change, the manifestations of the phenomenon will be characteristically local. Failing to incorporate migration within the policy discourse could seriously undermine potential alternative livelihood strategies. The papers discuss the necessity for states and their partners as well as local populations to develop strategies, policies and programmes along a continuum ranging from emergency preparedness and response to disaster risk reduction and climate change adaptation.

One of the greatest inequities in the shift of global temperature and the increase in natural disasters is that future generations will most likely witness the greatest disruption to their livelihoods. Incorporating the voices of tomorrow within the current policy discourse is an important step in developing strong future leadership needed to tackle these difficult challenges.

> *"It is the youth of the world who can set the agenda for the future and pursue it with diligence. We must do all we can to empower young people to take action, because the future belongs to them"* (Rajenda Pachauri, chairman of the intergovernmental Panel on Climate Change at COP 15/CMP15).

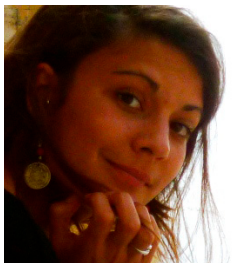
EDITORS

François Gemenne

François Gemenne teaches the course on "Environment and Migration" at Sciences Po's Paris School of International Affairs (PSIA). When he's not teaching, he conducts research on this and other related topics at IDDRI, where he is a research fellow. He has conducted field studies in New Orleans, Tuvalu, China, Central Asia and Mauritius. He has been involved in different international research projects, and has consulted for the Asian Development Bank, the International Organization for Migration and the Cartier Foundation for Contemporary Art. He has published three books and numerous articles on environmental migration, adaptation and vulnerability. He is also the editor of the 'Sustainable Development' series at the *Presses de Sciences Po*, a leading French academic publisher. A political scientist by training, he was first educated at the University of Liège (Belgium) and holds a joint PhD from Sciences Po and the University of Liège, as well as a Master of Research in Political from the London School of Economics and a Master of Sciences in Environmental Studies from the University of Louvain.

Pauline Brücker

Pauline Brücker is a research fellow at the Institute for Sustainable Development and International Relations (IDDRI). Her current research focuses on environment, migration and human rights issues.



Graduated of a Master of International Affairs from the Paris School of International Affairs (PSIA) at Sciences Po Paris, she is specialized in public international law (IHRL, IRL, IHL) and migrations in the Middle East, West Asia and the Horn of Africa.

She has been focusing her research on the protection of internal displaced persons, asylum seekers and migrants in the occupied Palestinian territories, Egypt, Iraq and Afghanistan. She especially worked for the defense of their economic, social and cultural rights as well as their inclusion in transitional justice processes.

Joshua Glasser

Joshua Glasser is a Master's student at the Harvard School of Public Health. Prior to graduate school, he worked as a grassroots organizer and public interest lobbyist for a non-profit organization, Common Cause, in his home state of North Carolina. He was also awarded a Fulbright Scholarship (2007-2008) for studies in Vietnamese language and culture in Hanoi, Vietnam. During his Fulbright year, he conducted a qualitative research study with migrant workers living with HIV/AIDS and their families. He completed undergraduate studies in political science and public policy analysis at the University of North Carolina at Chapel Hill in 2006.

After graduate school, Joshua plans to work on research related to climate change adaptation policy. He is particularly interested in linkages between global climate policy and finance frameworks, and local, community-based adaptation efforts.

CONTRIBUTORS

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Mylène André is a French student and a recent Master's graduate in International Public Management at the Paris School of International Affairs (PSIA, Sciences Po Paris). She holds a Bachelor Degree from the Latin-American campus of Poitiers (Sciences Po) and has academic and professional experience in Chile, where she completed an academic exchange and internships in the private sector.

Her interests include the environment, climate change and energy and their present and future impacts on our lifestyles. Additionally, she is interested in human rights awareness and especially in the Southern Cone of South America. She hopes to enhance her experience in these fields through different departments (communications, research and publication or public policies), in France or abroad.

Radu Botez

Born in Romania and raised in Germany, Radu Nikolaus Botez is a graduate student in International Security, specialized in Migration Studies and Asian Studies, at the Paris School of International Affairs (PSIA, Sciences Po Paris). His interest lies mainly in security challenges in South Asia, where he is currently interning with a think tank in New Delhi.

Besides regularly writing security briefings for openDemocracy.net, Radu Botez is also part of Asylos, a network of volunteers researching for lawyers representing asylum-seekers in Europe. In the future, he would like to complete his education with a PhD and later work in a think tank.

Natalia Capellini

Natalia Capellini is an anthropologist from Sao Paulo, Brazil, where she studied at the University of Sao Paulo. She is currently in the second year of the International Affairs Master's degree on Environment and Sustainable Development at the Paris School of International Affairs (PSIA, Sciences Po Paris). She studied agricultural uses of water in France and the Mediterranean Region.

She additionally worked on gender issues with Brazilian and international social movements, in isolated communities in Brazil. She wants to pursue her studies making links between gender and environment, especially in rural areas.

Carolina Milhorance de Castro

Brazilian student holding Bachelor' degrees in International Relations and in Biology/Ecology, Carolina Milhorance de Castro is currently enrolled in the Environment, Sustainable Development and Risks Master's degree at the Paris School of International Affairs (PSIA-Sciences Po Paris).

She has had diverse professional experiences in research institutions, NGOs and international organizations, including the Oswaldo Cruz Foundation, the Brazilian Biodiversity Fund, and the OECD. She also has field experience in the Amazon region. Her main interests are international cooperation, environmental politics and the promotion of sustainable development. She is currently working on the role of transnational networks and on South-South cooperation mechanisms.

Shoghi Emerson

Shoghi Emerson is a Belgian student, holding a Bachelor's degree in Economics and Politics (SOAS, London) and a Master's degree in Sustainable Development (PSIA, Sciences Po Paris). He is currently a graduate student in the MSc International Political Economy at the London School of Economics.

He worked in the European Parliament as a parliamentary assistant on climate change issues, and would now like to pursue a career in crisis management and humanitarian work.

Eva Gutahr

Eva Gutjahr is a Brazilian student, holding a MSc degree in Social Anthropology from the University of São Paulo in Brazil and a Professional Master's degree in International Affairs from the Paris School of International Affairs (PSIA, Sciences Po Paris). She also holds specializations in the fields of Environmental Management (Senac-SP) and Intangible Cultural Heritage instruments and policies (Unesco and Brazilian Ministry of Culture).

She has worked as a consultant for over six years in projects related to the safeguard of the intangible cultural heritage of the Wajãpi indigenous community of Amapá, Brazil, and has also provided services in the fields of environment, education and cultural promotion for several organizations working with indigenous peoples in Brazil. She has received a "best academic production" prize in 2008 and her thesis was awarded a publication by the University of São Paulo in 2009. She is interested in relations between environmental change, social vulnerability and cultural aspects of development.

Nikola Gütermann

Nikola Gütermann is a German student. She studied in International Affairs and Governance from the University of St. Gallen in Switzerland and at the Universidad del Pacífico in Lima, Peru. She is now completing her double Master's degree at the University of St. Gallen and at the Paris School of International Affairs (PSIA, Sciences Po Paris).

She is particularly interested by international organizations and issues such as international security, migrations, and trade, and overall, international challenges from a political and economic standpoint.

Jean Le Goff

French Student, Jean Le Goff has completed a Master's degree in international relations, with a specialization in environmental issues, at the Paris School of International Affairs (PSIA, Sciences Po Paris). He is now following a research Master in psychosociology, in which he is conducting a research project about sustainable lifestyles and the process of change. His broad interest in environmental and social issues mostly relate to one question: how to build a post-oil and post-carbon society?

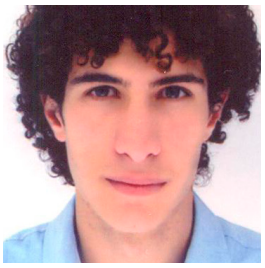
Daria Mokhnacheva

Daria Mokhnacheva was awarded a BA (Hons) Degree in Japanese Studies and Social and Political Sciences from the University of Cambridge (UK). She is completing a Master's degree in Environment and Sustainable Development at the Paris School of International Affairs (PSIA, Sciences Po Paris). She is currently on a study exchange at the University of Columbia, New York, focusing on environmental migration, development, and humanitarian relief in the context of natural disasters.

She gained experience in the areas of first aid and conservation, volunteering in the Natural Park of Aconcagua in Argentina. She worked at UNDP Russia as Programme Associate in the Energy and Environment Unit.

Charles Edouard de Ramaix

Charles-Edouard de Ramaix is a French-American student. He has been attending Sciences Po Paris since 2007, but has also attended the University of Edinburgh. After completing a Bachelor's degree in Euro-Asian studies, he is completing a Master's degree in Environment, Sustainable Development and Risks at the Paris School of International Affairs (PSIA, Sciences Po Paris).



He is currently interning for an American NGO, Audubon, involved in the conservation and protection of natural ecosystems.

Concerned about global warming issues, he would like to pursue his studies with a PhD analyzing the possible implementation in today's world of ancient irrigation systems. Professionally, he would like to stay in the environmental field and hopes to combine it with his passion for archeology.

Eve Schneider

Eve Schneider is currently pursuing her Master's degree on Environment, Sustainable Development and Risks at the Paris School of International Affairs (PSIA, Sciences Po Paris). After a year spent in Mongolia working on the protection of surface waters from the adverse effects of both climate change and the rapid development of mining industries, she would now like to specialize in humanitarian and development actions that take the environment into account. To this end, she is currently working on a research project that looks into how climate change adaptation and disaster risk reduction can be better integrated and mainstreamed into humanitarian and development projects.

INTRODUCTION

François Gemenne, Pauline Brücker and Joshua Glasser

We came upon the idea for this volume as we read student term papers for a course at Sciences Po in Paris. The course, "Environment and Migration", which is thought to be the first of its kind in the world, examines the complex relationship between environmental change and migration flows. Created by Sciences Po in 2010, the course serves as part of the Master's Degree Program offered by the Paris School of International Affairs (PSIA).

For their final assignment, students were asked to select and analyse a case of environmental migration, be it a sudden and violent natural disaster or a slow-onset environmental degradation. As we read, we were struck by the quality of the papers, many of which could be mistaken for the work of scholars. Second, though the areas of focus spanned the globe, most of the cases occurred (or saw turning points) in 2010. Thus, we set out to assemble the best student papers into this compendium, "The State of Environmental Migration 2010."

The student-authors responded enthusiastically to the idea, and agreed to continue working through the summer months, to transform the term papers into full-fledged book chapters. We edited and proofread them, and by summer's end, this volume was born.

The student-authors for this volume come from a wide variety of backgrounds and countries. Some chose to address events that took place in their home countries, and made use of local-language reports to provide a unique vantage on these events. Others examined on-going, but overlooked, crises, providing new insights and frameworks through which to understand these intractable problems. All told, while hardly a universal account of environmental migration events in 2010, our volume does capture a diverse array of illustrative cases, from decades-long quagmires to enormous catastrophes, and from incremental migration to massive displacement.

Above all, our objective in assembling this volume has been to provide empirical evidence on the linkages between environmental change and migration. While media reports often capture the basic facts on the ground, our student-authors have dug further and unearthed answers to more fundamental questions. Who moved, and under what circumstances? What sort of assistance did they receive, and from whom? Was return migration possible, and if not, where are those displaced now living?

Such assessments were needed for a variety of reasons. First, they provide a new lens through which we might view the most dramatic world events of 2010. Most of the papers constitute the first detailed analyses of the migration flows that were induced by these events, paving the way for future scholarly works.

Second, by using a comparative perspective, we see that no two events of are the same, though they often carry the same uniform label of "environmental migration". As a concept, environmental migration has attracted enormous policy and media attention in recent years, by actors as diverse as the European Commission, the Asian Development Bank, and the government of the United Kingdom. Yet too little has been done to study and explore the phenomenon comprehensively, leading to oversimplified and deterministic narratives in the mass media. A key endeavour of this volume is to situate the different cases in their historical and socio-economic contexts.

Our volume reveals considerable diversity among 'environmental migrants'. Some were forced to flee for their lives, while others made rational decisions as part of their livelihoods strategies for meeting basic household needs. Some will return to their hometowns, while others will need to relocate to new communities. Some crossed international borders and were exposed by the lack of an international human rights regime to protect them, while most stayed within national boundaries. Some needed massive international assistance

(whether or not it was received is another question), while others were able to cope more or less independently. Thus, a key takeaway from this volume should be that policy instruments to address environmental migration should be as diverse and varied as the migrants themselves: a one-size-fits-all approach cannot hope to succeed.

On the other hand, while one theme of the book is diversity, another is universality. Regardless of the context, a few themes emerge that thread the cases together. For example, in nearly every event, affected persons (migrant and non-migrant alike) were forced to deal with incomplete (and sometimes inaccurate) information in making key decisions. Second, though some countries did better than others, the intense social needs of post-disasters (and the equally intense politics) created tension and discord in many cases. There is simply no such thing as a "perfect response". Third, while returning to their houses is not always possible, many environmental migrants do wish to re-establish homes and communities as quickly as possible. Policymakers should consider these common themes as they consider the value of early-warning systems, the need for disaster management planning, and the importance of dignity and community in responding to environmental migration.

Each chapter in the book has a similar structure. Because each case has a specific context, the author begins by contextualizing the environmental change to be analyzed. For example, what were the underlying vulnerabilities of the population? What mechanisms were in place to prevent the disaster and/or help people cope with environmental changes? Each chapter then describes the change in the environment and the migration flows that ensued. Policy responses from governmental and non-governmental actors are assessed, and their effectiveness evaluated. Finally, each chapter closes by bringing the case forward to present-day and hinting at future developments, including prospects for return migration.

We have organized our volume into two sections. The first section includes the cases of emerging catastrophes from 2010. Because of their sudden nature, migration typically takes the form of sudden, unplanned-for displacement. Though these events often elicit widespread media attention, the focus is often on the immediate aftermath, and thus the complexities and long-term ramifications of sudden displacement are not well-understood. In this section, we will examine the record-breaking floods that wracked Pakistan starting in July, displacing more than 20 million people by year's end. We will study the wildfires of Russia (July and August), which singlehanded caused a spike in world food prices. The devastating Haiti Earthquake of January and the more seismically-severe (but less deadly) quake in Chile (March) are each addressed. The section will close with an example from France: February's Xynthia storm, which demonstrates that environmental migration can be an important issue in developed countries as much as in the developing world.

In our second section, we turn to on-going crises, disasters, and problem spots. Though they rarely make headlines, these intractable events continue to affect the lives of millions who live nearby. We will examine the hazards posed by glacial melting in Nepal, where thousands of families live downhill from major glacial lakes. Darfur, where a continuing drought has caused intense suffering for millions, will also be addressed. The volume concludes with a study linking three seemingly-separate cases in Brazil. This chapter highlights the fact that ecological pressure (often associated with 'slow-onset' disasters) can in fact be related to sudden crises, as was the case in the tragic Rio landslides that struck in the early days of 2011.

This volume will mark the first in an annual series, which will aim to provide the reader with regularly-updated qualitative assessments on the changing nature and dynamics of environmental migration. We look forward to developing this series in the future, and are happy that the International Organization for Migration (IOM) has associated itself with this publication.

Finally, we wish to thank those who made this publication possible. The student-authors, of course, went "beyond the call of duty" in spending many weeks of their summers revising their papers and transforming them into the following chapters. We hope that this publication does justice to their efforts. Pierre Barthélemy, who is in charge of IDDRI's publications, has spent countless hours proofreading the chapters and ensuring that every last detail is fit to print. Benoît Martimort-Asso, Development and Communication Director at IDDRI, has encouraged and supported this publication immensely, while Dina Ionesco, Policy Officer at IOM, ensured a smooth liaison between IDDRI and her organization. Laurence Tubiana and Shahidul Haque have been supportive of our endeavour from the outset, and each has kindly agreed to write a foreword. Many thanks to them all.

PART 1 EMERGING CATASTROPHES

Fleeing the floods in Pakistan, 2010. © UNHCR.

Emerging disasters are sudden events that catalyse enormous media attention and generally inspire massive response on the part of governmental and non-governmental actors. They often induce large-scale displacement, particularly in the immediate aftermath. Though displaced persons often desire to return home as quickly as possible, recent cases demonstrate that return is not always possible and that acute events can lead to long-term (or even permanent) displacement. In 2010, more than 42 million people were displaced by disaster, more than the global number of refugees and internally-displaced persons (IDPs) combined. Most displacement occurred in Asia, where populations are massive, environmental hazards are common, and social vulnerability is prevalent. Moreover, in an era of climate change, such events are likely to become more frequent--and severe.

In this section of the volume, we highlight several cases of emerging disasters (and related displacement) from around the world. We open with two of the most catastrophic events from 2010: the floods in Pakistan, and the Haiti earthquake. However, middle-income countries are not exempt from such events, as the cases of the Russian forest fires and Chilean earthquake show. However, the significantly lower death toll and more robust response to these events highlight the virtues of addressing vulnerability, risk reduction, and disaster response from a policy perspective, before disasters strike. Lastly, the final case, of the Xynthia storm in France, underscores the fact that even the world's wealthiest countries can struggle with risk reduction, land use, and resettlement policy, though they also have substantial more resources with which to respond to the problem.

Taken together, these cases span the globe, geographically and economically. While each case is unique, the challenges posed by emerging disasters are ubiquitous. And while there is no "ideal response", policy and planning do matter. We cannot prevent natural hazards, but we can take important steps to reduce their human toll.

1. FLOODS IN PAKISTAN

Shoghi EMERSON

INTRODUCTION

In late July 2010, Pakistan experienced unusually heavy monsoon rains that resulted in the largest and most destructive floods in its history (IRIN, 2010). The downpour, which went on uninterrupted for more than eight weeks, swelled the Indus River up to 40 times its normal volume, inundating an area of 132,000 square kilometers (equivalent to the size of Italy), leaving one-fifth of the country under water. The heavy precipitation gathered into waves of floodwater flowing down the Indus River basin, spurring UN Secretary General Ban Ki-moon to describe the crisis as a "slow-motion tsunami" (*The Guardian,* 2010).

The floods spread chaos and destruction along its path, submerging entire villages, sweeping roads and bridges away, devastating agricultural land and livestock, and damaging many health and education facilities. The floods killed approximately 2,000 people, destroyed one million homes, and seriously affected more than 20 million people, making it the largest disaster ever recorded in terms of affected population, area covered, and number of households damaged (Solberg, 2010). A wider area and more people were affected by the 2010 floods in Pakistan than by the 2004 Indian Ocean tsunami, the 2005 Kashmir earthquake, and the 2010 Haiti earthquake combined (NDMA, 2011). The cost of the damage was equally colossal, with more than $10 billion (US) worth of losses, effectively reducing Pakistan's GDP by 5.8% (Asian Development Bank/ World Bank, 2010).

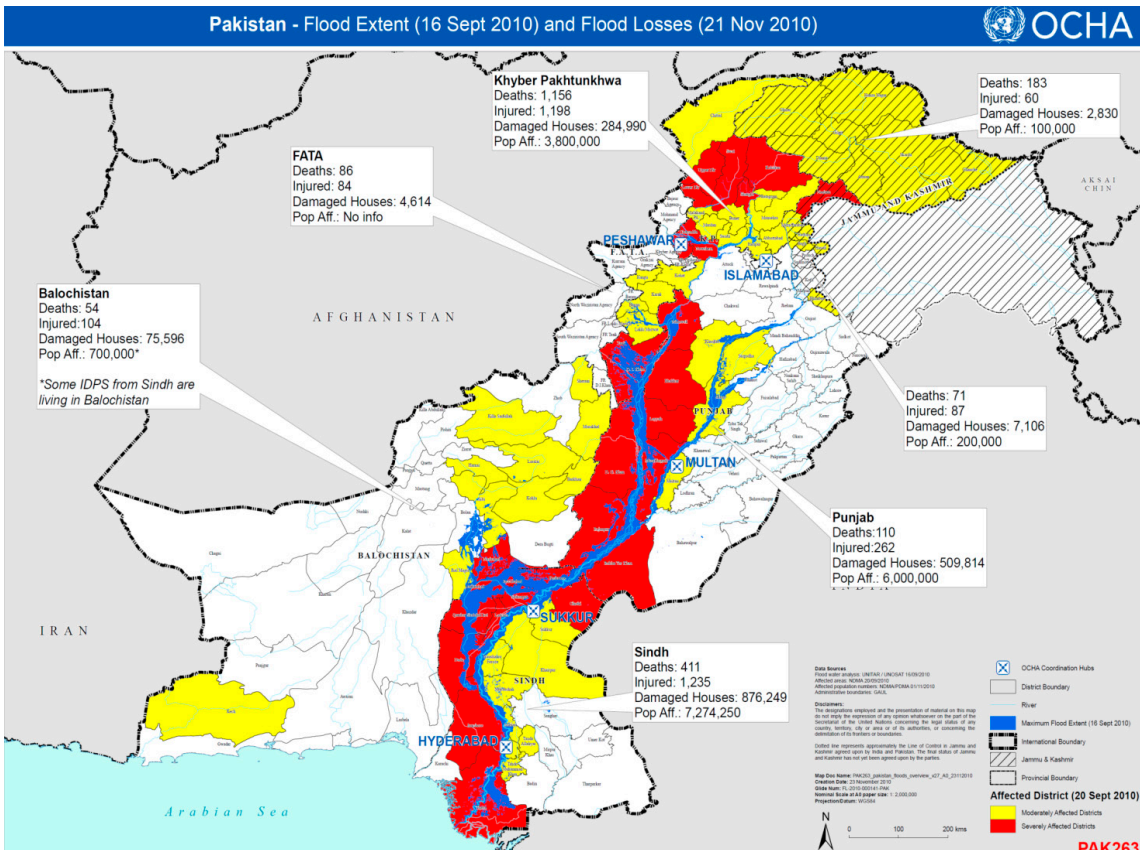
This case study addresses population displacements caused by rapid onset disasters, by examining the particular case of the 2010 floods in Pakistan. The consequences of the floods are first analyzed as a quadruple crisis: health, shelter, and food crises in the midst of a complex emergency (Part I) –highlighting how its multi-dimensional aspect deepened population vulnerabilities and raises questions about their legal rights. The article then explores the emergency response to the floods by considering funding, coordination, and ground operations (Part II). It ends by assessing the effectiveness of the response and evaluates the prospects of future flood impacts in Pakistan (Part III). The discussion will reveal that while the emergency relief phase of the response successfully avoided a major humanitarian crisis, the early recovery and reconstruction objectives are being neglected, leaving affected populations more vulnerable than ever in facing the next inevitable flood. It is therefore imperative that lessons be learned from the 2010 floods and concrete measures be taken to strengthen preparedness and resilience to floods in Pakistan.

1. THE CONSEQUENCES OF THE FLOODS

Many regions of Pakistan were affected by the 2010 floods, which submerged 78 of the country's 141 districts. The floodwaters ran from the northern Pakistani provinces of Khyber Pakhtunkhwa (KPK) and the Federally Administered Tribal Areas (FATA), through the central regions of Punjab and Balochistan, and finally reached the Southern Sindh area, before finding their way into the Indian Ocean (see map 1).

Regions were affected differently, nonetheless, according to their level of exposure to the flood and their topography. Mountainous areas like KPK were more affected by flash floods and mudslides, while others were more exposed to lasting riparian floods. Furthermore, while the water receded in Balochistan and KPK within days, it took several weeks in Punjab, and months in some areas of Sindh, for the water to clear, due to their flat topography.

Map 1. Pakistan Flood Extent and Losses



Source: OCHA 2010.

1.1. Floods as a quadruple crisis

Floods are fast-onset disasters caused by prolonged heavy precipitation, which can affect populations both directly and indirectly (IPCC, 2007a). They provoke direct physical damage by causing deaths and injuries, damaging crops and destroying houses and infrastructure. They also affect people indirectly by disrupting agricultural production, contaminating water supplies, spreading diseases, and putting pressure on public resources and services. Floods are multi-dimensional crises, therefore, whose factors of impact (direct and indirect) often interact to produce cumulative effects. Thus, the consequences of the floods in Pakistan can be understood as a quadruple crisis: health, shelter, and food crises in the midst of a complex emergency.

1.1.1. The health crisis

Floods are first and foremost a health crisis. They cause death through drowning and fatal injuries, contaminate clean water supplies, and foster vector-borne diseases. According to Pakistani government statistics, the floods affected 20,184,550 people, and resulted in 1,985 deaths and 2,946 injuries (Solberg, 2010). These data indicate that morbidity and mortality rates remained relatively low, despite the immense scale of the disaster. According to the final IASC report, the timely and effective delivery of emergency humanitarian aid can largely be credited for this success (ISAC, 2011:55).

By contaminating water supplies, floods provoke dehydration and diarrhoeal diseases such as cholera, typhoid, and rotavirus. They often combine with dehydration and undernourishment, morevover, to create a vicious cycle of susceptibility to infections that particularly affects children. Floods also favour the spread of infectious diseases like malaria, as the pools of stagnant water constitute prolific breeding grounds for disease-carrying insects and rodents (Ahern, 2005).

In Pakistan, outbreaks of acute respiratory infections (ARI), typhoid, malaria, hepatitis A, conjunctivitis, skin infection and gastroenteritis were particularly feared in the aftermath of the floods (Solberg, 2010). World Health Organization (WHO) data shows that out of the 5.3 million consultations it conducted, 13% were for acute

diarrhoea, 15% were for ARI, 18% were for skin disease, and 3% were for suspected malaria (WHO, 2010a).

Floods can also have substantial mental health impacts, although no studies were found for this case, such as post-traumatic stress syndrome, depression, anxiety, and even suicide (Ahern, 2005:38). In addition, the floods had indirect health impacts in Pakistan by damaging or destroying 515 of the 3,000 hospitals and clinics present in the affected districts, further aggravating the vulnerability of local communities to health risks (NDMA, 2011).

1.1.2. The shelter crisis

Although the health crisis was contained, millions of people lost their home in the flood. A total of 1,744,471 houses were destroyed, which will amount to a total cost of some $1.5bn (ADB/WB, 2010). About 12 million people were left homeless as a result and were forced to seek refuge along roadsides, in public buildings, within host communities, or in displacement camps (UN, 2011). In total, about 3.4 million people were forced to flee their area to live in some 5,928 relief camps (UNHCR, 2011a).

According to a WHO survey conducted in the 29 most severely-affected districts, close to 90% of households were forced to move for at least 2 weeks after the floods, with over half having living in an Internally Displaced People (IDP) camp at some point. Most displaced populations also remained in their area of origin – with only 17% moving away. Finally, once they relocated to an IDP camp, the majority of IDPs stayed put, as shown in Table 1; the paths taken by those who moved repeatedly were not captured in the survey (WHO, 2011).

Table 1. Movements of flood-affected IDP (after relocation to IDP camp)

Stayed in one place	64%
Moved once	34%
Moved more than 5 times	2.5%

Source: WHO, 2011.

UNHCR data also shows that IDPs mostly gathered in small groups after the floods, with the average camp size being 264 IDPs and the largest camp holding 20,000 people (UNHCR, 2010). With regards to camp management, the Pakistani authorities headed half the camps, a quarter lacked any central management, and the rest was organized by local NGOs, the Army, or individuals. The location of camps also varied, as shown in Table 2.

Table 2. Camp Locations

Sites	% of camps
Schools	39%
Other public buildings	10%
Tents	28%
Spontaneous roadside settlements	11%
Other	12%

Source: UNHCR, 2010.

Then again, it is very difficult to draw a detailed picture of population movements, in part due to the sheer size of the disaster and because data was not systematically collected. Nevertheless, the International Organization for Migration (IOM) is now rolling out a "displacement-tracking matrix", which will enable detailed data about population displacements to be gathered systematically and centralized in a common database (IOM, 2011b).

1.1.3. The food crisis

Thirdly, the floods brought about an acute food crisis by destroying many crops shortly before harvesting season. This caused prices to increase at the very moment that the purchasing power of the affected population fell sharply. On the one hand, the floods reduced the *availability* of food by destroying agricultural production. About 80% of food reserves were lost, 2.4 million hectares of standing crops (worth $1 billion) were destroyed (including a third of the rice planted in 2010), and hundreds of thousands of livestock and poultry were killed (WFP, 2010). According to the World Bank, the damage inflicted on the agricultural and fisheries sectors amounts to about $5 billion, roughly half the total cost of the damage (ADB/WB, 2010).

On the other hand, the food shortage was compounded by a reduced *accessibility* to food. By submerging land, sweeping away stores of feed and seed, and destroying irrigation systems, the floods hindered agricultural production and deprived rural communities of their unique sources of livelihoods. As 80% of the affected populations depended on agriculture for their income, millions became dependent on food aid – especially those families forced to flee to IDP camps (IASC, 2011:43).

As a result, the floods gravely stressed food security and increased under-nutrition, a condition that also exacerbates vulnerability to diseases (Black et al, 2008). UNICEF reported that six months after the floods, 22% of children aged 6-59 months in Sindh were still suffering from acute malnutrition, well above the WHO's 15% emergency threshold level (UNICEF, 2011a).

The floods wiped out years of development and aggravated the inequality that is endemic in

Pakistan: two percent of households control more than 45% of the land in the country (World Bank, 2011). The cataclysmic results of the floods further marginalized poor and vulnerable populations, leaving most farmers without productive land and severely curtailing access to vital services that would normally serve as a safety net in difficult times.

1.1.4. A complex emergency

Finally, a "complex emergency" occurred in areas of military conflict that were also affected by the floods. The precarious security situation in Northwest Pakistan aggravated the risk of negative outcomes from the natural disaster. The region is embroiled in the "War on Terror" pitting national and international security forces against Taliban insurgents, and over 2.4 million people have been internally displaced by the fighting (HRCP, 2010).

Conflict-induced IDPs were "among the most vulnerable groups in flood-affected areas" (IDMC, 2010). Many had only just recently resumed farming activities when the floods destroyed their crops. Furthermore, the most severely affected areas were precisely those where people displaced by conflict and human rights abuses had sought protection. Finally, the precarious security slowed the delivery of emergency relief. Tellingly, the highest mortality rates occurred in areas controlled by Islamist militants: for example, KPK province experienced mortality rates 10 times above the national average (WHO, 2010b).

It is clear that floods are multidimensional crises with wide-ranging consequences for affected populations. But how do underlying vulnerabilities interact with the crisis itself to trigger migration? The context of social vulnerability that paved the way for mass displacement in the wake of the floods will be now examined, in line with the legal rights that protected them.

1.2. Vulnerabilities and rights

The relationship between floods and migration is non-linear, but contingent on the vulnerability of the affected group or individual. Vulnerability refers to "the totality of relationships in a given social situation producing the formation of a condition that, in combination with environmental forces, produces a disaster" (Oliver-Smith, 2006). That is to say that disasters are socially produced, in so far as environmental hazards only become disasters when the social, economic, and political resources "to anticipate, cope with, resist, and recover from the impact of a natural hazard" are exhausted (Blaikie, Cannon, and Wisner, 1994:9). Population displacements, therefore, depend on the level of exposure to the flood, as well as on the ability to resist or adapt to its effects.

Vulnerability to environmental disasters, furthermore, is determined by four categories of factors: (i) individual factors, such as the level of health or socio-economic standing of a person; (ii) community-level factors, such as the presence of water and sanitation infrastructure in a locality and egalitarian access to drinkable water; (iii) access to information, which is facilitated by early warning systems and democratic institutions; and (iv) geographical factors, such as the proneness of low-lying river basin areas to floods (Adger, 2006).

The floods impacted Pakistani communities so markedly not solely because of their wide extent, but also because of the high vulnerability of the exposed population. The floods took place in flood-prone areas, and where communities had little access to information and similarly meager resources with which to cope or adapt. The people most severely-affected were predominantly small farmers and unskilled laborers that are reliant on agriculture for subsistence and live close to, or below, the poverty line. In addition, children were most affected by infectious diseases due to their inherent physiological vulnerability. Lastly, political instability and insecurity also contributed to this climatic event becoming a "complex emergency".

Responses to floods may vary, including *flight* and *evacuations* of people from harm's way, temporary *displacements, resettlements* to new homes, or *migration* to new (and usually distant) areas (Oliver-Smith, 2006). Moreover, such responses are often linked with one another. In Pakistan, for example, people initially fled or were evacuated by the Army, many were then placed in camps; and upon leaving camps, some resettled to new homes, while those who could not return to their area of origin simply migrated elsewhere (though detailed figures on such patterns are not available).

The vast majority of Pakistani displaced also did not cross an international border, which is a prerequisite to be granted the "refugee" status. The populations displaced by the floods in Pakistan, therefore, are not refugees but environmentally-induced internally displaced peoples (IDPs).[1]

Although not a legal category as such, IDPs are more and more recognized in international law.

1. IDPs are those "forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border." (1998 UN Guiding Principles on Internal Displacement)

Certain legal documents do indeed provide protection to them, such as the 1998 United Nations (U.N.) Guiding Principles on Internal Displacement, which sets clear rules to protect their human rights.[2] But they remain instruments of soft law devoid of clear enforceability. While such principles have gained general acceptance and authority, and were broadly respected during the Pakistani floods, it is important to note that the Pakistani Government labeled flood victims "flood affectees" – restricting the IDP category to those affected by military conflict in the Northwest (IASC, 2011).

2. RESPONSE TO A HISTORIC CATASTROPHE

Underlying social vulnerabilities and the legal context shape much of how the flooding disaster unfolded. But how did the emergency response play out on the ground?

The 2010 floods in Pakistan occurred with such speed and on such a scale that few governments could have faced it alone. With over half the country's districts affected, the sheer geographical scale and the number of affected people by the flood made the humanitarian response one of the biggest and most complex ever conducted by the humanitarian community (IASC, 2011).

2.1. Timetable of the response

The timetable of the response to the floods was organised in three phases: (1) a "rescue & relief" phase focused on immediate emergency operations, to prevent epidemics and provide emergency food and shelter, which started with the floods and ended in January 2011; (2) an "early recovery" phase to help affected populations rebuild their houses, restore their livelihoods, and restore basic health and education services, which also started with the floods and is expected to end at the end of 2011; and (3) a "reconstruction & rehabilitation" phase to rebuild all the remaining damage, which started in January 2011 and is expected to be completed within three to five years (OCHA, 2010). According to the Damage and Need Assessment conducted by the World Bank and the Asian Development Bank, the costs of the floods are as follows:

Table 3. Total Cost of the floods (in $US)

Phase	Funding
Emergency Relief	$928 million
Early Recovery	$956 million
Reconstruction and Rehabilitation	$6.8 billion - $8.9 billion
TOTAL	$8.6 - $10.7 billion

Source: ADB/WB, 2010.

2.2. Funding

The Pakistani authorities quickly solicited the help of the international community as the colossal scale of the floods became apparent. A first appeal was launched in early August 2010 for $459 million to respond to the immediate relief needs of the flood-affected populations. In November, the UN Office for the Coordination of Humanitarian Affairs (UNOCHA) launched the "Pakistan Floods Emergency Relief and Early Recovery Response Plan" (PFRERRP), which called for $1.96 billion to finance the first two phases of the response. To date, only $1.3 billion (69.7%) of funds requested have been raised, and only 34% of the early recovery components having been financed (OCHA Financial Tracking Service, 2011).

These funds have been the main source of finance for the international relief efforts. They have been directly distributed to UN Agencies, international organisations and INGOs/NGOs to fund projects on the ground, but have not been routed through Pakistani government channels (NDMA, 2011). In addition to international funds, help came in the form of rescue operations, medical supplies, food, clothing, non-food items (NFIs) and shelter kits from various countries, donor agencies, NGOs, the private sector and individuals.

In spite of these donations, the brunt of the cost of the floods is being born by the Pakistani government, especially as it now enters into the "reconstruction & rehabilitation" phase of the response. The immense cost of the disaster has placed an extreme burden on public finances in Pakistan (ADB/WB, 2010).

2.3. Coordination

In Pakistan, natural disasters are managed by the National Disaster Management Authority (NDMA), which is mandated to oversee and coordinate all disaster response activities. At the national level, it coordinated the evacuation and rescue operations of the Army and established a logistic flow system to dispatch relief goods to affected areas. Relief goods were first centralised at the Pakistani Air Force "main operating base" in

2. Also provide similar guidelines for action: the IASC Operational Guidelines on Human Right and Natural Disasters, the Humanitarian Charter, and Minimum Standards in Humanitarian Response.

Chaklala, then dispatched to provincial "forward operating bases", and transported to "district nodal points". From district nodal points, relief assistance was transported to affected areas by helicopter, boats, trucks or mules (NDMA, 2011). By and large, these early first-response operations are credited with having prevented massive loss of life (IASC, 2011:33).

Within a few weeks, the vast array of actors who came to operate on the ground were organised into clusters, as requested by the 2005 humanitarian reform. Local and international non-governmental organizations, international organizations, UN agencies and foreign aid agencies all worked to support the Pakistani authorities. The UN and its partner NGOs formed 10 clusters, each with a specific mandate and lead organisation at its head (see Table 4).

Table 4. Clusters and lead organisations

Cluster	Lead organisation
Agriculture	Food and Agricultue Organization (FAO)
Camp coordination and management	UN High Commissioner for Refugees (UNHCR)
Community infrastructure	UN Development Program (UNDP)
Education	UNICEF
Food	World Food Program (WFP)
Health	WHO
Logistics	WFP
Nutrition	UNICEF
Shelter and non food items (NFI)	IOM
Water sanitation and hygiene (WASH)	UNICEF

Source: OCHA, 2010.

2.4. Humanitarian response

The humanitarian response has sought to meet three overarching objectives: implementing the "survival strategy" to prevent excess mortality and morbidity, restoring livelihoods, and re-establishing community services (OCHA, 2010).

The Health Cluster carried out 25 million medical consultations through the Disease Early Warning Systems (DEWS). With the help of its partners, the WHO also set up 1,400 mobile health clinics in disaster zones, which have treated 5.7 million people (WHO, 2010b). Medical teams have been primarily treating skin diseases, acute diarrhoea, respiratory infections and suspected malaria. They have also been running immunization programs as well as providing health education and maternal care (WHO, 2010b). Six months after the floods, three-quarters of households reported a flood-related health issue, but almost all reported sufficient access to basic healthcare (WHO, 2011:13-14).

The Food Cluster was able to nearly triple its food emergency distributions from three million to eight million beneficiaries by October 2010, thereby preventing millions from temporary hunger (IASC, 2011:34). *The Nutrition Cluster*, for its part, has focused on screening and treating children for malnutrition (UNICEF, 2010). From October onwards, it substantially expanded its nutrition programs: especially in Southern Pakistan, UNICEF established a total of 625 Feeding Centres for the management of severely malnourished children, as well as 602 Supplementary Feeding Programmes (UNICEF, 2011a.). So far, 1.3 million young children have been screened, and 55,921 out of 89,832 severely malnourished, 155,000 out of 301,000 moderately malnourished and 95,131 out of 180,000 pregnant and lactating women have been treated in feeding centres (OCHA, 2011b:3). UNICEF also provided 8.5 million children with Vitamin A supplements (UNICEF, 2011a).

The Water Sanitation, and Hygiene (WASH) Cluster has worked to reduce the vulnerability of affected populations to water-related diseases, by improving access to safe drinking water and sanitation, and raising hygiene awareness. UNICEF and its 172 reporting organisations have provided clean water to 3.5 million people daily (mainly by installing and repairing hand pumps) and sanitation facilities to 1.9 million people. By January 2011, it had also provided hygiene kits to nearly 6.5 million people and distributed thousands of buckets and jerry cans (USAID, 2011). On the whole, the absence of major outbreaks of water or sanitation-related diseases highlights the success and benefit of the WASH aid (IASC, 2011).

The Shelter and NFI Cluster, headed by IOM, provided emergency shelter to families made homeless by the flood, and has since been helping them rebuild their homes. During the floods, the cluster distributed one million tents and tarpaulins, mostly in the provinces of Punjab, Sindh and KPK – still, only accounting for 67% of the emergency shelter needs. In addition, it provided substantial non-food items (NFIs) that included 438,600 bedding sets, 603,200 kitchen sets and 94,500 tool kits (IOM, 2011b). As part of its "winterization strategy", moreover, it distributed more than 2.5 million blankets to help households get through the cold winter (IOM, 2011a).

Since March 2011, the Cluster has focused on "Early Recovery" efforts to rebuild houses and support sustainable returns. Households with completely destroyed houses (60% or more damaged)

have been helped to move out of their emergency shelter and into solid "one-room" or "transitional" shelters. Transitional shelters are wooden lightweight structures that can be relocated, and are aimed to those who cannot yet return to their area. One-room shelters are simple traditional structures made from mud or brick, which can progressively be upgraded with more rooms to form a home once finances are available. The cluster has used work-for-food programs and cash hand-outs (WATAN cards) in order to support the recovery of the local economy. It has refrained from conducting key-in-hand projects, while providing technical assistance and ensuring the fluid supply of locally sourced materials (NDMA, 2010).

Furthermore, other clusters have worked to restore livelihoods where crops and livestock have been destroyed and land inundated. *The Agriculture Cluster* has distributed seeds (wheat and vegetable) as well as fertilizers for the winter planting season to over 768,000 households. Some 320,000 households have also received livestock feed to prevent further losses of animals. As a result, the latest estimates show that agricultural production in flood-affected areas will reach 90% of pre-flood levels (NDMA, 2010:38-39). Finally, the response sought to restore basic community services. *The Education Cluster*, for example, repaired about 1,000 flood-damaged schools, trained 8,000 teachers in disaster risk reduction, and established Temporary Learning Centers that benefited nearly 300,000 children. UNICEF also established about 1,000 Child Friendly Spaces (CFS), which today provide educational and recreational activities as well as psychosocial support to 411,000 children. In addition, it plans to install 500 Transitional School Structures (TSS) in flood affected areas in 2011 to ensure access to quality education for children whose schools were damaged or destroyed by the floods (UNICEF, 2011b).

3. THE CURRENT SITUATION AND FUTURE PROSPECTS

3.1. Assessing the response

The emergency relief phase of the response was successful, as a major food crisis or epidemic outbreaks were avoided, despite being undertaken in difficult circumstances. Aid was sent to areas that were either under water, in mountainous regions cut off by damaged bridges, or in areas where the Taliban insurgency was under way. Conversely, it has been reported that aid distribution was subordinated to political interference in some instances, and that organisations with ties to radical Islamic organisations such as Lashkar-e-Taiba engaged in relief and rescue operations, raised funds, and set up camps (*Times of India*, 2010).

In addition, most IDPs have now left relief camps. In the aftermath of the floods, 3.4 million people were displaced and forced to live in some 5,928 relief camps. Six months after the floods 166,000 people still lived in more than 240 camps and spontaneous settlements (UNHCR, 2011a). Today, 97% of displaced populations have left relief camps. Some areas remain under water, however, such as in Sindh and Balochistan, where approximately 53,075 acres of land are still inundated with half a metre of floodwater. In these provinces, 60 relief camps continue to host a total of 53,168 flood affected IDPs, while all other provinces are now showing 100% rates of return (NDMA, 2011).

But due to the scale of the destruction, many returnees have not been able to live in their own homes. As of January 2011, more than half the IDPs had returned to their original homes, but a third were still living in tents, while the remaining 15% were living with host families or in rented accommodation in their area of origin, according to a survey conducted by UNHCR in Sindh (UNHCR, 2011b).

Early recovery and reconstruction objectives, on the other hand, have only partially been met thus far. A year after the floods, affected populations report ongoing needs across all sectors, with the most pressing issues being permanent shelter (54.0%), economic support (28.5% for loans to restart farms or businesses and 23.3% for employment), and food (31.3%) (WHO, 2011). The main impediments are by-and-large financial and organisational insufficiencies, as only 34% of the requested funds for early recovery have been raised from donors to date, and most clusters have inadequate strategic plans (IASC, 2011:42). As detailed below, the funding gap particularly affects the housing and agricultural sectors, as well as health and education (OCHA, 2011a).

Table 5. Funding gap for early recovery (in $US)

Sectors	Balance needs
Agriculture and Food security	79,000,000.00
	20,819,870.00
Health and Nutrition	44,958,230.00
Water and Sanitation	32,811,052.00
Education	44,079,573.95
Housing	118,601,921.00

Governance	10,536,000.00
Non-Farm Livelihood	12,030,000.00
Community physical Infrastructure	25,000,000.00
Disaster risk reduction	10,665,000.00
Environment	(4,316,500.00)
Gender	4,909,582.00
Protection	14,000,600.00
TOTAL	413,095,328.95

Source: OCHA, 2011a.

Limited financial resources have meant that few houses have been rebuilt. Only 40,500 one-room and transitional shelters have now been constructed, out of the 1.7 million homes damaged or destroyed by the floods. Likewise, the current commitment to help build 247,000 solid shelters by the end of the year would only meet 31% of the total needs (UN, 2011). This shows that there remains a clear and dire need for increased funding if the shelter crisis is to be resolved.[3] In addition, many houses are being rebuilt in dangerous riverbank areas, while many people without land rights have been returning home to find themselves without a place to plant or rebuild a house (OCHA, 2011b).

Moreover, basic social services remain disrupted in flood-affected areas (UNICEF, 2011b). Concerns subside about the potential outbreak of epidemics, while many people still lack food assistance, safe drinking water, and permanent shelter, particularly in Sindh. Local communities are also facing the challenge of re-establishing their source of livelihood and rebuilding destroyed infrastructure. In addition, Pakistan hosts 1.25 million IDPs, as well as 1.8 million refugees from Afghanistan (IOM, 2011c:119). These populations are particularly vulnerable to environmental disasters and underscore the continuing risks created by complex emergencies in Pakistan.

3.2. Climate change and preparedness

Early recovery activities must transition as seamlessly as possible to support long-term reconstruction and avoid leaving affected populations in an even more vulnerable position to face the next disaster. Indeed, future prospects do not bode well for floods in Pakistan. It already is a disaster hotspot and one the most flood-prone countries in the world. Unfortunately, climate change will only worsen the trend, forcing ever-larger numbers of people off their land. It will intensify monsoons, with up to 20% more rain falling in South Asia by 2050. Melting glaciers will increase the risk of flooding during the wet season and drought in the dry-season, particularly in South Asia (IPCC, 2007b). Global warming will also cause extreme weather events to increase in intensity and frequency, with category 5 tropical storms expected to triple over the next century (Knutson and Tuleya, 2004).

Climate change is also set to cause more epidemics and malnutrition (IFPRI, 2009), as crop yields will fall by 30% in South Asia over the next 40 years (IPCC, 2007a:11), and diarrhoeal and infectious diseases will affect more people due to higher temperatures and humidity levels (WHO, 2009:24-25). This in turn will erode the systems sustaining health and may lead to conflicts over depleted resources.

Pakistan is therefore caught in a ratchet, as environmental factors steadily gain in strength while affected populations become ever more vulnerable. The 2010 floods have stretched the coping mechanisms of flood-affectees to their limit as many have reportedly sold whatever assets they owned to survive last year's disaster (IASC, 2011:45). It is therefore urgent to help the most vulnerable groups build up their resilience. Until now, the international response has largely focused on emergency relief, but a strong commitment to early recovery and reconstruction is absolutely necessary.

Pakistan must also improve preparedness. It must first build up national capacities and develop specific contingency plans for areas at risk. Since the floods, the NDMA has established a Strategic Planning Unit (SPU). The government has also set a goal to meet the Hyogo Framework for Action (HFA) on disaster risk reduction by 2015, and has established early warning systems for this purpose; flooding mitigation programmes are also being developed in collaboration with the UN (NDMA, 2011).

Pakistan must also strengthen its cooperation with external actors and improve cluster coordination. Indeed, reconstruction has been organised along cluster lines rather than having an integrated perspective at national and regional levels. An overarching strategy for reconstruction and rehabilitation as well as a comprehensive assessment of outstanding needs are both still lacking today in Pakistan. A major reason for this is that the NDMA and OCHA requirements for medium and long-term strategies have been inconsistent and changed over time (IASC, 2011:57). Also, while information was widely collected, it was often duplicated and not used for strategic purposes.

3. Nevertheless, the crisis has been resolved in certain regions, like in Gilgit-Baltistan where 100% of the caseloads have been covered.

The NDMA should, therefore, appoint a single unit to conduct continuous needs assessments during and after disasters to avoid duplications, while cluster leads must agree on standard assessment formats and methodology. IDPs must also be systematically tracked, to better target their needs (IASC, 2011).

CONCLUSION

One year after the 2010 floods in Pakistan, a mixed picture subsides of the disaster response and future preparedness. The floods were of an unprecedented scale as the heavy monsoon rains of the North traveled the length of the country, washing away entire communities and forcing massive population displacements. Within weeks the humanitarian response grew to become the largest emergency operation ever staged, thereby preventing the crisis from enduring unnecessarily and avoiding many deaths.

Nevertheless, although the floodwaters may now have receded, the devastation remains. It is critical for recovery and reconstruction efforts to be maintained, and proper funding and strategic coordination to be provided, if the resilience of vulnerable communities is to be restored. The Pakistani authorities must also continue making headway towards institutionalizing disaster mitigation and integrated response to natural disasters, as well as improving preparedness.

Climate trends are unequivocal: floods will affect Pakistan with ever-greater frequency and severity. Therefore, the humanitarian community, local and federal governments, as well as local communities must learn from their shortcomings and better prepare for the next, inevitable disaster in Pakistan.

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2. WILDFIRES IN RUSSIA

Daria MOKHNACHEVA

INTRODUCTION

In 2010 Russia experienced the hottest and driest summer on record. Fast-spreading wildfires in July and August devastated forests and crops, destroyed dozens of villages and surrounding infrastructure, killing 62 people. As over 3,000 rural households were destroyed, thousands of people were forced to seek temporary refuge. Important efforts were undertaken by the government and civil society to contain the fires and assist the victims. This case study provides an analysis of the emergency response to the disaster and compensation and reparation policies in Russia, with a particular focus on the displacement and resettlement of the affected population.

1. CONTEXT OF THE DISASTER

1.1. Historical and socio-economic context

Since the disintegration of the USSR in 1991, the Russian Federation experienced various political, institutional, economic and legal reforms. Yet, the federal government has considerable power, and the responsibility over regional matters is shared between the federal bodies (responsible for general policy and decision-making) and the regional administrations (policy adaptation and implementation).

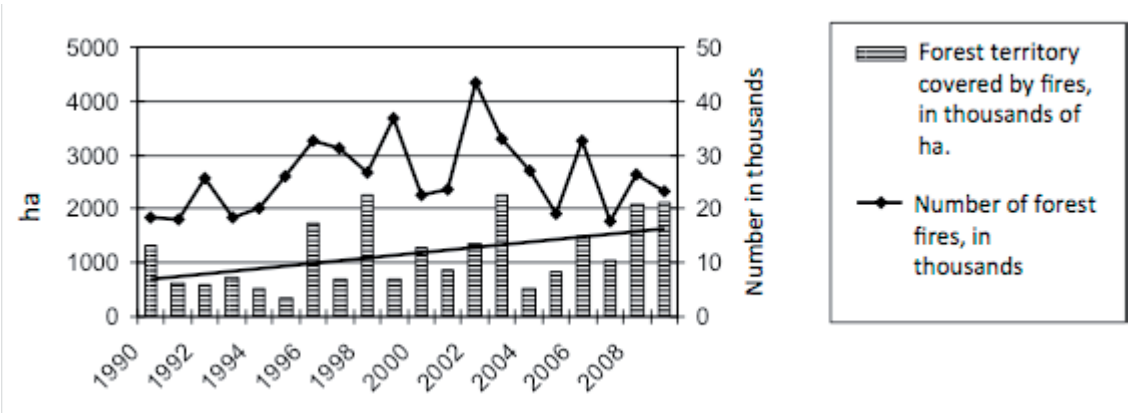
Since the 1990s, Russia has faced a demographic crisis as low birth rates, low life expectancy, and high mortality rates contributed to a fast population decline (-4.25% from 1991 to 2006; Demographic Research Institute, 2011), only slightly mitigated by return and labour immigration from CIS (Commonwealth of Independent States) countries. The situation, however, started improving in the mid-2000s, and increasing immigration and decreasing natural decline led to an increase of the population by 10,500 thousand people in 2009, the first increase since 1994.

Internal migration accounts for 85% of total migration flows in Russia. On average, 1.9 million people migrate within the country every year (1,910,648 people in 2010, Federal State Statistical Service, 2010b). Federal Law of the Russian Federation N5242-1 (1993) provides a legal basis for internal migration and guarantees freedom of movement and choice of residence within the country for Russian citizens. Among these internal migrants, a majority (55%) migrate within the same federal subject[4]. Main internal migration flows are directed from Northern and Eastern parts of the country (particularly, the Far Eastern federal district) towards the west (Central federal district). Thus, Russia's population is unevenly distributed and concentrated in cities located mostly in the European parts of the country (the Central and Volga federal districts account for 48% of the population; Federal State Statistical Service, 2010b), whose better economic opportunities continue to attract both international and internal migrants. Moscow and the Moscow region attract 93% of internal migrants.

Large areas of the country remain sparsely populated, and rural areas suffer from depopulation: nearly 100,000 people left rural Russia in 2010, mostly young people (14-29 years of age). Rural Russians, who account for 27% of the national total (Federal State Statistical Service, 2010b), often suffer from poor living conditions, limited infrastructure and social services. Nearly half (47%) of

4. The Russian Federation consists of 83 federal subjects, which are administrative units enjoying different levels of autonomy but an equal representation in the Upper House of the Parliament (two delegates for each federal subject).

Figure 1. Government statistics on forest fires 1990-2010



Source: Blokov, 2010.

the rural population is older than 40, and about 14% is older than 65, which points at another demographic and social problem, as many elderly people live alone in harsh conditions in the countryside (Federal State Statistical Service, 2010b)

Considering existing demographic and socio-economic problems, the government is currently working on the design of a new framework for the national migration policy for the 2012-2025 period, following the 2002 Presidential Decree, 'On the improvement of the management of the migration policy'. The project is aimed at harmonizing existing federal and regional legislation and addressing existing gaps in the legislation and the rights of the migrants, to facilitate and optimize migration flows and encourage economic modernization and development in the country. The draft document was to be examined in 2011 by the State Commission for migration policy (Federal Migration Service, 2011). In addition, a Framework for the demographic policy of the Russian Federation until 2025 (Presidential Decree N1351, 2007) contains specific clauses concerning support to the improvement of living conditions and infrastructure in difficult and less developed regions that currently suffer from migration outflows, as well as support to the relocation of people from regions with harsh environment and climatic conditions. Currently, a federal programme 'Zhilishe' ('Housing'; Presidential Decree 675, 2002) is being implemented to improve the living conditions and housing of the population. It includes initiatives to relocate people to better housing, and to provide new accommodation to displaced people, including those displaced by nuclear accidents and disasters. Additionally, a special programme is being implemented to close some old and isolated settlements in the Far Northern areas, with subsidies provided to the residents to help them obtain housing in other towns or regions (Federal Law N 211).

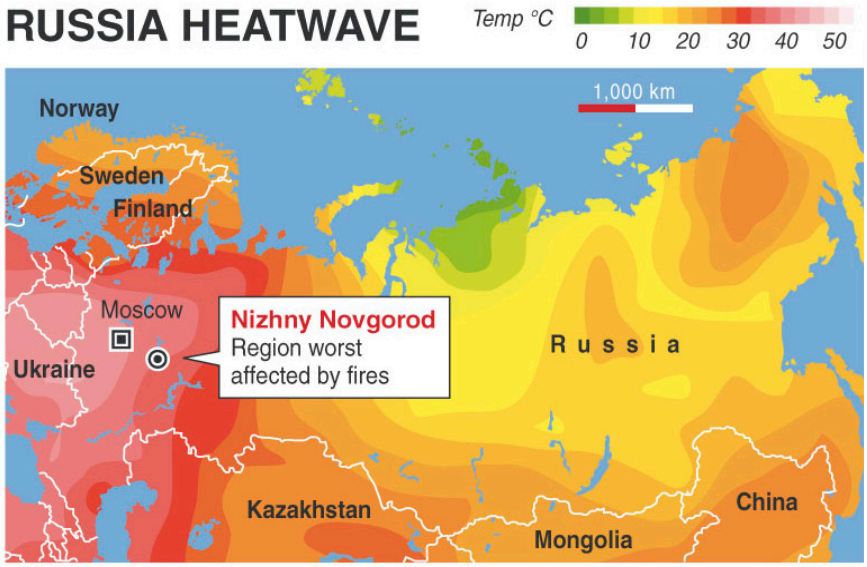
1.2. Geographical location and environmental characteristics

With an area of 17 million square kilometres, Russia occupies most of Northern Eurasia and is largely covered with biodiversity-rich, little-disturbed ecosystems, many of which are listed as globally significant by the World Wildlife Federation (WWF, 2010). Russia's forests cover an approximate area of 780 million hectares, representing 22% of the world's forest resources, and play an important role in the national and local economy (WWF, 2011, Global Forest Watch, 2011).

Wildfires present a major challenge with significant environmental and economic impacts that the Russian government has to confront on a yearly basis. Between 15,000 and 50,000 wildfires are recorded in the country every year, covering from 2 to 17 million hectares and destroying several hundreds of thousands hectares of forest and wood.

These figures vary greatly among regional and governmental agencies, ministries and research institutes, and from year to year, but there is a general acknowledgement of the fact that the total area covered by wildfires has increased over the last decade. According to the Russian Federal Forest Agency (Rosleskhoz, 2011), 90% of forest fires occur as a result of human activity, such as breach of fire safety regulations, negligence, as well as poorly controlled agricultural burning of land (a practice inherited from the Soviet times and still widely used accounts for 10% of wildfires). Natural causes, such as lightning, account for only 10% of forest fires. Peat from swamps that were drained

Map 1. Temperatures in Russia during heat wave in August 2010



Source: Reuters.

during the Soviet times constitutes another major fire hazard. Heat and low levels of humidity result in underground peat fires, which are harder and costlier to fight, and can have highly destructive ecological consequences and damage to human infrastructure. Most fires usually burn in vast, scarcely populated areas in Northern Siberia and the Far Eastern region, where fire-fighting efforts are limited because of difficulties of access, high costs and the near-absence of threat to the population. Wildfires that occur in more densely populated areas are generally contained effectively.

2. THE DISASTER

An unprecedented heat wave hit Russia in the summer of 2010. Several temperature records were set in the European part of the country. Throughout the entire month of July, Moscow experienced the hottest temperatures recorded in more than 130 years, topping 35 degrees Celsius. The west of the country suffered from its worst drought in decades, destroying crops, raising concerns about food security and economic growth in Russia, and forcing the government to impose a ban on grain exports, which markedly reduced world wheat supplies. Extremely hot and dry weather conditions resulted in intense and fast-spreading forest and peat fires as dry trees and peat caught fire easily. 19 federal subjects of the Russian Federation were affected by wildfires, mainly in the Western and Central parts of the country.

Some spring fires had already occurred in April and May, but regional authorities and the ministries in charge of forest protection claimed that the situation was under control by the beginning of the summer. Serious public, media and government concerns were only raised with the intensification of fires starting on July 29, when several villages were destroyed in the Nizhny Novgorod region within minutes. On July 31, the head of the Russian Ministry for Civil Defence, Emergencies and Disaster Relief (EMERCOM) admitted that the situation was 'complicated', and 30 people were reported to have died (Ministry for Civil Defense website, 2011). On August 2, the President of the Russian Federation, Dmitry Medvedev declared a state of emergency in seven regions, including Vladimir, Voronezh, Moscow, Nizhny Novgorod, Ryazan oblasts, and the republics of Mordovia and Mari El. Despite important efforts mobilised in the following days, new outbreaks of fire continued, and the death toll reached 50 by August 6. Starting August 12, the situation improved, and President Medvedev announced on August 20 that the crisis had been overcome. The fires were significantly reduced by the end of August, but were followed by a short new destructive wave of fires in the Volgograd region on September 2 and in the Altai territory (South Siberia) on September 8. Wildfires were almost completely extinguished by mid-September thanks to the efforts of professional fire fighters and volunteers. Some fires remained in the Far Eastern region and were put out by the third week of October (Ria Novosti News Service, 2010b).

According to the official figures of the Federal Forest Agency published in a report in February 2011, 32,000 wildfires occurred between the end of July and August 2010, covering a total area of 2.1 million hectares, and destroying 193,200 hectares of forest (Russia Federal Forest Agency, 2011). At the same time, by the end of August, independent Russian research institutes of the Russian Academy of Science had identified fires covering a total area of nearly 6 million hectares using advanced satellite technologies, while according to the Global Fire Monitoring Center wildfires had burned over 10-12 million hectares (Yabloko Report, 2010). Up to 400 new wildfires (200 on average) were recorded daily at the peak of the fire season from the end of July to mid-August.

The scale of the fires in the summer of 2010 was unprecedented and resulted in many casualties and material damage. According to official figures of the Ministry of Regional Development stated in October 2010, 199 settlements were entirely or partly burnt down and 3,180 houses destroyed. 62 people died in the fires, including 3 fire fighters. A total of 3,591 families were left homeless. Altogether, 7,237 people were affected, including 3,340 elderly people and 740 children (Ministry of Regional Development Report, 2010). Several industrial and military facilities were destroyed in the fires. A cloud of smoke stretched over 3,000 kilometres, enveloping several highly populated urban centres, including the capital, for several days. Pollutants, particularly carbon monoxide, were measured at two to three times maximum permission concentration levels, aggravating health problems. According to a report of the Ministry of Economic Development (BBC Russian, 2010), the heat wave in Russia increased the mortality rate five times, with 56,000 deaths more compared to the summer of 2009. According to Rosstat, the biggest increase in the mortality rate was recorded in the regions that were most affected by the fires, including Moscow region, Samara, Saratov, Ulyanovsk and Voronezh oblasts. Some residents of large cities, including Moscow, fled from the smog and heat and temporarily sought refuge in less affected regions – some went to their country houses, or to summer resorts in Russia or abroad (Interfax, 2010). Exact nationwide figures of voluntary and forced displacement caused by the fires and smog are not available.

Wildfires reached radiation-contaminated areas in the Bryansk region (close to Chernobyl), and got dangerously close to a nuclear research facility in the Nizhny Novgorod region and a nuclear fuel reprocessing facility in Chelyabinsk Oblast. The release of radioactive material into the atmosphere was feared, however no increase in radiation levels was detected in the region. (BBC Russia, 2010b).

The fires had a significant environmental impact as they reached natural protected areas, and destroyed some pristine forests, ecosystems and rare species of fauna. It is also estimated that the carbon emissions generated by the wildfires in 2010 amounted to 18% of Russia's annual GHG emissions, raising concerns about their current and future impact on the global climate and temperatures in the Arctic (Ria Novosti News Service, 2010b).

3. RESPONSE

Three main phases can be distinguished in the area of disaster management. The first concerns prevention and preparedness – design and implementation of safety standards, elaboration of emergency plans, dissemination of information. The second level is immediate emergency response in the case of disaster (informing the public, evacuating the population, providing first aid, fire fighting). The third level comprises long-term reparations, compensation, and restoration of adequate living conditions and means.

3.1. Legal framework for disaster management

The rights of Russian citizens in disasters are little elaborated and not detailed, and legislation pertaining to ecological disasters focuses mainly on preventive and safety measures, and responsibility for technological hazards and the liquidation of their consequences.

The responsibility to protect civilians, prevent disasters and manage their consequences is regulated by internal legislation in the Russian Federation, and is based mainly on two Federal Laws: Federal Law N68, dated 1994/12/21, 'On the protection of the population and territories from natural and technological hazards', and Federal Law N28, dated 1998/02/12, 'On civil defence'.

The two Federal Laws set out the general responsibilities and duties at different administrative levels (federal, regional and local), as well as the legal rights of civilians, and are complemented by additional regulations and guidelines at the federal and local levels. The general legal rights from which civilians benefit are stated in article 18 of the Federal Law 'On the protection of the population and territories from natural and technological hazards', and include the right for protection of lives, health and property by regional and local authorities in case of disaster, right for information, compensation and allowances, medical assistance,

and free social insurance. Meanwhile, the Federal Law 'On civil defence' provides the basis for the conduction of evacuation of the citizens in case of war or disaster, and assigns this responsibility to local governments.

Forest fire prevention responsibilities are set out in the Forest Code of the Russian Federation that came into force in January 2007 (Federal Law N 200-FZ, 2006). The new code decentralised the control over forest resources, and assigned the responsibility to prevent forest fires to private tenants and local authorities. At the same time, the staff of the forest fire fighting force was significantly reduced, the forest fire fighting air force 'Avialesokhrana' dismantled, and the task of fire fighting distributed between various smaller public and private companies.

The concrete implementation of regulations pertaining to disaster management falls on regional and local authorities (although according to Federal Law 'On the protection of the population and territories from natural and technological hazards', article 19, citizens also have some duties in disaster prevention and relief). However, as it became apparent that the regional governments failed to deal efficiently with the 2010 wildfire crisis, the federal government took over the management of the disaster on July 30, and the disaster management responsibilities were divided between various ministries and overseen by the Prime Minister and the President. The Ministry for Civil Defence, Emergencies and Disaster Relief, which is usually responsible for emergency response in disaster situations that threaten people's lives, took over fire fighting activities, and mobilised more than 160,000 people in fire fighting operations (including several thousands volunteers), whose efforts throughout the summer and autumn helped put out the wildfires.

3.2. Evacuation and emergency response

Responsibilities for civil defence in Russian legislation include the provision of information to the population, the evacuation of the population and valuables to safe areas, the provision of shelter and of means of self-defence, and the provision of services, including medical assistance, first aid and accommodation. In theory, every administrative unit should have standard emergency plans for the evacuation of civilians in case of war or natural or technological disaster, as stipulated in the Federal Law 'On civil defence' (1998). Regional and municipal governments are expected to prepare and train the population, possess all necessary equipment and medical supplies, and organise and conduct evacuations. The Ministry for Civil Defence, Emergencies and Disaster Relief (EMERCOM) and the Ministry of Interior and the Defence Ministry provide troops to assist with evacuation, guarantee the safety of people, and maintain order. Existing guidelines, such as those issued by the All-Russian Scientific Research Institute for Civil Defence and Emergency Situations, describe the standard procedures for the management of evacuations, including the creation of special evacuation committees and units at designated points of departure and arrival, the specific duties of each actor involved, and the provision of transport, shelter and medical support.

The wildfires in 2010 demonstrated that not all municipalities were prepared for emergency situations. The residents of the rural settlements were usually informed about the necessity of evacuating by units of the EMERCOM or by the police that patrolled in the region. Evacuation was not always assisted, and the people were expected to leave their settlements on their own means. However, later on, buses were provided by the authorities for those who did not have their own transport. Some people refused to leave their villages, for fear of looting. Many elderly people died in their burning houses, as they had nowhere to go and were not ready to leave their homes (Argumenty i Fakty, 2010, Ria Novosti News Service, 2010b; Moscow Komsomolets, 2010). Some rural settlements were difficult to access because of poor infrastructure, which made evacuation difficult or sometimes impossible. A prisoner camp in the Republic of Mordovia could not be evacuated as the single railroad that connected it to nearby settlements had been dismantled in 2006 (Gazeta News Service, 2010a).

There are few available official statistics concerning the temporary resettlement of the victims and evacuees (it is unclear whether the evacuees were registered in the temporary camps), and most information comes from individual testimonies and investigative journalism. It appears that the provision of temporary shelter varied qualitatively and quantitatively across the regions. Many victims of the fires who lost their houses initially went to live with friends and relatives. Others were relocated to nearby settlements, where temporary shelter was set up in schools, sanatoria, hospitals and nursing homes. Residents of the village of Mokhovoe that burned down in the Moscow region on July 31 were relocated to a nearby Army barracks. In the Volgograd region, temporary resettlement camps were set up, offering three hot meals a day, medical and psychological care, as well as help with the recovery of lost documents and identification papers (Russia Region Press, 2010). In the Altai region,

60 people were temporarily accommodated in a local hospital, and some elderly people 'agreed to temporarily stay in nursing homes' (Russian Red Cross, 2010). Many citizens temporarily offered rooms in their apartments and houses to the victims – their offers were posted on the Ministry of Regional Development's website. Many displaced people were able to move into their new houses by the end of October, and the majority had moved by the end of November, although as reported by some journalists, some people who did not qualify for new housing had to stay in their temporary shelter, often unfit for the region's harsh winter climate. It appears that the victims were not always satisfied with the way evacuations were conducted. Some complained about the lack of assistance, others about the fact that they were kept in the temporary shelters with little available information, and could not return home for lack of transport. Some reported insulting treatment by government officials (Rosbalt News Agency, 2010).

Medical assistance was provided by the Ministry of Healthcare and Social Development and the EMERCOM. According to the Ministry of Healthcare and Social Development's website, 1,652 victims of wildfires received free medical assistance in August and September: the majority received outpatient assistance, and about 140 were hospitalised (Ministry of Health and Social Development, 2010 and Ministry of Regional Development, 2010a). Special medical units were created to provide medical assistance to fire fighters. A medical train circulated in the regions affected by the wildfires carrying doctors to assist victims, volunteers and fire fighters.

Other services made available to the victims included social and psychological support, as well as assistance with administrative matters. Education services were provided from September for all temporarily resettled children, either through the organisation of classes in the places of temporary accommodation, or via the provision of transport to local schools.

3.3. Compensations, reparations and costs

According to article 18 para. 1 of the Federal Law 'On the protection of the population and territories from natural and technological hazards', all citizens are entitled to compensation for lost property in the event of natural disaster. The actual amounts of compensation and allowances are, according to the same article, para. 2, 'to be defined by the legislation of the Russian Federation and the legislation of the [federal] subjects of the Russian Federation'. In practice, however, the insurance and compensation policies proved inefficient (Kremlin stenographic report, 2010). As highlighted by President Medvedev at a meeting on October 13, only 16% of the houses that burned down were insured. The amount of compensation for wildfires in 2010 had to be determined on an ad-hoc basis by the ministries and local governments. Every person qualifying for compensation received 10,000 Rubles (roughly 330 USD or 240 Euros) soon after the fires, enough to cover initial expenses (clothes, sheets, food). Retired people received an additional 25,000 Rubles. In addition, early in August, the government promised 200,000 Rubles to each victim for the loss of personal goods (paid jointly from the federal and regional budgets), and families of the deceased received 1 million Rubles. Those who lost their houses were entitled to either a financial compensation up to 2 million Rubles, accommodation in existing houses, or a new house built by the government. According to the statistics of the Ministry of Regional Development, most of the families (2,202) opted for new houses, while 1,061 families opted for monetary compensation, the amount of which was based on the cost of the property lost, calculated on average real-estate prices in the region concerned. Only 139 families chose to move to existing houses in other towns (Kremlin stenographic report, 2010). Although precise figures are not available, media reports suggest that some were helped by the government, but it is probable that many chose their new place of residence independently, and some might have moved to other regions (a right guaranteed through the Federal Law N5242-1 'On the right of Russian citizens to freedom of movement and choice of residence within the Russian Federation').

From September to November 2, 145 new houses were built under the supervision of the Ministry of Regional Development, and the last evacuees in the Volgograd region and Altai krai were able move in on November 30. The houses were often built in the original settlements to satisfy the demands of the victims, and followed the original street-plans (Vesti News Service, 2010). According to the construction plans published on the Ministry of Regional Development's website, 79 settlements were rebuilt, out of the 199 reported as destroyed. However, the Minister of Regional Development had announced mid-August that some of the original settlements could not be rebuilt: their residents therefore received apartments in nearby towns, or new houses constructed in nearby reconstructed settlements. As an example, the village of Verkhnyaya Vereya, in the Nizhny Novgorod oblast, which was entirely destroyed on July 29 with 341 houses burned down, was reconstructed in September,

and 60 additional houses were built to host people from nearby settlements that had been destroyed. The residents of the village of Mokhovoe, located in the Moscow region, where 15 residential buildings burned down, were relocated to a nearby village Beloomut, where 150 new individual houses had been constructed for the fire victims (Ministry of Regional Development, 2010b).

Following the request of the President, the infrastructure in the affected rural settlements was improved. Gas was provided to 19 settlements, and important social services introduced with the construction of maternity clinics, a nursery for 120 children, a playing field, playgrounds, shops, and a post office. The Ministry of Regional Development had further plans for the construction of additional social facilities (such as maternity houses, healthcare centres, schools, sports centres, art houses), roads, and electrical networks up to the end of 2011. According to the figures of the Ministry, by October 13, 10,933 billion Rubles (US$ 358 million, 264 million Euros) had been distributed by the federal government and sent to the regions to finance material aid and reconstruction works (Ministry of Regional Development, 2010c)

3.4. Public response

As is often the case following major sudden humanitarian disasters, the wildfires galvanised civil society, resulting in various acts of solidarity and assistance. Many volunteered to fight fires that encircled settlements and wildlife reserves. Youth political parties, churches, NGOs, such as the Russian and the Estonian Red Cross, businesses, and individuals from all over the country collected and donated clothes, furniture, and electrical equipment to the victims who had lost all their possessions. As mentioned above, some people offered accommodation, and some owners of hotels provided rooms for temporary shelter. More than 40 large national and international companies donated funds for relief and reconstruction, and some companies made contributions in-kind (for instance, Samsung provided 2,000 televisions for the affected families) (Kremlin stenographic report, 2010).

The international community also provided assistance. Fourteen countries sent staff and equipment to help with fire fighting operations. Some countries raised funds (such as Switzerland, which contributed 360,000 Euros); some offered rehabilitation programmes for victims and helped in the construction of the new houses. The International Federation's Disaster Relief Emergency Fund (DREF) provided CHF 111,772 (US$ 144,00, 101,000 Euros) to the Russian Red Cross for humanitarian aid to affected families (Relief Web, 2010).

The role of the media and the Internet was crucial in raising public awareness, complementing official figures that often understated or even played down the facts, denouncing the lack of political response and cases of social injustices, during the crisis and throughout the reparation period. Information and advice on how to help were posted on personal blogs, and helped mobilise public action.

4. ANALYSIS AND IMPLICATIONS

4.1. Criticism of the government response and policy

The main criticisms directed at the government concerned the failure to prevent the fires, which were aggravated by a slow, poorly coordinated and under-financed response. Many environmental NGOs and experts condemned the reforms of the Forest Code conducted by then President Putin in 2007, which resulted in spending cuts, the decentralisation and the dismantling of a forestry management and fire control system that had functioned effectively for decades, with professional, t rained fire fighters and appropriate ground and air equipment. Following the 2010 summer disaster and these criticisms, President Medvedev requested to review the Forest Code and increase the budget allocated to protection from wildfires. Some proposals were reviewed and amendments accepted by the State Duma in December 2010 (Federal Law N 422, 2010), and the Federal Forest Agency presented additional proposals for amendments of the Code in February 2011, which essentially consisted of restoring the controls over the protection from fire to the Federal Forest Agency, increasing the staff and designing an efficient monitoring and warning system.

Negligence and failure to implement regulations by responsible authorities were another important cause of the disaster and of the extent of its consequences. Prime Minister Putin fired the head of the Federal Forest Agency, who had played down the extent of the fires at the beginning of the summer and claimed that the situation was under control. A new presidential decree in August, 'On additional measures for the prevention and liquidation of the emergency situation, related to fire safety' attributed personal responsibility to the governors for fire prevention and liquidation, and compensation to the victims. On September 4, the President requested the Prosecutor-General to conduct an investigation on the unpreparedness to manage wildfires among local authorities, who had not reacted to the disaster in a timely manner, and did

not implement existing regulations on disaster prevention and emergency evacuation plans. Local authorities were accused of dereliction of duty and legal proceedings were initiated against some members of regional administrations, including in Moscow and Ryazan oblasts (Gazeta News Service, 2010b and 2010c).

The allocation of compensation and the reparation process also sparked many questions and criticisms. First, not all victims of wildfires qualified for compensation. Owners of houses that burned from ground fire (caused by agricultural burning) or fires that occurred outside of the peak period, or in regions that were not declared as threatened, were not entitled to compensation. Those who could not provide a proof of residence for lack of registration documents were also forced to open legal proceedings, and some had to continue residing in temporary shelters in poor living conditions. Mass media regularly denounced compensation injustice and housing problems, which led to official investigations by the Investigation Committee of the Russian Federation in May 2011 (Ria News Service, 2011).

According to the official figures, of the 3,591 families that had been left homeless, only 3,402 received new housing or indemnity. Thus, 189 families seem not to have received any form of compensation. The reasons for this are unclear, but this figure perhaps includes the 150 owners of burned property that had not been found, as reported by the Minister of Regional Development. These owners had perhaps moved to another region prior to the fires and did expect to be compensated.

Some beneficiaries of compensation complained about fraud, as their new housing turned out to be smaller than their initial property. Moreover, the quality of the new hurriedly built houses was not always appropriate for the local climate. It became evident at the beginning of the winter that the thermal insulation of the new houses was poor, and the heating system was not powerful enough to heat the houses, or too costly for the elderly. Some new settlements were built in swampy areas, which could affect residents' health and comfort. Those who complained were reportedly insulted by local government officials (Radio Free Europe, 2010, Rosbalt News Agency, 2010).

Some people did not always have a choice despite the initial offers of various compensation schemes by the federal government: most elderly people were resettled in new houses and were not offered financial compensation as an alternative, on the grounds that they would be more exposed to fraud if they tried to rebuild their houses without the government's help. According to the testimony of the residents of the village of Mokhovoe, they were not given a choice, and were relocated to new individual houses on the outskirts of a nearby village (Beloomut; Bigg and Kirilenko, 2010). In fact, many of the fire victims would have rather returned to their settlements, to which they were emotionally attached. Many, especially older people, who previously lived in apartments, were not ready to look after a house, which would be physically more demanding and more costly to maintain.

All told, the disaster pinpointed many legislative and institutional gaps in the management of emergency situations in Russia, as well as organisational weaknesses and a lack of professionalism at many levels of the country's administration.

4.2. Displacement and Resettlement

The disaster led to the resettlement of a section of the affected population, and governmental decisions and action in the aftermath of the disaster seem to have greatly shaped the patterns of displacement. Migration theory often refers to urbanisation processes, as difficult living conditions, natural hazards and a lack of job opportunities push people from rural areas to urban centres with better possibilities, services and infrastructure. It is possible that the wildfires and the destruction of settlements resulted in the departure of some people from rural areas to larger Russian cities. Younger families may have indeed been tempted to seek better opportunities in urban centres. But about a third of the victims preferred to take the financial compensation offered by the government, and there is no information on their subsequent movement and place of residence.

However, two thirds of the victims chose to move into the houses built by the government, which means in most cases that they remained in or close to their original settlement. Nearly half of the affected population were elderly and were not ready to leave the region with which they were familiar to start a new life elsewhere. At the same time, the compensation schemes designed by the government made it more economically advantageous to opt for new houses rather than to accept financial compensation, and in this sense the government perhaps encouraged a return policy within the affected population through promises of better housing and improved infrastructure and services. Such a view squares well with regional development policy, which has been designed to reverse the depopulation of rural areas.

While few people moved great distances as a result of the fires, much short-range displacement occurred. For example, official statistics show that

only 79 settlements have been restored out of the 199 initially reported as having been destroyed (Ministry of Regional Development, 2010b). Consequently, more than half of the settlements that burned down were abandoned. The reasons for this are not stated, but in some cases the government claimed that certain settlements could not be repaired, and new houses were built in nearby locations (it is not clear whether the residents were consulted prior to the decision and whether or not they agreed with it). In some cases the abandonment of settlements may have been a result of social modernisation policy: in October 2010, the Minister of Regional Development Victor Basargin requested the President's permission to examine the possibility of relocating the residents of very small isolated settlements to larger villages, where they could benefit from better social facilities and services, and find employment opportunities. This project was suggested to be implemented as part of the federal target programme 'Zhilishe'. Additionally, this would also reduce the costs of roads and infrastructure maintenance, and limit the vulnerability of the population in case of wildfires. According to the Ministry for Regional Development (Ministry for Regional Development videoconference, 2010), the population supported this policy and relocations have started in the Vladimir oblast. This policy again seems to have encouraged rural development, rather than an urbanisation process.

Overall, it seems that population displacement was limited and rather tightly controlled by the Russian government, which perhaps used the opportunity to support a policy encouraging the development of rural areas and preventing their depopulation.

CONCLUSIONS AND RECOMMENDATIONS

Despite potentially good intentions, the way compensation and resettlement were planned, organised and implemented can legitimately be criticized. Choices were sometimes imposed upon the victims, some social injustices occurred, and work was conducted too hastily and with little consideration of the actual needs of the population.

Another criticism concerns the long-term implications of the disaster. As President Medvedev acknowledged, the heat wave that hit Russia in 2010 may have been an illustration of the effects of climate change and a hint of the challenges to come. Judging by the trends of the last decade, wildfires are likely to become more destructive every year. As a result, rebuilding burned houses and infrastructure is not a sustainable policy, and further displacement of the population to more developed and less vulnerable areas may be a better solution.

Given people's reluctance or incapacity to abandon their homes and lifestyles on the one hand, and the risks of depopulation and loss of control of vast swathes of the country's territory on the other, the government will have to address the issue through a more sustainable approach. This would include increasing the resilience of the population, through stronger preventive, warning and protection systems, improved implementation of evacuation procedures and appropriate legal and institutional frameworks (including the revision of the Forest Code). Investments required for these adaptation measures will certainly be less than the cost of annual reparation and emergency response.

Where resilience cannot be built, voluntary migration can prove to be a positive adaptation strategy and reduce the vulnerability of the population (as well as reducing fires, most of which are caused by human activity and negligence). However, this would require appropriate conditions and mechanisms that would facilitate the relocation and the integration of people to new areas. These conditions and mechanisms could include improved infrastructure, subsidies to acquire housing in a new location, help with transport, help with integration into the local community, taking into account the fact that many of the people concerned are elderly or unemployed and thus have special needs. This would require an appropriate legal and administrative support, and therefore a revision of existing migration legislation. Some of these gaps have already been registered in the above-mentioned draft document for the new framework for the migration policy for 2012-2025, but the concrete policies and mechanisms would need to be further elaborated and described in greater detail in binding legal documents and guidelines. A few programmes already present in Russian legislation under the umbrella programme 'Zhilishe' (such as subsidies to people moving out of the Far Northern regions), could be used as a model for a resettlement and regional development policy supporting internal migration from wildfire-prone regions to safer areas.

Migration and development policies could well complement each other and improve the conditions of the population in the face of environmental hazards, through the assisted relocation of people to settlements with better infrastructure for protection from wildfires, transport and communication. Better employment opportunities available

in larger settlements and regional urban centres could help improve the livelihoods of rural residents. As for now, many make a livelihood from forest ecosystem services such as wood, berries, hunting: better employment opportunities would therefore make them less dependent on their immediate environment and more resilient to future disasters. The development of regional settlements and towns would at the same time help reverse current migration flows, reduce the pressure on larger urban centres in the west and centre of Russia, and perhaps even attract new migrants to the new modernised areas.

More generally, this case helps illustrate the complex relationship between natural disasters, migration and development, as environmental disasters can influence trends in population displacement and regional development, but can at the same time be mitigated through appropriate migration and development policies. Therefore, environmental factors and risks should be considered in both migration and development policy, and disaster prevention and relief policies should integrate migration and development as possible adaptation strategies. There is a great potential for improvement of Russian legislation and policies in this domain.

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3. THE EARTHQUAKE IN HAITI

Nikola Gütermann and Eve Schneider

Located in the Carribbean basin, which is subject to frequent natural and environmental disasters, Haiti's geography can be considered as a liability (Eichler 2006: 5). It lies in the middle of the hurricane belt and is subject to severe storms, occasional flooding and earthquakes as well as periodic droughts (CIA 2011). On January 12, 2010, it was struck by a major 7.0Mw earthquake, affecting more than 3 million people and leading to significant protracted displacement.

INTRODUCTION: NATURAL AND ENVIRONMENTAL DISASTERS IN HAITI

Natural disasters have long been part of Haitian history. The earliest recorded disaster was a hurricane that destroyed Santo Domingo in 1508; the first recorded disaster in modern times, "the great hurricane", struck the island in 1930 (Eichler 2010: 14). A wave of devastating disasters began with an earthquake in 1952 (prior to which quakes were virtually unknown on the island). Over the past decade, disasters have intensified and become more frequent. In 2004, for instance, Tropical Storm Jeanne killed over 3,000 people, mainly in Gonaives. One year later, Hurricane Stan led to nearly 1,800 fatalities and left roughly $3.9 billion in damage. However, the most brutal hurricane season ever experienced in Haiti was in 2008. Four storms (Fay, Gustav, Hanna, and Ike) destroyed agricultural land and crops, killed 793 Haitians, injured 548 people and destroyed or damaged around 100,000 homes (OCHA 2008: 1).

Meanwhile, the country's widespread environmental disasters, such as deforestation, soil erosion and inadequate supplies of potable water, exacerbate the already-heavy impact of natural disasters (CIA 2011). According to Alscher (2008: 29), Haiti has reduced its forest cover from 25% (1950) to 1% (2004). Such environmental degradation can aggravates the impact of natural disasters such as in the case of Jeanne in 2004. Though merely a tropical storm, Jeanne's high death toll was due in part to the lack of tree cover (Masters d.u.). The same storm caused fewer than 20 deaths on the Dominican side of Hispanola, which is 28% covered by forests (Alscher 2008: 29).

Largely as a consequence of deforestation and the resulting soil erosion, soil degradation in Haiti is severe over almost the entire country. According to the Food and Agriculture Organization of the United Nations (FAO), 94.8% of Haitian soil is severely degraded and 97.1% of the total Haitian population lives on this degraded soil. Furthermore, with more than 98% of forests gone, little topsoil is left to hold rains, leading to increased and nearly-annual flooding events. Lastly, all of these factors are aggravated by Haiti's horseshoe shape, which gives it an disproportionately long coastline in the midst of one of the world's busiest tropical storm belts (Eichler 2006: 5).

These natural and environmental disasters went unaddressed in the years leading up to the quake, and caused significant social vulnerability among the poor. Thus, when a 7.0 earthquake struck the Southern coast of the country on January 12, 2010, conditions were ripe for a humanitarian catastrophe. Though centered at the town of Leogane, the impacts were strongly felt in the nearby metropolis and capital of Port-au-Prince. Though exact death toll, damage, and displacement figures are never precisely known, the quake is thought to have contributed to the deaths of tens or hundreds of thousands of people, and displaced between one and two million people from their homes.

These displaced persons adopted multiple strategies. Some crowded into Internally Displaced Persons (IDPs) camps, while others went to live with relatives. Only the lucky few were able to make their way abroad. This paper examines these different strategies, with a special consideration

of the political response, services provided to the various groups, and the legal context in which all of these environmental migrants were living. The first section of the paper deals with the domestic situation faced by IDPs, while the second section examines the fate of those who attempted to relocate to other countries in the Western Hemisphere.

1. COPING WITH THE EARTHQUAKE: INTERNAL DISPLACEMENT STRATEGIES

Right after the quake, some families stayed on their property even though their house was destroyed, or was vulnerable to collapse due to aftershocks, while others moved away from the quake zone to find shelter elsewhere. These quake-crated IDPs can be distributed into two groups: 1) IDPs located in camps, which were mainly in urban areas; and 2) IDPs residing with host families, mainly in rural areas. However, it should be noted that the two groups were not so clearly defined in reality. Some households chose to keep a few members of the family in IDP camps, while sending others to live with host families in rural areas. Other IDPs traveled frequently between urban and rural areas over time. Still, this framework will be used in this paper for conceptual clarity.

1.1. Assessing protection and assistance to IDPs

1.1.1. The role of the International Organization for Migration (IOM)

IOM has had missions in Haiti since 1993. It was among the first organizations to respond to the flow of IDPs, and was able to do so by reallocating the funds scheduled for other emergency assistance missions. In the first 6 months following the earthquake, IOM distributed 2 millions Non-Food Items (NFIs) to 300,000 families and registered 720,000 IDPs. It is now the head organization of the Camp Coordination and Camp Management (CCCM) Cluster, which is in charge of managing several major camps and registering the population of IDPs. IOM also established an information system that covers all known camps (including those not managed by international organizations); qualified patrols make regular visits to manage the system. Based on this field information, IOM issues regular surveys on the living conditions in camps, and on evictions or on the conditions of return of IDPs; it also informs IDPs about relocation opportunities.

However, many camps were built spontaneously on private ground or in places not sound for habitation. Consequently, starting a few weeks after the quake, many IDPs were expelled by landowners. By March 2011, 8% of IDPs had been evicted from their camps; 25% more had been threatened with eviction (CCCM, 2011a). In a survey conducted on IDPs who had left camps, 35% declared that the reason for their departure was because they had been threatened of eviction. By comparison, 16% feared rains or hurricanes, 14% moved because of the poor living conditions and 14% because of security problems (CCCM, 2011b).

1.1.2. Living conditions in IDP Camps

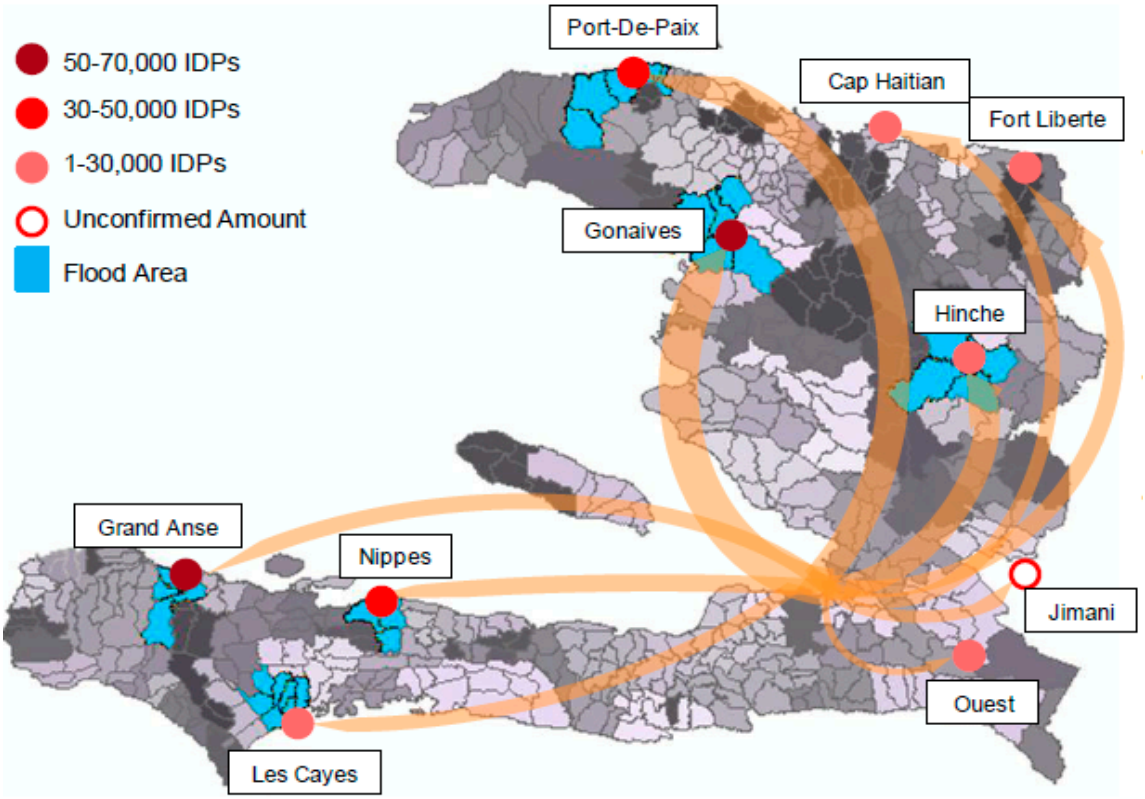
Although a great amount of resources were allocated to camp management, living conditions in camps could be very difficult, especially in spontaneous camps. In the first few months, 100,000 households were given a tent each. But tents do not offer a sufficient protection to live through the rainy season, during which 60 to 80 mm of rain can fall in an hour. 64% of IDP camps provided no access to water and 47% did not have toilets. Access to such basic services is especially rare in smaller camps (fewer than 100 households) which account for 70% of all camps and 16% of the IDP population living in camps (CCCM, 2011c). Cases of violence have been reported.

Even though the number of IDPs living in camps has steadily decreased, almost half of the initial IDP camp population remains, and the rate at which camps are emptying has also begun to slow. Between January and March 2011, the number of large and medium-sized camps (more than 100 IDPs) decreased while the number of small IDP sites (1-19 households) grew by 17% (CCCM, 2011c). This is particularly concerning since, as mentioned above, living conditions in small spontaneous sites are more severe and people are facing stronger threats of eviction.

1.1.3. IDPs in rural areas

From a humanitarian perspective, the interesting thing about IDP sites is that a lot of data is available on them and about the IDPs they are housing: where they are moving, what their needs are, and so on. Thus, despite the lack of financial resources, response strategies can be planned. On the contrary, movements of IDPs to host families in rural areas are more difficult to assess, because IDPs are not captured in the data and become invisible. Even counting them requires small-scale, costly surveys of rural households. Estimates of IDPs living with guest families in rural areas put the number between 500,000 and 600,000, or 30% of the total number of IDPs. 96% of them were hosted by immediate family members (either within the home, or in makeshift homes in gardens). In some areas, 43% of rural households reported hosting

Figure 3. Urban-rural migrations in Haiti after the 2010 earthquake



Source: JTF-Haiti. Operation Unified Response. Found under: https://www.cimicweb.org/cmo/haiti

new people after the earthquake; on average, they were hosting 4 adults and 2 children.

The main problem in rural areas is that IDPs arrived with very little or no resources in households that were already poor themselves. Economic and natural resources were rapidly overstretched: reports show that within a few weeks, many rural households had eaten the stock of food they had planned to live on for four months, until the next harvesting season. With no savings, some had to sell their production tools (shovels, land, seeds, etc) in order to buy food. These households are now facing high food insecurity since they cannot produce enough for the next season. Coping strategies analyses show that they have reduced the number of meals per day, and the quantity of food eaten at each meal. Rural households have also turned to other sources of income such as tree cutting for charcoal production, even though they are aware that this practice makes their immediate environment more fragile and therefore exposes them to heightened environmental threats.

80% of IDPs hosted in rural households are unemployed. One response from IOM was to launch large Cash-For-Work (CFW) programs. The idea is simple: IOM hires IDPs to rebuild roads and evacuate the rubble. This program provides them with the salary they need and helps rebuilding the country, by involving the population in the reconstruction process. IOM's policy was to give priority to IDPs, therefore 70% of their hires were IDPs against just 30% locals of rural areas. However, this practice proved controversial, for several reasons. First, local people also needed cash in order to buy food – for which prices rose sharply after the quake – and production tools, so IOM's policy was seen as unfair and created social tensions. Secondly, wages paid by IOM were three to four times higher than wages for agricultural workers, many of whom therefore chose to abandon agriculture temporarily to earn more, putting the regional agricultural production at risk. Third, work opportunities were very short-term, so as to maximize turnover and reach more beneficiaries. Since many of the workers were untrained, this practice elevated the risk of work-related accidents. Finally, rubble removal requires very expensive equipment, such as trucks, which were provided by foreign companies and international organizations. Thus, much of the money did not reach intended beneficiaries, and the impact was much smaller than anticipated (USAID Inspector General, 2010).

1.2. Sustaining livelihood: relocation and returning home strategies and challenges

With so many problems in IDP camps, why did so many stay? Many simply did not know where to go: this was the reason given by 55% of IDPs still in camps. Housing reconstruction is on-going, and many IDPs do not know what state their house is in. The Ministry for Public Works used a three-color coding system for housing: green for "not damaged", orange for "in need of repair", and red for "unsafe and in need of demolition". However, a survey by the CCCM Cluster showed that 35% of people residing in camps do not know how their house was classified (CCCM, 2011c). In addition, more than 70% of Port-au-Prince residents rent housing, and since rents for "green coded" houses have increased by 300% since the quake, many families on modest incomes cannot return. Finally, Haitian property law is highly disorganized, and many households existed on land with vague property rights.

IDPs also need cash to relocate their household, and they need livelihoods in their new communities, as well as basic public services, water, sanitation, transport, education. Both the evacuation of rubble and reconstruction are on-going and are taking more time in poorer neighborhoods, which prevent families from going back. What's more, IDP camps are often closer to home communities than permanent, reconstructed options (cf. map 2 in Annex, showing IDP sites near Port-au-Prince). Ironically, leaving IDP camps would mean further displacement from family, friends, social networks, and livelihoods than simply staying put. What's more, fear of returning to permanent buildings after the experience of the earthquake has also proven a barrier to return.

Between January and March 2011, the average number of people in households in IDP sites fell from 4.3 to 4.1. The decrease implies that households were sending family members (mainly male heads of household) to their future relocation site, while keeping some family members in the camp, where at least a few services were accessible. This strategy allows families to prepare for their relocation while minimizing risks. However, when they do leave, about two-thirds of IDPs choose to return home over relocating elsewhere. Even after relocation, conditions are difficult: only 40% of relocated people live in undamaged houses, whereas 30% live in houses in need of repair or unsafe houses, and 30% live in a tent or in makeshift shelters on plots (CCCM, 2011b).

In rural areas, some parents also chose to leave their children with their host families and to register them at school, while they looked for work in urban areas or engaged in CFW activities. IDPs in rural areas are increasingly children, women with babies, and elderly people, categories who are not able to contribute to agricultural work. This demographic shift puts added pressure on rural families' resources, who have to feed more people with less labor and increased environmental vulnerability: in short, a recipe for major food insecurity. At the same time, the bulk of international reconstruction aid has been distributed to urban areas, both for reconstruction and to improve access to public services. Labor migrants are pulled towards urban zones for employment, while rural areas (which were less directly affected by the quake) must cope with housing and feeding large vulnerable populations.

1.3. Improving the response to internal displacement

Even prior to the 2010 earthquake, Haiti was one of the poorest countries in the world, and the poorest of the Northern Hemisphere. It has been struck by a series of natural disasters and has proven structurally vulnerable as a country. So that rebuilding must also mean investing in people's ability to cope with natural disasters. Although another earthquake of this magnitude is unlikely to occur again soon, Haiti will regularly be struck by violent storms and hurricanes in the years to come, especially in an era of climate change. Haitians need to be prepared for these natural threats. After the quake, some proposed that Port-au-Prince be entirely demolished and reconstructed in order to offer better living conditions and improved protection against natural disasters. However, such proposals encountered major financial, social, and logistical challenges.

One of the strategies of the CCCM Cluster was to keep as many people as possible in rural areas in order to avoid IDP return to the overcrowded and most vulnerable neighborhoods of larger cities (Pascal, 2011). However, most IDPs felt that their displacement was temporary, and that they should return home to their cities and neighborhoods as soon as possible. Indeed, most of the voluntary migration in recent months has been composed of people returning to urban centers, either permanently or in circular migration from rural areas. These sorts of intentions and desires should be a part of employment, development, and migration strategies in the reconstruction phase, something that has not always been done in this case.

It is also important not to focus only on urban areas for reconstruction. IDPs have put heavy social pressure on rural areas, and have affected both

livelihoods and coping capacities of rural populations. Aid must be provided quickly to rural areas, not only to avoid an aggravation of the current situation and a humanitarian crisis, but also for the long run. Rural development aid, and particularly agricultural aid, is essential to the country's reconstruction, in order to avoid a new exodus out of rural areas in the years to come. Rural farmers must be capable of producing sufficiently to feed themselves and to save for coping in crises.

In addition, an urban-centric reconstruction process might attract a surplus of labor migrants, adding to already overcrowded urban areas. Reconstruction has to be done quickly, but it should not offer wages and job opportunities that are so advantageous that they would compete with other vital economic activities, such as the agricultural sector.

Temporary migration has also proven, in the Haitian case, to be a valuable adaptation strategy. Families planning to relocate have been sending individual members to future relocation destinations in order to minimize risks, prepare for moves, and improve livelihoods. This sort of beneficial strategy can be aided by the provision of quality information on return/relocation opportunities.

2. THE CASE OF INTERNATIONAL MIGRATIONS

2.1. Haitian international migration patterns prior to the 2010 earthquake

From the late 19th Century through the 1930s, poor rural Haitians increasingly began to migrate to Cuba and the Dominican Republic to find work in the sugar plantations (Alscher, 2009: 10). Since the mid-1950s, migration ties to the United States and, to a lesser extent, Canada have also been important. As the country descended into chaos after the breakdown of the Duvalier dictatorship in the late 1980s, Haitians began arriving in the United States in large numbers. Between 1980 and 2000, the Haitian population residing in the United States more than quadrupled from 92,000 to 419,000 to around 535,000 in 2010 (Terrazas, 2010). Haitians have also migrated to Europe in recent years, though in much smaller numbers (Alscher, 2008: 46).

But how did environmental factors (including the earthquake) impact these migration pathways? Environmental degradation and disasters appear to be important triggers for Haitian migrations outside Haiti's borders as well. Indeed, as Myers (1993: 189) states, Haitian people are "abandoning their homelands in part because their country has become an environmental basket case". The poor management and use of environmental resources impedes a prospering agricultural economy.

However, political instability and oppression are also critically important to Haitians' migration decisions. As Catanese (1999: 51, cit en Alscher 2009: 3) underlines, Haitian migration is induced by both environmental and political factors that have "reinforced each other over long periods of Haitian history". Poor governance has had the effect of weakening food security, reducing state capacity, and triggering environmental migration. Such problems in governance include both the serious flaws of the Duvalier regime as well as macroeconomic stabilization policy in the modern era (Eliscar 2010, Dupuy 2011). Indeed, the conditions put by the IMF and the World Bank for the payback of the debt, "impeded the development process of Haiti by demanding the breaking down of tariff barriers on imports" (Eliscar, 2010:22). Lowering tariffs impacted on Haitian food security as foreign commodities now flood the national markets in a way that Haitian producers have not been able compete with (Dupuy, 2011). Furthermore, with less state investment in the agrarian sector, the conditionalities put a toll on rural populations and forced them to metropolitan areas in search of factory-related employment opportunities (Eliscar, 2010: 22). The result was a rural exodus, as laborers flowed to Port-au-Prince[5], as well as abroad, to the Dominican Republic, the wider Caribbean, and North America.

2.2. Neighboring countries' responses to Haitian international migrations

2.2.1. Migration to the United States

Since the United States is home to the largest number of overseas Haitians (535,000 people; Terrazas, 2010), it is worth analyzing the impact of the quake on Haiti-US migration flows. Immediately after the earthquake, US immigration rules were relaxed. The Department of Homeland Security (DHS) extended Temporary Protected Status (TPS), which is a "temporary immigration benefit that allows qualified individuals from designated countries (or parts of those countries) who are in the United States to stay here for a limited time period" (USCIS 2011), and offered an 18-month

5. Ironically, this rural-to-urban migration flow was halted not by economic change, but by the natural disaster of the earthquake, which created what Robert Fatton (2010) calls "a reverse exodus" back to rural areas.

visa to Haitians who arrived in the USA prior to the earthquake. According to the U.S. Department of State, 54,716 Haitians had approved petitions to migrate to the United States at the time of the earthquake and were waiting for visas to become available (Wasem, 2011: iii). Furthermore, deportations in progress were halted by the DHS (Zissis, 2010). Nevertheless, three days after the earthquake, Secretary of the DHS Janet Napoliatano warned of the consequences of Haitian fleeing to the USA:

"At this moment of tragedy in Haiti it is tempting for people suffering in the aftermath of the earthquake to seek refuge elsewhere. But attempting to leave Haiti now will only bring more hardship to the Haitian people and nation… It is important to note that TPS will apply only to those individuals who were in the United States as of January 12, 2010. Those who attempt to travel to the United States after January 12, 2010 will not be eligible for TPS and will be repatriated" (DHS Jan. 15, 2010).

According to the Coast Guard, 1,377 Haitians have been interdicted at sea in the fiscal year 2010, a smaller number than in previous years (Aguilera, 2010). These figures imply that attempts by Haitians to reach the USA (illegally and usually in small, unseaworthy boats) fell following the earthquake (a.u. EU Times 2010). Certainly the increased surveillance of the Coast Guard and military warships was a deterrent. But Michael A. Clemons, of the Washington-based Center for Global Development, points to a different reason: cost. The journey costs $600-1000—well beyond reach for many families in the aftermath of the quake.[6] Simultaneously, the US Department of Homeland Security reported a drop in the flow of *legal* migrants, from 26,007 and 25,859 in 2008 and 2009, respectively, to 22,582 in 2010. (Monger and Yankay [DHS] 2011:4). In the aftermath of the quake, it seems that financial resources for all forms of migration to the US were hard to come by.

One year after the earthquake, 1.3 million Haitians still remain displaced from their homes (Wasem 2011: 17). Nevertheless, in January 2011, US-immigration authorities began repatriating Haitians to their country (Armario, 2011). David Abraham, expert on US-immigration law, explains the repatriating of Haitians as follows: "The crudest explanation has always been that the situation in Haiti is endemically so bad, that if irregular entry is permitted to take hold, a dam would break and Haitians would come in massive numbers. On the one hand, the policy is a defence of the formal legal procedures for admission and immigration and the requirement that everyone follow those rules. On the other hand, it is a desire to keep Haitian immigration at a minimum. Now that the short-term earthquake emergency is over, it's back to normal. If people are allowed to stay on, they will build social connections and become integrated into communities, and it then becomes much harder to deport them" (Abraham interview, 2011). A January 2010 *USA Today*/Gallup poll backs these statements, showing that a majority of Americans (53%) are opposed to accepting more Haitian immigrants into the United States. Abraham further maintains that "Haitians--like all unskilled immigrants--put negative pressure on the labor market, especially on the wages of the already-poor natives (mostly Black and Hispanic)…It's the rude masses that the state is worried about" (Abraham, 2011).

But Abraham's comments beg the question: does the US really have to worry about the "rude masses"? Clemens counters that, in the 10 years prior to the earthquake, 118,000 Haitians were caught in the high sees and violently brought back to their "prison" that they were desperately trying to escape. This number represents just 1/26 of 1% of the current US population, and constitutes a group that is much too small to have any negative impact on the labor market. These forcibly repatriated Haitians became what Clemens calls "avoidable victims" of the 2010 quake (Clemens, 2011). Second, Clemens identifies a misconception of Haitian immigrants' roles in US society: they are seen as a threat rather than as a valuable human resource.

Similarly, Lardner (cit. in Wasem 2011:7) asserts that the term of "threat to national security" was "being construed too broadly, being applied arbitrarily to Haitians, and wasting limited resources" in the aftermath of the quake. Clemens also notes that, for 28 years (1952 to 1980), US refugee law provided designations for environmental causes of displacement. It is only in modern times that the US has reverted to strict immigration control in the wake of natural disasters. Moreover, Wasem (2011: ii) observes that "Haitians are not afforded the same treatment as other asylum seekers", and that Haitians have been "singled out for more restrictive treatment" (Senate Subcommittee on Immigration 2002, cit. in Wasem 2011: 7)—even before the quake. Thus, the American clampdown on Haitian immigration after the quake is retrograde, but hardly unusual given the social and political context.

2.2.2. Migration to Latin American countries

In contrast to decreasing migration flows towards the USA, the Jesuit Refugees Service (JRS) and the Jesuit Migrants Service (JMS) have recorded increased numbers of migrants towards neighbouring Latin American and Caribbean countries after the 2010 earthquake (Stapleton

6. Interview with Michael A. Clemens on April 13th, 2011.

2010). According to Edson Louidor, in charge of communications for JRS/JMS in Latin America, trafficking networks have emerged, promising Haitians passage to the French Guyana or the USA (for work or study) in exchange of money. However, these Haitians are mainly being abandoned in Brazil or in Ecuador. These activities have led to border crackdowns in French Guyana and Brazil in the year following the quake (Wilner, 2011). In Brazil, Haitians fleeing the consequences of the earthquake are not entitled to refugee status. The status is given to people escaping circumstances such as political or ethnic persecution and religious discrimination, but not to those fleeing poverty and the consequences of natural disasters (Stapleton, 2011). In February 2011, Brazil completely suspended the issuance of refugee status to Haitians.

The number of Haitians in Ecuador has also risen significantly after the earthquake according to the JRS Ecuador Director Fernando Ponce (Stapleton, 2011). Based on statistics provided by immigration police services, 1,258 Haitians arrived in Ecuador in 2009, a further 1,867 in 2010 and as many as 1,112 during the first months of 2011. In addition, the national tourism office in Chile reported that 820 Haitians entered the country in 2010, almost twice as many as in 2009 (477); 125 more arrived in January 2011 (Stapleton, 2011). Though the flows are small, these numbers show a clear increase in international migration to South America in the aftermath of the quake.

Concerning migration toward the Dominican Republic, Dominican migration director Sigfrido Pared Perez estimated that the earthquake led to a 15% increase in the Haitian migrant population (a.u. 2010). Like the USA, the Dominican Republic restarted the process of repatriating Haitians to their country at the beginning of 2011, ending a moratorium put in place after the 2010 earthquake. As of mid-March 2011, nearly 7,000 illegal Haitian migrants had been brought back to Haiti (a.u. 2011). The Dominican Republic and Haiti have long been urged to work more closely to solve shared problems like environmental degradation and poverty. But the paramount issue has always been migration. The response of political leaders to this latest source of tension will be crucial for future relations between the countries.

2.3. Moving forward: improving the response to disaster-induced international migration

Migration is often an indicator of poverty, poor governance, and environmental misery in sending areas. It is also a response to these conditions. Indeed, Michael A. Clemens noted that "migration and remittances have been responsible for almost all of the poverty reduction that has happened in the island country over the past few decades". Such continuous remittances of Haitians in the US are higher in the long term than official development assistance. Thus, Clemens proposes to accord a special immigration status to "victims of environmental degradation or disaster" and thus considers an entire new class of immigration ("golden door" visa), which would let more Haitians into the USA and could improve conditions in Haiti, as well. For David Abraham, on the other hand, "it would be a revolutionary idea to include "victims of environmental catastrophes" in the asylum category, as all countries have so far refused economic conditions as a ground for asylum status, even when those economic conditions have been caused by chaos, the disorder of failed states, etc. However, Clemens counters that there is precedent in US law for environmental causes to be considered among those seeking refugee status.

Despite the legal context, the fact remains that migration to the US is an expensive proposition: hence the fall in migration to the US in the immediate aftermath of the quake. Still, if Haiti fails to reform its agricultural sector to promote food security and productivity, there will be people who try to leave Haiti in search of a better life elsewhere. Yet in spite of the humanitarian imperative, the 2010 earthquake has proven that powers in the region, such as the US and Brazil, are still hostile to open borders. In the international arena, it may be time to consider the establishment of "environmental refugee" as a status in international law.

CONCLUSION

Throughout Haitian history, internal and international migration, political and economic instability, and environmental and natural disasters have been bound up in one another. Before the earthquake, many Haitian farmers and peasants had to leave their land as a consequence of environmental damages such as soil degradation, floods and droughts, which have not been addressed sustainably. The worsening humanitarian situation and the inability of the Haitian government to offer basic needs to their urban population after the devastating earthquake in January 2010 has forced many to migrate back to the rural areas they once fled due to over-exploitation of natural resources. Others have tried to leave or left the country, mainly destined for Latin American and Caribbean countries. Migrations towards Ecuador, Brazil, Chile and the Dominican

Republic all increased in 2010, implying a link to the earthquake and its aftermath. Meanwhile, migration—legal and illegal—to the US has fallen, due to strict immigration controls and the high cost of the journey.

Although the 2010 earthquake was a seismic—rather than climatic—event, climate change will almost certainly pose more natural hazards to the country. Therefore, disaster risk reduction strategies and protection policies for displaced persons must be implemented. By studying the case, we can learn a great deal that may be useful for future humanitarian practice. Haitians made use of multiple migration strategies in the aftermath of the quake. They were occasionally abetted by international actors, and sometimes thwarted by policies and legal loopholes that hurt their search for a better life. Vast policy change is needed, both domestically and internationally, both to improve the current humanitarian situation in Haiti, and to bolster resilience in the face of future disasters.

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4. THE EARTHQUAKE IN CHILE

Mylène André

INTRODUCTION

Following the dictatorship of Augusto Pinochet (1973-1990), Chile has experienced stable democracy and is now considered as one of the most developed countries in South America and one of the leaders of the continent, though its economic inequalities are among the highest in the sub-continent.

Chile is geographically unique, as it extends from the Atacama Desert in the North to Cape Horn in the South, with a varying landscape of deserts, lakes, mountains, and glaciers in between. It is also highly prone to natural disasters: the country lies on top of the tectonic Nazca Plate and the South American plates, and therefore frequently experiences earthquakes. Because of its long Pacific coastline, these earthquakes can trigger tsunamis, as well.

Chile is therefore considered highly vulnerable to disasters related to climate change. The United Nations Framework Convention on Climate Change (UNFCCC) names Chile as a country of particular concern due to changes in prevailing global climate patterns (Government of Chile, 2010b:13), and the country has seven of the nine national characteristics that made up a "vulnerability framework" in the article 4.8 of the UNFCCC.

1. CONTEXT AND VULNERABILITY: OVERVIEW OF CHILE AND DESCRIPTION OF THE DISASTER

1.1. The 2010 Earthquake

On Saturday, February 27, 2010, at 3:34 am, an 8.8 magnitude earthquake hit central Chile. Its epicenter was situated 35 kilometers below the floor of the Pacific Ocean, 6.4 kilometers from the coastline, 115 kilometers from the city of Concepcion, and 325 kilometers Southwest of Santiago. It was the second largest quake ever recorded in Chile, and the fifth largest recorded in the world since 1900 (Beittel & Margesson, 2010:3). After the earthquake, the US Geological Survey (USGS) registered at least 150 aftershocks, of which nine had a magnitude of 5.0 or greater (Beittel & Margesson, 2010:3). The earthquake lasted more than two minutes; some witnesses described the duration as an "endless moment" (*BBC Mundo*, 2010). It was felt in Santiago and even in Western parts of Argentina.

Michelle Bachelet, the President of Chile during the event, quickly appealed for calm (*BBC Mundo*, 2010). At 5:00 am, she put in place an emergency committee and announced that the national authorities were trying to evaluate the damage caused by the earthquake and the number of victims. She recognized that it was a "major earthquake" but reassured Chileans that all the national institutions were operational. Rescue teams started to search for people trapped in their houses and buildings (particularly in elevators), giving priority to the most dangerous and urgent situations.

On Sunday, February 28, President Bachelet declared a state of constitutional exception for the two most affected regions (Bio Bio and Maule), for a period of 30 days in order to "guarantee the public order and the delivery of the first basic needs" (*El Pais,* 2010). This procedure, authorized by the Chilean Constitution,[7] empowered the Army and the policy, particularly to control looting. Meanwhile, national and international media began broadcasting the first images of the devastation

7. See Chilean Constitution (1980), amended en 2005; Article 32-5: "The special powers vested in the President of the Republic are the following: (…) 5 .- declare states of exception in the cases and forms listed in this Constitution."

caused to houses, hospitals, and highways, as well as people gathering in the streets in the quake zone (Ruiz, 2010).

As the earthquake cut communications in parts of the country, parts of Chile were isolated from vital information flows; in some places, it took days to reestablish the communications infrastructure. The radio and the internet (including social media networks, such as Facebook and Twitter) were critical in making announcements, searching for missing persons, and relaying information to and from the affected area (*La Nacion*, 2010).

Unfortunately, such resources did not prevent tragedy in the immediate aftermath of the quake. The (US) National Oceanic and Atmospheric Administration recorded a tsunami moments after the quake. However, the Chilean oceanography service, SHOA, initially declared (on Twitter) that no tsunami was imminent (Rivas, 2011). By the time they noted the NOAA warnings and changed course, critical response time had been lost. Fortunately, in some localities, port captains issued emergency warnings, and people were able to move out of the tsunami's path. However, owing to the contradictory information from the national authorities, many people were needlessly trapped by the tsunami and its eight-meter high waves. Earthquake and tsunami damage, aftershocks, shortages in basic needs, "and poor emergency management provoked panic and chaos in some areas in the days following the disaster. Desperate people turned to looting for food, though bigger items (including TVs) were also reported looted in some cases (*El Comercio Perú*, 2010). Because of memories of the dictatorial period, and because its term in power was days from ending, the Bachelet government was hesitant to send in the Army to restore security.[8] As a result, citizens organized their own protection, until the government finally instituted a curfew to curb looting. Police and Army forces were deployed against looters, sometimes resorting to tear gas and water canon (Long, 2010).

After the disaster, the government declared six regions of catastrophe: Maule, Bio-Bio, Araucania, O'Higgins, Valparaiso and the Metropolitan Regions. The Maule and Bio-Bo regions were the most affected; Concepción (capital of the Bio Bio region) and Talcahuano were the most affected cities (ECLAC, 2010).

The large number of missing persons created some confusion in counting the dead. On March 1, the death toll stood at 700 (*Fox News,* 2010), but government critics claimed that this figure was riddled with inaccuracies (*El mostrador*, 2010). As bodies were identified and communications improved, the death toll was lowered in many regions. A Chilean government report from March 5 counted 452 deaths (*El mostrador*, 2010); the US Government issued an estimate of 507 deaths on March 11 (Beittel & Margesson, 2010). All together, approximately 2 million people were affected by the earthquake, the resulting tsunami, or both.

1.2. Socio-economic and natural characteristics of the affected areas

The most affected areas were the Maule Region and the Bio Bio Region, in Central Chile (ECALC, 2010). Like much of the country, these regions lie at a significant distance from Santiago, and are isolated from the capital by large areas of wilderness.

The regional capital of Maule Region (VII Region) is Talca. According to the last census in 2002, Maule was home to 908,097 people[9]; the region is approximately the size of Belgium. The population density of the region is quite low (32 per square kilometer), and it is the least urbanized region in the country (with 35% of the population in rural areas). Its major economic activities include agriculture and livestock, including the production of rice, beets, wines, and forestry products. The energy sector is also quite important, as Maule is a major source of hydroelectric production.

The Bio Bio Region (VIII Region) is to the South of the Maule Region. The region has nearly 2 million people in just more than 37,000 square kilometers; the regional capital is Concepción[10]. This region is more rainy and colder than the Maule Region. Consequently, fishing and forestry are more developed than agriculture, manufacturing and services. Its capital, Concepción, is the economic center of the region, with 1 million inhabitants and a variety of commercial, touristic and educational services.

Both regions score poorly on national CASEN studies, which measure poverty based on the number of people unable to afford basic needs (Ministry of Planification, 2009). While the national poverty rate is 15.1%, Bio Bio has a rate of 21% (second worst in the country) and Maule a rate of 20.7% (third).

8. The change of government took place on the 11th of March. The center-left alliance government of Michelle Bachelet was replaced by the center-right alliance government of Sebastián Piñera, after 20 years of center-left alliance since the fall of the Pinochet's dictature.

9. Website of the Maule Administrative Division: http://www.intendenciamaule.gov.cl/geografia.html

10. See Bio Bio Administrative Division website http://www.intendenciabiobio.gov.cl/

2. THE DISASTER AND ITS AFTERMATH

2.1. Preparations

Because of its timing (just two months after the devastating Haiti earthquake), its magnitude (much larger than Haiti), and its consequences (much less catastrophic than Haiti), the Chilean earthquake of 2010 provoked significant debate about the nature of Chile's preparations for natural disasters. Many of these debates focused on Chile's governance structures, especially on its prevention-oriented building codes, which were credited with a key role in minimizing the damage (and thereby, the displacement) caused by the event (Reuben, 2010).

Due to its long history of earthquakes, Chile has developed a special building code called "strong columns weak beams". Such codes are considered essential in a country that registered the world's most violent recorded earthquake (a 9.5-magnitude event in 1960 that killed 3,000 people and left 2 million homeless), and that is likely to experience a quake of magnitude 7.0 or higher every five years (Lafsky, 2010). Chilean authorities have also developed extensive seismic studies and technology, and population-level awareness about earthquake safety is quite high. These policies (particularly in the area of building codes) are strictly enforced (Padgett, 2010). Enforcement in turn is aided by very low levels of corruption; Chile ranks 25th in the world in Transparency International's Global Corruption Index (Padgett, 2010).

2.2. Displacements

Partly as a result of these preventative steps, the number of displaced people was significantly lower than it might have been had a large number of structures collapsed. Still, a large number of people were on the move in the aftermath of the disaster. For one thing, approximately 500,000 people sought safer ground in the days immediately following the disaster. Many of these people departed from the cities of Concepción and Talcahuano, and the villages of Dichato, Pullay and Tregualemu, seeking refuge in improvised camps in nearby hills. Fearing further aftershocks and tsunamis, they made do for days with basic tents and blankets (Wurgaft, 2010). The Army tried to convince these "People of the Hills" to come back to the city in order to receive more significant aid, yet some remained in the hills as many as ten more days (*Terra,* 2010).

The disaster caused the displacement of many people whose houses were genuinely damaged. It is difficult to state a number of such displaced persons with certainty. Immediately following the disaster, it was announced that 1.5 to 2 million people suffered from the effects of the quake and were "*potentially* displaced people" in need of shelter and basic needs (Barrionuevo & Robbins, 2010), but no number of *actually* displaced people was announced. Therefore, it is possible that the "potentially displaced" figure includes both "People of the Hills" (who fled for safety reasons) and those whose homes were damaged but did not migrate at all (Barrionuevo & Robbins, 2010).

A more precise displacement figure can be determined based on the number of people relocated to temporary camps (first in tents and then in wooden houses) after the disaster. A newsletter from the International Organization for Migration (IOM), issued in late March, reported that around 200,000 houses had been destroyed by the earthquake and 70,000 to 120,000 persons needed urgent shelter relief (IOM, 2010c). These were the people who had truly lost everything, and thus were priorities for national and international aid efforts in the aftermath of the disaster (as well as in the reconstruction phase of the recovery effort).

The Chilean Government, IOM, local authorities and local NGOs worked together to help the victims and provide housing. The construction of shelters for people left homeless (including 1,500 emergency shelts in Maule and Bio Bio) probably avoided larger flows of displaced people out of the affected region. (IOM, 2010a). The IOM also helped migrants living in the Santiago metropolitan area, including 1,300 persons severely affected by the disaster and needing shelter or other basic needs (IOM, 2010b).Others needed assistance, but were afraid to leave what was left of their homes and thus refused to relocate for assistance.

2.3. Response of governmental and non-governmental actors to those affected

2.3.1. Rights

The earthquake created two basic categories of displaced: those who fled in fear in the immediate aftermath of the disaster, and those who were forced into long-term displacement by the destruction of their homes. People in each group had a very different profile of needs, and were granted very different legal rights. For example, those who fled in fear needed basic needs in the days following the disaster, but were eventually able to return home; those in the other category required resettlement and related long-term social support.

Regardless of typology, all the internally displaced people (IDPs) in Chile lived in a vague legal

context following the quake. Chilean law regulates migration on the basis of classical paradigms of migration.[11] For example, Law 1094 of 1975 serves as the basis of migration law in Chile. Importantly, it only considers international migrants arriving in the country, and refugee or asylum status is only extended to those who flee their home countries for political reasons (as set forth in international refugee conventions).

Environmental migrants—and especially environmental IDPs—are not accounted for in Chilean law. They are not tourists, migrant workers, refugees, or asylum seakers, and moreover, in the case of the quake, migrants were native Chileans, rather than foreigners. In 2010, the Chilean Parliament approved Law 20,430, which further clarifies refugee protection law. However, the updated law still lacks a classification for victims of natural disasters and IDPs (UNHCR, 2010).

Internationally, protections for IDPs (such as the environmental migrants in the wake of the Chilean quake) are enshrined only in guidelines, such as the "Guiding Principles of Internal Displacement" from the UN Department of Economic and Social Affairs. In addition, the Inter-Agency Standing Committee (IASC) Operational Guideline on the Protection of Persons in situation of Natural Disaster was created by the IASC to advise countries on how to react in case of natural disaster and how to insure full protection of affected population (IASC, 2011).These guidelines put primacy on the protection of life; Chile did well in this regard as the death toll was limited, given the magnitude of the quake (though the government's management of the tsunami warnings did come in for criticism).

Secondarily, the guidelines emphasize the protection of displaced rights in the aftermath of disaster, and the assurance of displaced quality of life in the long-term rebuilding phase of recovery. Thus, the guidelines cover not only the humanitarian response, but also the long-range policy response from the national government. Such governments are responsible for the protection of the rights to housing, land and property, livelihoods, and education (including secondary and higher education), as well as facilitating legal documentation, freedom of movement and the re-establishment of family ties, freedom of expression and opinions, and the right to participate in democratic elections.

11. Decreto Ley Nº 1.094, DE 1975 Establece normas sobre extranjeros en Chile. Publicado en el D.O. Nº 29.208 de 19 de Julio de 1975. And especially "Parrafo 5, de los asilados políticos o refugiados", http://www.extranjeria.gov.cl/filesapp/manual_aspectos_normativos.pdf

2.3.2. Services provided

The national government reacted quickly in the days following the quake, with the exception of the tsunami early warning debacle.[12] An emergency committee was created, and a national rescue team composed of firefighters, emergency workers, and the Army, was deployed for search-and-rescue, as well as the identification of the bodies of victims. Within 36 hours, a State of Emergency had been declared (Moloney, 2010).

After the declaration of a State of Emergency, national authorities and local NGOs distributed basic goods (drinking water, three rations of food daily, blankets, sanitation equipment) quite efficiently to those in the affected area. For example, by March 2, the government had mobilized 5 million food rations, and was distributing 65,000 rations daily to the regions of O'Higgins, Maule, and Bio Bio (OCHA, 2010:50); areas outside of the immediate quake zone (including the city of Valparaiso) were also receiving food assistance (*ibid*.).

Still, the immense scale of the disaster created tensions in the food delivery system. Though the emergency response prioritized those most in need, 2 million people were affected by the disaster, and the government came in for criticism among those who were not prioritized by the distribution system (Wade & Cambero, 2010). In particular, critics contrasted the outpouring of rapid support from Chilean civilians with the slow reaction from national authorities (*ibid*). In the case of the city of Dichato, cargo ships could not come ashore and stopped short 30 kilometers from the village, which slowed down the delivery of food and water.

Meanwhile, in larger cities in the quake zone (such as Concepción), Army troops were sent in to provide security. The lack of food, water, and gasoline provoked looting, which resulted in the imposition of a month-long curfew. Still, victims of the looting argued that the looting was preventable, and that the delay in the arrival of government troops had led to a security vacuum (*CBS News,* 2010).

With the quake occurring at the beginning of the rainy season, shelter was a major concern during the emergency response phase. Forty-five camps opened in the quake zone, furnishing tents to those who had lost their homes. However, the vast majority (more than 80%, by some estimates) of those who lost their homes went to live with family and relatives. Such strategies reduced pressure on the camps, but made it difficult to estimate and plan for housing needs among the affected population (OCHA, 2010:50).

12. President Bachelet later admitted the failure of the monitoring system. See Moloney, 2010.

2.4. International response: mobilizing funds

Despite Chile's relatively high level of development, international assistance was still needed to respond to the earthquake. President Bachelet postponed it for two days, but finally called for international help on March 1. Her first request was for human resources (search-and-rescue teams and emergency aid workers), as well as water, food, and satellite cell phones (Franklin & Smith, 2010).

On March 10, United Nations Secretary-General Ban Ki-Moon toured the country and declared that the UN would play a role in the reconstruction effort. He also devoted $10 million from the Central Emergency Response Fund to support the response (*UN News Center,* 2010). Meanwhile, the International Federation of the Red Cross/Red Crescent launched a $13 million fund raising campaign for emergency needs (IFRC, 2010), and an international telethon raised a further $60 million to support quake relief (*Huffington Post*, 2010).

As part of its mission to help children in emergency settings, UNICEF also contributed to the effort (UNICEF, 2010). The organization re-opened schools in the affected area, distributed school supplies, and provided psychological support for child victims, especially in Maule and Bio Bio. Such efforts were particularly necessary as the quake coincided with the end of summer vacation (originally slated for March 15, but rescheduled after the quake to April 5).

On March 7, the World Food Program sent 35 tons of food (including high-energy biscuits and "meals ready to eat", or MREs) to the quake zone. Their supplies fed 35,000 people for five days; a further 70 tons of food had arrived within a week (WFP, 2010).

A number of foreign governments also contributed to relief efforts in different ways. For example, the United Kingdom provided tenting for 3,000 people (DFIP, 2010), while the United States provided technical advisors for humanitarian needs assessments (USAID, 2010). Japan sent medical teams, power generators, and water purification equipment (Government of Japan, 2010), while a number of other nations (including India, Indonesia, Norway, and Vietnam) sent cash assistance.[13]

Despite the diverse forms of assistance from many international actors, it is important to keep in mind that the overall cost of recovery and rebuilding far exceeded the aid provided for emergency relief. The American risk assessment firm Eqecat estimated that the disaster would cost $15-30 billion (10-20% of Chilean GDP) (Long, 2010); other firms similarly projected total costs of around $30 billion (US) (Associated Press - *News 24,* 2010). Many of these costs were related to critical infrastructure. For example, the Chilean Ministry of Health estimated that the cost to rebuild hospitals and health facilities in the quake zone would be approximately $3.6 billion (Government of Chile, 2010a).

2.5. Situation today

The Chilean government projects that reconstruction in the quake zone will last until 2014 (Government of Chile, 2011). When this article went to press, the government was reporting that 61% of income subsidies and 90% of housing payments had been made for 2011 (*ibid.*). Meanwhile, it reported that 70% of educational facilities had been repaired and that the majority of public infrastructure (roads, water systems, bridges, airports) was again functional (*ibid.*).

Despite these rosy figures, many victims of the disaster have expressed frustration to national and international media. For example, reports have highlighted housing reconstruction has not been sufficiently rapid to prevent more than 120,000 families from going homeless in the wake of the quake (Associated Press – *News 24,* 2010). Meanwhile, Claudio Arriagada, president of the Chilean Association of Cities, claims that, despite the large number of payments that the government claimed to have made, "only one percent" of recipients had been able to use the money to find new housing (*ibid.*). Some of the discrepancy may be due to the slow pace of physical reconstruction. Arriagada claims that only 1,570 homes had actually been built, one year after the quake, while more than 135,000 subsidies had been granted (*Cooperativa,* 2011).

Indeed, even on the first anniversary of the quake in February 2011, many victims in the most affected areas were still living in huts (Nelsen, 2011). Many had first been housed in leaky, rat-infested tents in the four months following the disaster, at which point they were moved to wooden huts. Several residents spoke to the *Christian Science Monitor*, stating that they were still in search of permanent homes and that they had suffered from water and sanitation shortages and ill-defined plans for reconstruction (*ibid.)*.[14] In part

13. See for instance Government of India, 2010; Jakarta Post, 2010; Government of Norway, 2010; Government of Viet Nam, 2010.

14. Another camp, near Tacahuano, was also accused by the National Health Services of being out of compliance with regard to basic sanitation. See Tauran, 2010.

due to these breakdowns, the anniversary visit of (newly-elected) President Sebastian Piñera to the quake zone in March 2011 elicited protests from thousands of families upset with the management of the reconstruction process.

On July 20, 2011, a wave of violent protests broke out in the Bio Bio Region. They denounced the Chilean government for the slow process of housing reconstruction, and were met with water cannon and tear gas from the police (*Chilevision*, 2011). As the news spread via social networking sites, supporting protests broke out around the country, even at government facilities in the capital, Santiago (*Terra*, 2011). The protestors' claims were supported by Clemira Pacheco, a member of the House of Deputies. She noted that, 17 months after the disaster, many families were still being deprived of basic living conditions, and that there had been a lack of citizen participation in reconstruction planning (*El Concecuente*, 2011).

In response to the protests, the government met with community leaders to find solutions to the housing reconstruction crisis. A number of new measures were proposed by government representatives, including an increase in subsidy payments to affected people (Guerrero & Paz Nuñez, 2011). At the time that this article went to press, no final solution had been found, and the issue remains highly sensitive in the quake zone.

CONCLUSION

Among the many disasters worldwide in 2010, the case of Chile stands out both for the enormous magnitude of the earthquake, and for the relatively low number of resulting deaths. The low death toll can be attributed to the array of prevention measures put in place by the Chilean government before the quake struck, and to the rapid deployment of humanitarian response in the quake zone. International financial assistance also helped avert a humanitarian disaster.

Nonetheless, the quake highlighted a few significant problems with Chile's disaster response system. Specifically, the failure of the tsunami early warning system and the extremely slow pace of reconstruction of housing in the quake zone have earned warranted criticism. The government should also consider the degree to which it is prudent to have people settling in quake- and tsunami-prone "danger zones" along the coast. Lastly, the government should consider that flaws in its legal code led to a situation where environmental migrants out of the quake zone lived in legally ambiguous situations, as Chilean law makes no provision for internally displaced persons.

RECOMMENDATIONS

In light of the findings of this case study, I would recommend the following:

1. The Chilean Parliament should take up legislation to codify international guidelines on IDPs and IDP protection into Chilean law.

2. The Chilean government should strengthen its emergency warning systems especially for tsunamis, and ensure strong lines of communication between national agencies and local agencies, as well as among national agencies themselves.

3. Having codified IDP rights in Chilean law, the Chilean government should move to improve mechanisms for reconstruction in the wake of natural disasters. These plans would help ensure that aid to IDPs extends beyond the emergency phase, to the recovery and rebuilding. In particular, special attention should be paid to local governments, who were responsible for camp management in the aftermath of the quake, and to the Home Ministry, which had administrative responsibility for the reconstruction effort. Such agencies should also be subject to higher levels of transparency.

4. The Chilean government should also begin a dialogue in quake- and tsunami-prone coastal areas about plans for future development and planning in the region. Any planning in this regard should have full public participation, including the voices of local representatives and associations.

5. The Chilean government should also consider the potential impact of climate change on the country, and plan risk management accordingly. Though the earthquake was a seismic, rather than a climatic, event, Chile is vulnerable to natural disasters caused by global warming. Both public actors (ministries and local governments) and private actors must have a role in climate planning, to ensure maximum efficiency and transparency. Climate risk reduction efforts should take place alongside, rather than in place of, the country's traditional risk reduction measures related to seismic activity.

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5. THE XYNTHIA STORM IN FRANCE

Jean Le Goff

INTRODUCTION

The Xynthia storm originated in Portugal on February 26, 2010. It crossed much of Western Europe before dissipating on March 2 in Scandinavia. On the night of Feburary 27-28, it struck the west coast of France, where it caused significant human and economic damage. At least 53 people were killed in France, 29 of them in a single town, La Faute-sur-Mer, located in the Vendée Region. 79 people were injured, and about 500,000 were affected. Damage costs were estimated at 2.5 billion euros (Anziani, 2010).

This case study highlights the ongoing struggle against natural disasters, even in wealthy countries such as France. After explaining the reasons that led to this catastrophe, this article deals with the reaction of the government and the strong protests it triggered among the population touched by the storm. In order to avoid such a catastrophe happening again, and to anticipate likely seaward threats posed by climate change, the government tried to displace people living in the most dangerous areas and launched plans to establish stricter planning and development rules geared at preventing disasters and protecting populations. This case study evaluates the positions and the arguments of both government actors, and those in the affected region. It also sheds light on the ongoing debates about adaptation to climate change.

1. WHEN NATURAL AND HUMAN FACTORS MEET

Described as the most violent storm to hit France in over a decade, Xynthia was potent because of a combination of storm surge and high winds. Dikes were broached in some places, causing severe flooding. The departments most severely hit were Vendee (35 dead) and Charente-Maritime (12 dead). In Vendée, two towns were particularly hit, L'Aiguillon-sur-Mer and La Faute-sur-Mer.

1.1. The pressure for development along the coastline

Though Xynthia was a natural event of an exceptional strength, its human impacts were due to social factors. In recent past, the region has undergone significant development, as former marshes were drained, protected with dikes, and used for agriculture (Ecalle, 2011:30). In recent years, the land has again been converted, this time for mass tourism. Indeed, Vendée has become a very attractive destination, thanks to its beautiful landscapes and beaches. For example, the small town of La Faute-sur-Mer has only 1,000 permanent inhabitants, but welcomes about 40,000 tourists in the summer. L'Aiguillon-sur-Mer, located next to La Faute-sur-Mer, welcomes 10,000 to 15,000 tourists in the summer, while its winter population is only 2,300 (Ecalle, 2011:48). In 2006, 45% of the houses in L'Aiguillon-sur-Mer and 86% of the houses in la Faute-sur-Mer were holiday homes[15].

Tourism, and the significant wealth it attracts, has created strong pressure to develop land, in spite of potential natural hazards. In the case of Xynthia, all of the fatalities in La Faute-sur-Mer were in houses built in the last 30 years: 14 of them lived in houses built between 1980 and 1990, four in houses built between 1990 and 2000, and 11 in

15. See Cities data at http://www.lafautesurmer.net/carte-didentitee/ and http://www.cartesfrance.fr/carte-france-ville/85001_L'Aiguillon-sur-Mer.html.

houses built between 2000 and 2010 (Vinet, Defossez & Leclere, 2011). Much of the damage occurred in areas supposedly "protected" by the dikes. However, these structures were built for agriculture, not homes: among the 9,000 km of dikes in France, it is estimated that 1,350 km were meant for agricultural land but are currently being used to protect residential areas (*Presse Ocean,* 2010a). For example, in La Faute-sur-Mer, the Côte de Lumiere camping area was located in a hazardous low-elevation zone, and was completely destroyed during the storm. Only the fact that the camp was closed for the winter prevented mass fatalities.

1.2. A predictable (and predicted) catastrophe

The story of the Côte de Lumiere Campsite illustrates perfectly how development in the Vendee region took place in a highly unplanned manner. The site was considered to be dangerous, and the camping facilities were built illegally. The government attempted to close it but was opposed by the mayor of La Faute-sur-Mer, René Marratier. In 2002, he organized a protest gathering of 1,000 people. Their main argument was that the campsite was essential for the town's economy. Because local authorities had a vested interest in developing tourist infrastructure, they were reluctant to impede development. Thus, the government failed in its preventive efforts.

In La Faute-sur-Mer, a disaster prevention plan had been in development for nearly ten years, and still had not been formally adopted at the time of the storm. In 2001, the French government had asked La Faute-sur-Mer, and a few other coastal towns, to adopt disaster prevention plans. The mayor did not respond, and in 2007, a prefect attempted to force adoption of his own plan. Though it was not very strict, the prefect's plan still triggered strong opposition. In November 2009, three months before Xynthia, the town council of La Faute-sur-Mer again postponed adoption of the disaster prevention plan, arguing that there had been « no constructive dialogue » with the state (Ecalle, 2011:62). Similar scenes played out in other coastal towns, where disaster prevention was viewed as a drag on economic development.

After Xynthia, it was now clear that such a lax attitude was a mistake. Indeed, the risks were known: in La Faute-sur-Mer, studies pointing to the risk of flooding were made public in 2007 (*Info ExpoProtection,* 2010), and a report from the local public works administration was made public in 2008. This report states, « The conjunction of two phenomena, a rise in the water level of the Lay Estuary [separating L'Aiguillon-sur-Mer and La Faute-sur-Mer] and a rise in sea level, could have a very strong impact on densely developed areas behind an aging set of dikes » (Raison, 2008:287).

Who is responsible for these errors? The French Senate asserted that responsibilities were shared, since both local and national authorities could refuse to issue construction permits (Anziani, 2010:26). Soon after the storm, an association was created to defend the victims of the storm in La Faute-sur-Mer and the surroundings, the Avif (in French: Association pour la défense des victimes de La Faute-sur-Mer et des environs) The association filed a sealed complain against persons unknown to the public at the time of this article's publication. Three local authorities from La Faute-sur-Mer (including the mayor, René Marratier) and a state civil servant have so far been put under investigation for "involuntary homicide", and "endangerment"[16]. Legally, the main objective of the investigation is to determine who was responsible for the issuance of construction permits for two housing developments in La Faute-sur-Mer, "Les Doris" and "Les Voiliers."

After Xynthia, the consensus was that housing regulations and prevention measures needed beefing up. However, the investigations were only the first part of the saga between the government and the victims of the storm. Days after the storm had passed, the government announced that some houses wouldn't be rebuilt, and that the people living in the most dangerous areas would be displaced to homes on safer ground, with compensation. But when the prefect of Vendée, Jean-Jacques Brot, announced the terms of compensation, he elicited a massive protest among locals unhappy with the terms offered.

2. THE STATE, THE DISPLACED, AND THE CONTROVERSY OVER "BLACK AREAS"

2.1. A quick and generous reaction?

The strategy of the French government after Xynthia was to act fast. The first reaction, a few days after the catastrophe, was to issue a state of emergency for the four most-affected departments (Charente-Maritime, Deux-Sèvres, Vendée, Viennes), allowing the victims to be compensated

16. In French : "homicide involontaire" and "mise en danger de la vie d'autrui"

for storm damage[17]. On March 16, President Nicolas Sarkozy announced in a speech that « no one would be permitted to return to live in areas where there is a risk of death." (Sarkozy, 2010). On March 18, the prefects of Vendée and Charente-Maritime were asked to demarcate "areas of extreme danger"; their findings were made public April 8. These areas, now called "black areas", included 1,501 houses. On April 13, Prime Minister François Fillon argued that priority should be given to those who desired to relocate away from dangerous areas. He claimed that, "if we had gone by normal procedures, residents would have spent many months in temporary housing, not knowing where they would live or how to go about repairing their houses." (Fillon, 2010).

Having one's house within a demarcated "black area" carried a double significance, one good and one bad. On the good side, owners who consented to sell their houses to the state were offered highly advantageous conditions: "an unprecedented measure for our country", Fillon called it (Fillon, 2010). Though compensation was based on market value before the storm, the payments were regulated by the Major Natural Disaster Prevention Fund, also known as the Barnier Fund. Created in 1995, the fund had a cap on payments at 60,000 euros per house, but this cap was raised suddenly in May 2010 to 240,000 euros per house—a major windfall for owners who sold voluntarily (Roux-Goeken, 2010). Such voluntary sales were well-received, and are likely to be re-enacted by the French government after future emergencies. On the other hand, for those who did not sell voluntarily, the "black area" meant a forced expropriation of one's property by the state (Presse Ocean, 2010b). Unsurprisingly, it was such cases that engendered a protest movement from dissatisfied owners who refused to leave voluntarily.

2.2. Hasty demarcation of the "black areas" and poor communication lead to protest

"The state announced the black areas as areas of massive destruction", explains Renaud Pinoit the vice-president of the Avif (the association of victims of La Faute-sur-Mer)[18]. The lawyer Hervé Cassara, from the Huglo-Lepage firm (which represents Avif), described the forced expropriation of land as "a second crushing blow to the heads" of the disaster-stricken homeowners along the coast.[19] Demonstrations emerged, with protesters carrying signs saying "spared by Xynthia, hit by the state" and "leave us our houses, we have other solutions". Boyardville, a town in Charente-Maritime, even "seceded" from the state, creating the "Free State of Boyard" by a vote of 288-11. Vote organizers declared that "the state doesn't respect our liberty to live in a place where there is no danger."

The protest movement was triggered by three factors. First, the decision-making by prefects was so rapid that data assessment was incomplete and field work was precluded, so some decisions were taken on the basis of estimates rather than hard data. Second, the government and the prefects used a brusque and sometimes incoherent communication strategy. Third, the unusual procedures of assigning "black areas" elicited public confusion.

The demarcation of black areas was executed with tremendous speed. Three days after they received orders from the government, the prefects had proposed initial maps to the Ministries of Ecology, Energy, Sustainable Development, and Maritime Affairs. Though these ministries offered comments and feedback, 90% of the initial maps remained unchanged (Anziani, 2010:34). When these maps were made public, disaster victims reacted with surprise and discontent. "In the initial black areas, there were some houses that had not suffered any damage, there were even houses two of three meters above sea level," explains Renaud Pinoit[20].

On April 15, Corine Lepage, a lawyer for Avif, sent a request to the administrative court of Nantes, asking for the documents and assessments on the basis of which the black areas were demarcated. The request was accepted by the court, which ordered the prefect of Vendée to release these documents on April 29.[21] On May 14, the prefect responded by releasing eight pages of documents—far less than had been requested by Avif. Despite their limited scope, the court accepted the documents as sufficient on May 27. Cassara, Avif's lawyer, argues that this release of documents proves that, contrary to the government's claims, "there were no [comprehensive] assessments" prior to the drawing of "black areas."[22] In this part of the controversy, Vendee was a special case, as the

17. Without this text, insurance companies only cover wind and rain damages, not flood damages, much more important.

18. Interview with Renaud Pinoit, vice-president of the Avif, conducted on August 2nd 2011.

19. Interview with Hervé Cassara, lawyer of the cabinet Huglo-Lepage defending the Avif, conducted on July 26th 2011.

20. Interview with Renaud Pinoit, vice-president of the Avif, conducted on August 2nd 2011.

21. Tribunal Administratif de Nantes, ordonnance du 29 avril 2010 relative au référé n°1002332.

22. Interview with Hervé Cassara conducted on July 26th 2011.

French Senate reported that experts contributed more than 5,000 work hours to complete assessments in Charente-Maritime before "black areas" were designated (Anziani, 2010:34).

The Xynthia case also highlights the problems of a poor communications strategy. Initially, the prefect of Vendée, Jean-Jacques Brot, emphasized the danger of living in these areas and the necessity of displacing residents. It was not until April 15 that the government tried to adjust its message. It changed the terminology, from "black area" to "solidarity area", and stressed the generous terms of compensation offered. Though it initially claimed that no modifications would be made to "black areas", it later relented: 184 houses were removed from the "black area" designation on September 20 (though 11 previously unlisted houses were also given the designation.) "There is no doubt whatsoever that the confusion in public communications was an aggravating factor in the vigorous reaction from the affected population," the French Senate noted in its report (Anziani, 2010:35).

Lastly, the legally vague status of the "black areas" further aroused public discontent. Cassara notes that the black areas are "a legal UFO…with no legal basis, it is neither in the urban planning code, nor environmental codes, nor property expropriation codes." It was created to move faster, to show that something was being done". He and his colleagues with Avif argue that normal legal procedures for expropriation should have been followed. Indeed, when Avif went to course in January 2011, the court ruled that judgment was impossible since the black areas "had no legal base"—leaving the homeowners in the midst of a "catch-22" situation.

2.3. Extent of the discontent

For some people, the opportunity to sell their house to the state was met with relief. In La Faute-sur-Mer, "in [the most dangerous] half of the black area, everybody was happy to sell their house"[23], says Renaud Pinoit. Pinoit further argues that those who lived through the storm wanted to leave as soon as possible, while those who lived permanently elsewhere "could not imagine being in any danger, even with two meters of water flooding their houses."[24]

In the end, many people sold voluntarily. By February 1, 2011, 1,113 of 1,574 homeowners in "black areas" had agreed to sell, and 794 of them had already been sold (at a cost of more than 200 million Euros) (Ministry of Ecology, 2011a). Conversely, only 103 houses (79 in Vendee and 24 in Charente-Maritime) had been expropriated.

3. THE FUTURE OF DEVELOPMENT ALONG THE COAST LINE

The damage caused by Xynthia led the French Senate to observe that "the risk of sea level rise and coastal flooding has, up to now, largely been ignored in laws and regulations, as well as in population protection measures enacted at the local level" (Anziani, 2010:89). In February 2011, the government enacted a "Plan Against Rapid Coastal Flooding" (Ministry of Ecology, 2011a). This plan is meant to set forth a five-year "roadmap" for national and local planning on the issue. This new effort, along with the review of existing flooding risk reduction plans in La Faute-sur-Mer and L'Aiguillon-sur-Mer, has triggered a new debate: should the emphasis be put on the control of development in areas exposed to natural risks, or should these areas be better protected by dikes?

3.1. The Plan against Rapid Coastal Flooding: a priority given to the control of development

Even if Xynthia showed how dangerous some areas can be, "Xynthia has not tarnished the dream of a house next to the sea" (Kerjouan, 2011). Insee, the French national statistics institute, projects that the population of Vendée could add 240,000 people within 30 years, bringing the total population close to one million (Insee, 2010). The Plan proposes axes for action to reduce vulnerability in the face of such demographic pressure. Two axes are geared at improving knowledge, monitoring, and alert systems, as well as public awareness of natural hazards. The other two are meant to control development and improve physical protection infrastructure.

Xynthia exposed the fact that tools meant to control development in dangerous areas have not been fully used. Natural Disaster Prevention Plans (of which Flooding Risk Prevention Plans are a part) are designed by national government authorities, in concert with local authorities, and are approved by city councils. Such plans delineate three types of areas: "green" (suitable for construction), "blue" (construction suitable under certain conditions), and "red" (construction not suitable). Yet at the time of the storm, only 46 of 864 communes exposed to the risk coastal submersion in France had approved flooding prevention plans; another 71 had been asked to adopt a plan but had yet to do

23. Interview with Renaud Pinoit conducted on August, 2nd 2011

24. Ibid.

so (Anziani, 2010:23). A key measure of the Plan Against Rapid Coastal Flooding is to accelerate adoption of new Flooding Risk Prevention Plans[25], and to revise some existing ones. At the time of the storm, 21 coastal towns in Charente-Maritime had approved a risk prevention plan, but none in Vendée. The new national Plan calls for 62 new plans to be adopted in Charente-Maritime (and 19 to be revised), while also calling on 17 plans to be adopted in Vendée (Ministry of Ecology, 2011a).

With regard to dikes, the first action taken was to repair 120 km of dikes in Charente-Maritime and 80 km of dikes in Vendée damaged by the storm (Ministry of Ecology, 2011a). The new Plan Against Rapid Coastal Flooding also establishes a roadmap for improving existing dikes. This is more complex than it may seem, as 3,000 km of the 8,000 km of dikes in France are "orphan dikes", without identified owners (Ministry of Ecology, 2011b:30). Dike rehabilitation is expected to begin at the earliest by the end of 2011.

The twin goals of development control and dike construction highlight a tension in priorities. For example, in a speech on March 16, 2010, President Sarkozy noted that "in high flooding risk areas, it will not be possible to build houses behind dikes anymore. Indeed, sooner or later, no matter how high or solid, these dikes will be submerged" (Sarkozy, 2010). The Plan against Rapid Coastal Flooding adopts the same position, stating that "any work likely to be put in charge, even in exceptional cases, can be considered safe" and thus, "new dikes will not be used to open new areas for development." ((Ministry of Ecology, 2011b:17). Thus, the official state position is that dikes should be the protection tool of last resort (Ministry of Ecology, 2011b:17).

3.2. Diverse positions among the disaster victims

The land use planning discussions in the wake of Xynthia inspired great debate in the coastal communities affected by the storm. In August 2010, a new Flooding Risk Prevention Plan was made public for La Faute-sur-Mer and L'Aiguillon-sur-Mer. Public consultations lasted through the end of 2010, and a second round of consultations are still underway. Meanwhile, groups that had mobilized in the wake of the storm (including "L'Avenir ensemble" in L'Aiguillon-sur-Mer and the "Association pour la défense des propriétaires fautais" in la Faute-sur-Mer) organized September demonstrations that drew 700 people. These groups protested against the Flood Risk Prevention Plans on the basis of their negative economic impacts. Indeed, they took a far more radical view than Avif, which does not endorse unrestricted development in new parts of the coast.[26]

Pinoit, of Avif, notes that the new rules are being "tested" in Xynthia-affected communities: "The Risk Prevention Plan in La Faute-sur-Mer and L'Aiguillon-sur-Mer is likely to influence the other Risk Prevention Plans adopted elsewhere in France, which will cover five million people nationwide." With the coming presidential election (April-May 2012), Pinoit feels that the government ministries are in no hurry to move quickly this time.

Moreover, Avif considers dike repair a top priority. "Before establishing risk prevention plans, we should make sure the existing protections are up-to-date. Let's first protect what is built, and then adapt the houses and set rules for development…people died in houses with a second floor too", says Pinoit. And while some feel there is time before the next storm, Pinoit notes that La Faute-sur-Mer suffered two floods in the space of four months in 1940-1941.

CONCLUSION

The Xynthia storm highlighted significant gaps in the French system of flood control and population protection in coastal areas. In addition, the response of the government, the protests of the victims, and the attempts to address coastal development policy add complexity and intrigue to this case. From outside, one might be tempted to dismiss the protest movement. Indeed, the compensation provided by the state was very favorable to disaster victims. However, this essay tries to highlight a different view. The controversy over "black areas" was due more to the form than the content. The lack of assessment and the poor communication strategy from the government was more problematic than the idea of displacing people from dangerous areas. These problems imply that the government significantly underestimated the psychological sensitivities of the migration/displacement process.

This is not to say that people may justifiably live wherever they choose, even in areas of mortal danger. But it is to say that precautions should be taken when displacement is necessary. Moreover, there are reasonable disagreements about how far development control policies should go. While the central government is more in favor of restricting

25. « Plan de Prévention des Risques d'Inondation » (PPRI) in French

26. Interview with Renaud Pinoit conducted on August, 2nd 2011

coastal development, local authorities and civil society groups prioritize protection through the system of coastal dikes.

Xynthia is likely to be an important precedent for future crisis management. Yet key questions remain unanswered: how to go about moving people from their homes, how to pay for the expensive process of compensating displacees, and how to balance development and planning policy with the construction and maintenance of physical protective infrastructure. Future generations of French policymakers will have to continue to work through these difficult issues in the years and decades to come.

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PART 2 ON-GOING CRISES

In the second part of this volume, we address the world's forgotten crises. While emerging disasters often inspire dramatic media coverage and substantial policy response, the world's slow-onset disasters deserve much more examination, both in terms of their ecological circumstances and the types of migration to which they are linked. For example, while emerging disasters are connected with massive and sudden displacement in the acute aftermath, incremental environmental degradation may be connected to diverse migration patterns in and out of the affected area. Such heterogeneity makes it difficult to measure, much less address, these flows. Moreover, the policy response may even be part of the problem.

While human activity is often a major contributor to the environmental degradation outlined in this section, many of these challenges will be exacerbated by climate change in the coming decades. Moreover, while climate change theorists often posit that migration constitutes a failure of adaptation, it is important to consider the linkages between migration and adaptation in these cases. For better or worse, people in these rapidly degrading ecosystems use migration as a strategy of adaptive response to their local conditions. Adaptation policy, then, should consider migration dynamics as part of the adaptation process, rather than as a barrier to be overcome via adaptation. This is not to say that every migration is healthy (socially or environmentally), but rather, that policy should be responsive to the demographic situation on the ground.

In our first case, we examine the hazards from glacial melting and the potential risks for populations in the Himalayan Mountains of Nepal. Interestingly, this case of slow-onset degradation may be linked to sudden disasters, as melting may trigger frightening and deadly glacial lake outbursts that could quickly overwhelm local settlements. Next, we examine the case of Darfur. Despite its diminishing place in world headlines, our case shows that the underlying environmental problems remain largely unsolved. Lastly, we present a collection of three case studies from Brazil: the Amazon frontier, northeastern plains, and the hills around Rio de Janeiro. The cases highlight the diversity of environment-migration linkages in Brazil, while also making connections in all three cases to underlying demographic and environmental policy aims pursued by local and national authorities during different periods of the country's modern history.

6. DISPLACEMENT RISKS FROM GLACIAL MELTING IN NEPAL

Radu Nikolaus Botez

INTRODUCTION

In December 2009, in order to highlight the threat of climate change to the Himalayas region, the Nepalese government held a meeting at a height of 5,262m and adopted a resolution on climate change. Such a symbolic meeting had already been conducted a few months earlier by the government of the Maldives, which met underwater, thus drawing the attention to the sea-level rise posing an existential threat to the island state. Like the Maldives, Nepal faces several threats from climate change-induced environmental change. The melting of glaciers results in the creation of, and additional pressure on, glacier lakes. When glacial lake outburst floods (GLOFs) take place, as, for instance, in 1985 (Dig Tsho Lake), its consequences for the population and the destruction it causes are significant (Schild 2008: 4).

Glacial lake outburst floods are but one kind of environmental disaster Nepal is likely to face as global temperatures continue to rise.27 For example, the 2008 monsoon triggered major floods, causing the Saptakoshi River to break through a dyke and flood the Sunsari district in Southeast Nepal; 54,000 people were displaced (MSF 2008). Moreover, while natural disasters28 are the most obvious linkages between environmental change and migration, slow-onset environmental degradation resulting from floods, landslides, and human activity can also harm livelihoods and increase the likelihood of migration and displacement (Shrestha and Bhandari 2005). At the same time, the environment is only one of several factors that explain migration, which is a complex social process.

This case study aims to provide an overview of the progressive melting of glaciers in Nepal, a type of slow-onset environmental degradation that can lead to rapid-onset disasters such as GLOFs. This paper will examine how these processes and events affect the migration decisions of local people, as well as how policymakers and NGOs have addressed the issue of melting glaciers potentially leading to devastating GLOFs.

1. CONTEXT AND VULNERABILITIES

1.1. General description of Nepal

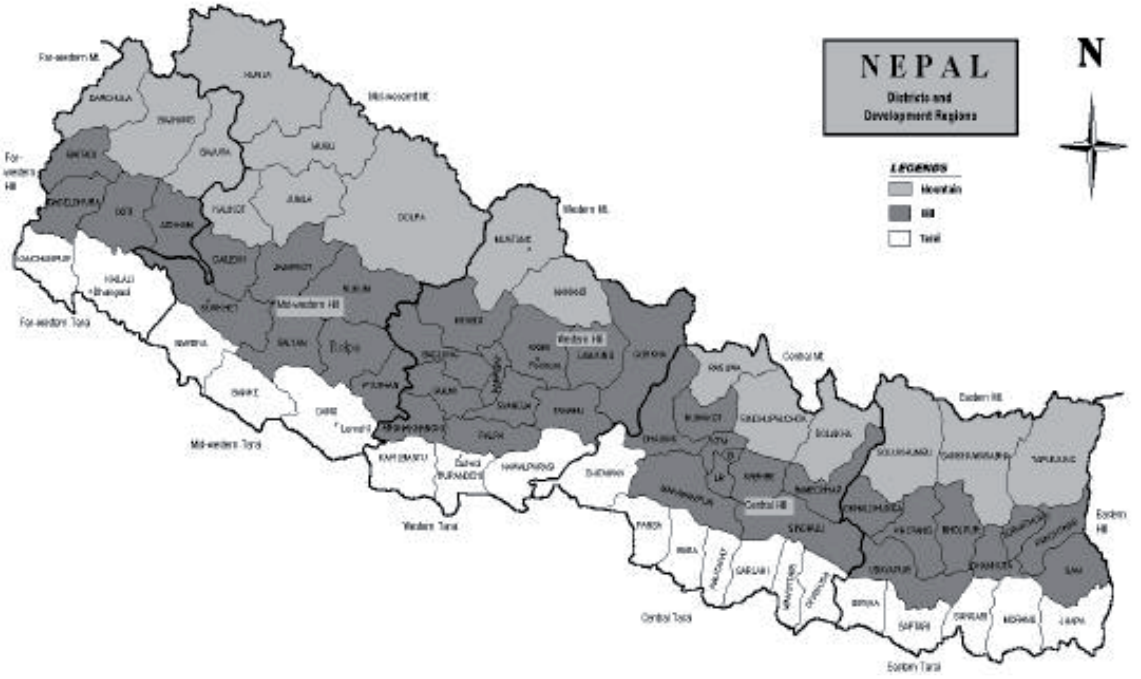
Kumar divides Nepal into three main regions, defined by "a combination of altitude, climate, district boundaries and drainage basins from South to North and East to West," (Kumar KC 2003: 122): 1) the mountain zone (which includes 7.3% of Nepal's 29 million people,29 covers 22.7% of the country's area and 0.3% of its arable land); 2) the hilly area (44.3% of the population, 50.2% of land area, 48.1% of arable land); and 3) the Terai area (48.4% of the population, 27.1% of land area, 51.6% of arable land). As a result, the "mountain districts are chronically deficient in the production of staple foodstuffs. This, in combination with their poor transport infrastructure, means they are also chronically food-insecure" (Gill 2003: 6). The hill area also suffers from an agricultural production deficit, while only the Terai land has a food surplus (ibid.). Environmental hazards may affect these regions differently, widening inter-regional disparities.

27. The average increase of temperature in Nepal is expected to increase by 0.6 degrees Celsius per decade--higher than the global average (Webersik and Thapa 2008: 2).

28. It should be noted that the natural/human categorization of disasters is not always straightforward. For example, the 2008 floods were caused not only by heavy rains but also by poor maintenance of the dam itself.

29. This overview is based on Gill (2003) and K. C. (2003)

Map 1. Ecological zones in Nepal



Note: White areas: Tarai; dark area: Hills; grey area: Mountains. Source: Kumar KC 2003: 122.

1.2. Historical description of affected areas

Glacial lake outburst floods (GLOFs) are considered one of the most imminent threats resulting from environmental change in Nepal. As glaciers melt, new glacial lakes are formed and existing lakes expand, increasing the risk of GLOFs. In 1985, a GLOF in the Dig Tsho Glacial Lake in eastern Nepal attracted international attention. An "ice avalanche" had fallen into the lake, causing a five-meter high flood wave that overcame a moraine dam and ran down mountainsides, destroying houses, land, infrastructure, and causing $1.5 million in damage to a hydroelectric power plant (Schild 2008: 4). The glacial lake, 1,500 metres long and 300 metres wide, was almost completely emptied by this event (Horstmann 2004: 3). In one of Asia's poorest countries (UNDP, 2010), such events impose a heavy toll. And while the Dig Tsho GLOF was among the most devastating, such floods occur every two to five years according to the Nepalese Department of Hydrology and Meteorology (Kattel 2007).

1.3. Socio-economic and natural characteristics of affected area

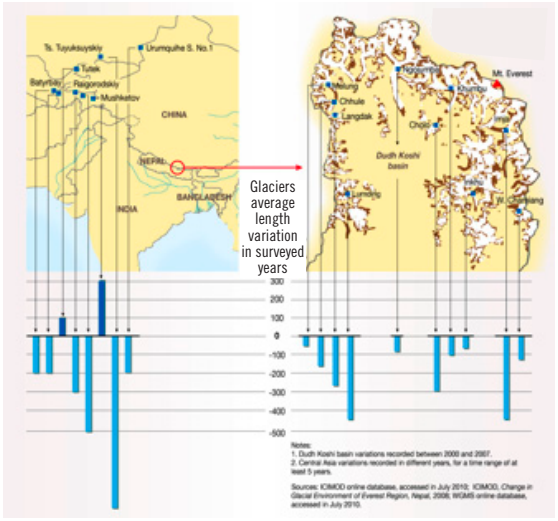
In recent years, much emphasis has been put on the notion of vulnerability as a way of anticipating the impact of environmental changes on populations. Vulnerability is "a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity." In other words, vulnerability is equal to 'f' (exposure + sensitivity - adaptive capacity)" (ICIMOD 2010:1). Resilience can be defined as "the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks" (ibid.). Finally, endowments and entitlements also need to be analyzed in order to understand vulnerability and resilience. Dulal et al. (2010: 627) define endowments and entitlements as "important resources required by every society or group to enable them achieve a sustainable livelihood. […] This includes capital assets of individuals, households, communities, or groups, such as human, physical, natural, financial and social capital [that will define] their ability to achieve a sustainable livelihood, [which in turn will] enhance their adaptive capacity and resilience in the face of increasing climate change threat."

"Human capital" refers to the "level of education and productive skills of the people [and which] includes knowledge, skills, competencies, and attributes embodied in people that facilitate the creation of personal, social and economic well-being." (Dulal et al. 2010: 627) In Nepal, human

capital is present (through traditional knowledge) but needs to be supplemented. The general level of education in Nepal is low[30] and information needed to cope with environmental change is not available to much of the population. As a consequence, both training and awareness-raising is needed to foster the adaptive capacity of the population. However, as Pokharel and Byrne (2009: 25) point out, "adaptation to climate change, while of course widely practiced in an ad hoc (autonomous) way, is new to Nepal as a field to be regulated through policy."The fact that Nepal is one of the poorest countries in Asia represents a further vulnerability. Unemployment (46%) and the number of those living below the poverty line (24.7%) is generally high – Nepal ranks 146th in the UN Human Development Index – yet some groups are in an even more perilous situation: Women and members of lower castes are heavily disadvantaged, and poverty is higher among ethnic minorities and tribal groups which are regarded as "inferior" by members of the higher castes (Bhusal 2008: 33). These groups are likely to be harder hit by an environmental disaster. Furthermore, a look at Nepal's progress towards the achievement of health related Millennium Development Goals (MDGs) – eradicate extreme poverty and hunger (GOAL 1), reduce child mortality (GOAL 4), improve maternal health (GOAL 5), combat HIV, malaria and other diseases (GOAL 6) - indicates a critical situation and thus a vulnerable population (WHO 2007). For instance, "addressing child malnutrition, the underlying cause for half the child deaths, remains a challenge in Nepal. About half of children under three years […] are too short for their age, and most children suffer from some type of micronutrient deficiency." (ibid.). Also, as for the fight against HIV, malaria and other diseases, "the trend shows that unless programmes are implemented on a war footing, a generalised epidemic with high mortality in the most economically productive group will begin and will start a vicious circle. The spread of HIV/AIDS will increase poverty and vulnerability, which in turn causes more infection and has serious impacts on the country's socio-economic conditions" (ibid.).

Remittances by migrants play an important role with regard to income diversification and thus reduction of vulnerabilities. According to Thieme and Wyss (2005: 72), "ninety per cent of the households farm for their own consumption but cannot meet the need for the whole year. Seventy-five per cent of households have no income from gainful

Figure 2. Glacier recession and expansion in Hindu Kush-Himalayas and Central Asia



Source: UNEP/GRID-Arendal 2010.

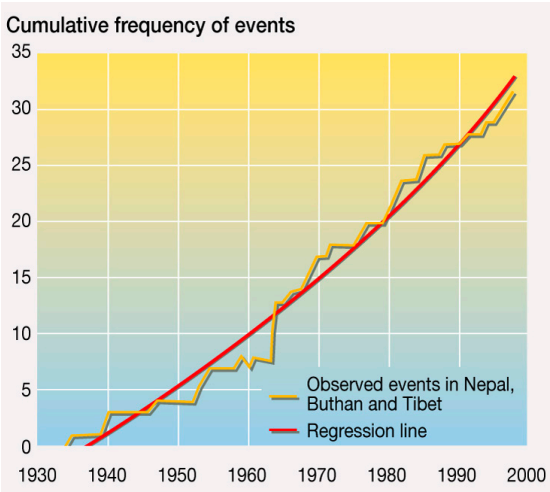
employment within Nepal. Remittances from present migration or income of past migration in the form of pensions from a foreign army are for most households the only or most important cash income." Financial capital, another important asset to determine the adaptive capacity of the population, is thus limited. Cash transfers suffer from the weak banking system, especially in regions that are farther away from the capital and main cities. As in many developing countries, there is a need for a more elaborated system to transfer remittances.

The country's topographic profile also contributes to the impact of the floods and thus the vulnerability of the Nepalese population. Elevation ranges from 100 meters in Southern Terai to more than 8,000 meters in the North. As a result, floodwaters are carried rapidly downhill, causing great destruction in their path. However, the population also depends on this topography to bring water from glacial melt and mountain lakes during the dry season.

The precipitation during the monsoon season is crucially important for agriculture and other basic needs, but floods often go hand-in-hand with these monsoon rains, which can displace thousands and destroy agricultural land and crops. In recent years, precipitation patterns have changed due to climate change, which creates additional vulnerabilities (particularly in the agrarian population). While traditional knowledge certainly helps in dealing with the rains, it must be supplemented with detailed data on precipitation patterns in order to allow the population to adapt and prepare.

30. While the literacy among the male population was 62.7% in 2001, only 34.9% of women were able to read and write.

Figure 3. Glacier Lake Outburst Floods



Source: UNEP/GRID-Arendal 2010.

As noted above, vulnerabilities can be understood as a lack of necessary assets to realize capabilities to cope with the environment. Because Nepal suffers from a lack of endowments and entitlements needed to ensure adaptation to environmental change, and because of the country's unique geography and topography, it is particularly vulnerable to global environmental change, and thus represents an important case study for climate scientists.

2. MIGRATION PATTERNS OVER TIME

2.1. General patterns

According to figures from the 2001 census (Kumar KC 2003: 11), the most important internal migration takes places from rural to rural areas, accounting for about 68.2% of all migration activity, while rural-to-urban migration accounts for 25.5% of total internal migration. Moreover, migration takes place more often from higher to lower altitudes (Gill 2003: 11). Reasons for internal migration are marriage (23%), agriculture (18.1%), service (11.5%), study (10.3%), business (5.5%), and 'other reasons' (31.6%). The Mid-West and Far-West parts of the country experience population loss as a result of migration.

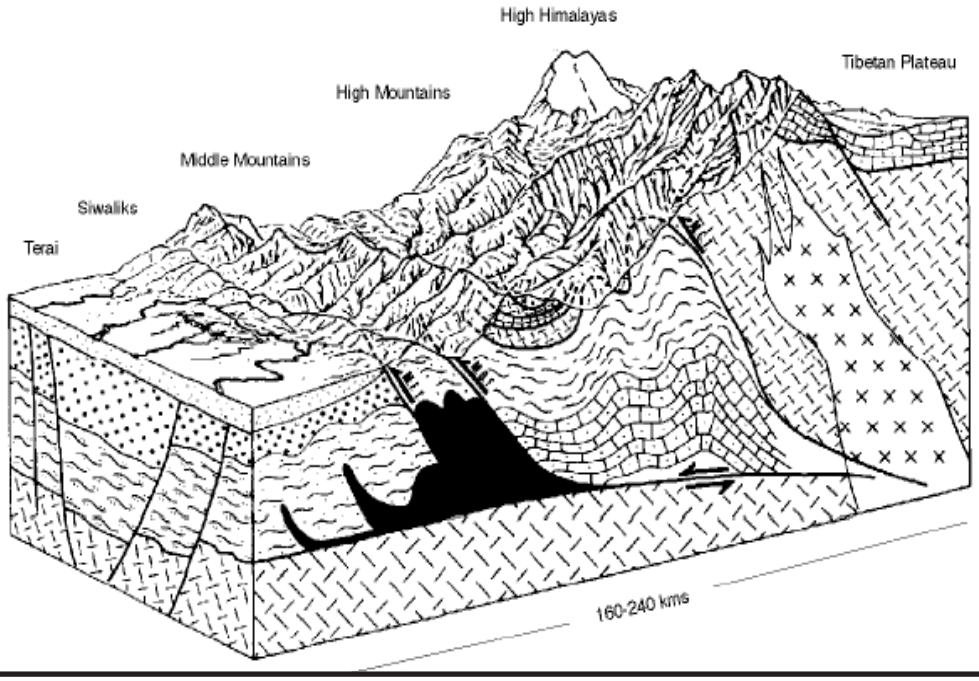
Internationally, the most prominent emigration destination from Nepal is India, where about 900,000 Nepalese (77.3% of the expatriate community) are believed to live (Kollmair et al. 2006: 153). India is a prime destination because of the open border between the two countries (Shrestha and Bhandari 2005: 21). Migration to the Gulf States, officially estimated at 110,000, is believed to be at around 170,000 (14.5%) while 40,000 (3.5%) are estimated to have left for Europe, the US, Japan and Australia (Kollmair et al. 2006: 153).

2.2. The environment-migration nexus

Two studies, Massey et al. (2007) and Shrestha and Bhandari (2005), address the environment-migration nexus in the Chitwan Valley (Terai), examining the importance of environmental deterioration on human migration. Massey et al. (2007: 6f.) identify five specific aspects of environmental change that they deem important in order to establish the link between environment and migration: 1) "higher levels of population density will be associated with higher rates of out-migration among residents of the Chitwan Valley"; 2) they anticipate that "a perceived decline in agricultural productivity will be associated with a greater likelihood of out-migration among farm households"; 3) "local areas with less open farmland will have higher rates of out-migration than those where agriculture is more abundant"; 4) "families facing less access to fodder will have higher rates of out-migration"; 5) "variations in access to fodder and firewood are expected to have different effects on the migratory behaviour of men and women." They also assume that "given that the Chitwan Valley continues to exhibit a great deal of environmental variation, local environmental changes [are expected] to have a stronger influence of local moves within the valley than on long-distance moves out of the valley". Both Massey et al. (2007) and Shrestha and Bhandari (2005) conclude that labour migration is a coping strategy to environmental degradation. However, such migrations are almost all local; there is little evidence that international migration patterns into and out of Nepal have a strong environmental component (Massey et al. (2007: 22).

In their study, "Labour migration as a response strategy to water hazards in the Hindu Kush-Himalaya", Banerjee et al. (2011) find that "nearly 80% of the migrant households surveyed considered water-related hazards as an important influence on the decision to migrate for work. But even in these households, non-environmental reasons such as lack of income, unemployment, dissatisfaction with livelihood, and lack of livelihood opportunities were significant determinants of labour migration". It should be pointed out that there is a considerable difference between the role of "rapid-onset hazards" such as floods and "slow onset hazards" such as droughts, floods playing a role in 60% of migrant households' migration decisions,

Figure 4. Topography of Nepal



Source: WWF 2005:6.

while droughts influenced migration behaviour in 30% of migrant households (Ibid.).

As Baherjee et al demonstrate, not all disasters have the same impact—or perceived impact. In the case of GLOFs, it is unlikely that mountain communities can engage in *in situ* adaptation. GLOF adaptation would require strong early warning systems, a change from mud to stone as the building material of choice (ICIMOD 2009: 28), and other costly interventions that only the central government (and international donors) can reasonably fund. Conversely, in the case of droughts, traditional knowledge can lead to successful local adaptation strategies (ICIMOD, 2009).In addition, since drought is a slow-onset process, it is possible for families to arrange for temporary migration out of the affected area.

3. POLICY RESPONSES

3.1. Risk assessment and reduction

The International Centre for Integrated Mountain Development (ICIMOD) has undertaken considerable efforts to assess risks emanating from glacial lakes. In 2001, it created an inventory of glaciers, identifying more than 8,000 glacial lakes in the greater Himalaya, 200 of which are potentially dangerous (Schild 2008: 2). A further assessment of glacial lakes in Nepal, using remotely sensed data, took place in 2009: 1,466 glacial lakes were identified, 6 of which are "potentially dangerous" (ICIMOD 2010a: 3).

Together with the Kieo University (Japan), ICIMOD has implemented a Wireless Fidelity (Wi-Fi) monitoring system of the Imja Tsho Lake, regarded as being at high risk for a GLOF. Two web cameras provide images of the area every 10 minutes, accompanied by additional data from sensors of the monitoring system (Garung et al. 2009: 6).

The threat posed by Tsho Rolpa Lake was addressed in the late 1990s after Dr. J. Reynold, a GLOF specialist, warned that the lake might burst in the summer of 1997 (Matambo and Shrestha 2010). An early warning system was installed, first in the form of Army posts in the area, which would warn population in case of a GLOF, then through a more sophisticated system that would receive signals from a GLOF sensor system and warn the population by air horns and sirens (ibid.). Furthermore, a channel system, financed by the Netherlands, was installed to lower the water level by 3 meter (Horstmann 2004: 4f.).

The United Nations Development Programme (UNDP), together with the EU's Humanitarian Aid Agency (ECHO), also aims at strengthening GLOF risk reduction through "non-structural and community-based interventions [and through fostering] understanding of socio-economic risks

associated with GLOFs" (UNDPa). This project[31] includes raising awareness among the population, land use planning (through, for instance, introduction of land use management concepts and practices at the community and local administration level), preparedness planning (through, for instance, the development of contingency plans and identification of evacuation routes and safe shelters), knowledge networking (through, for instance, documenting traditional coping mechanisms and practices, and facilitating information and knowledge sharing between different stakeholders), risk mitigation, early warning systems, disaster management planning and, finally, mainstreaming disaster risk reduction into development (UNDP, ECHO).

3.2. Resettlement programs

Resettlement has taken place on a small scale and only with regard to the Tsho Rolpa Lake. As it was believed that an outburst would take place in June 1997, an evacuation for the population living downhill from the lake was issued. Approximately 74% of the population of 6,000 that lived downhill from the lake was evacuated for one month (Matambo and Shrestha 2010). According to reports from the area, the physical risk reduction measures put in place gave the population the impressions that they were safe and thus that there was no need to move.

3.3. Relief action

Relief actions are undertaken by the state and international organizations in the event of floods, including GLOF. Action takes place under different policies such as the 1982 Natural Disaster Relief Act, stipulating, for instance, that families of victims shall be provided NRS 10,000 (€160) as relief assistance (Pokharel 2004) and the National Strategy for Disaster Risk Management of 2008. The former also establishes a Central Disaster Relief Committee, under the leadership of the Minister for Home Affairs, consisting of 25 members; it also authorises the government to set up aid funds at national, regional, district and local level (Government of Nepal 2008: 21).

Following the 2008 Koshi floods that displaced 42,000 people, the government of Nepal provided a return package worth NRS 50,000 (€800) to those returning to their original places of residence from the relief camps (IFRC 2009: 4). Moreover, it purchased land and allocated 133.8 square meters to each of 1,422 landless families (Shankar 2010). However, critics pointed out that the Chamar community, a Dalit (lowest caste) sub-caste, had been discriminated against in the reallocation process. Having been compelled to live on the borders of the Kosh river and landless because of their status, Dalits are more vulnerable to such floods (ibid.). Furthermore, the return package was provided only to those that had registered as Internally Displaced People (IDPs). Due to weak registration mechanisms, however, up to half of the IDPs were not able to register in some districts (IDMC 2010: 1). Additionally, the 2007 IDP policy[32] adopted by the government "has not been disseminated effectively across the country" (ibid.).

According to the International Federation of the Red Cross and Red Crescent Societies (IFRC), "throughout the response, the work of the humanitarian actors, of clusters and coordination, has been largely focused on temporary camps established in and around community buildings as well as on available unaffected land. Almost all those who fled needed housing and thus emergency shelter had an important role to play. Anecdotal evidence suggests that the response and the coordination of the response have overall been good. Throughout the disaster, with perhaps a few problematic exceptions, humanitarian need has been met." (Kellett 2008: 5). Despite these and other measures,[33] Chhetri (2001: 63), focusing on the domestic landscape, points out that there is a "lack of coordination among agencies related to disaster management, and of clear-cut job descriptions for those agencies." Other shortcomings include a lack of technical manpower.

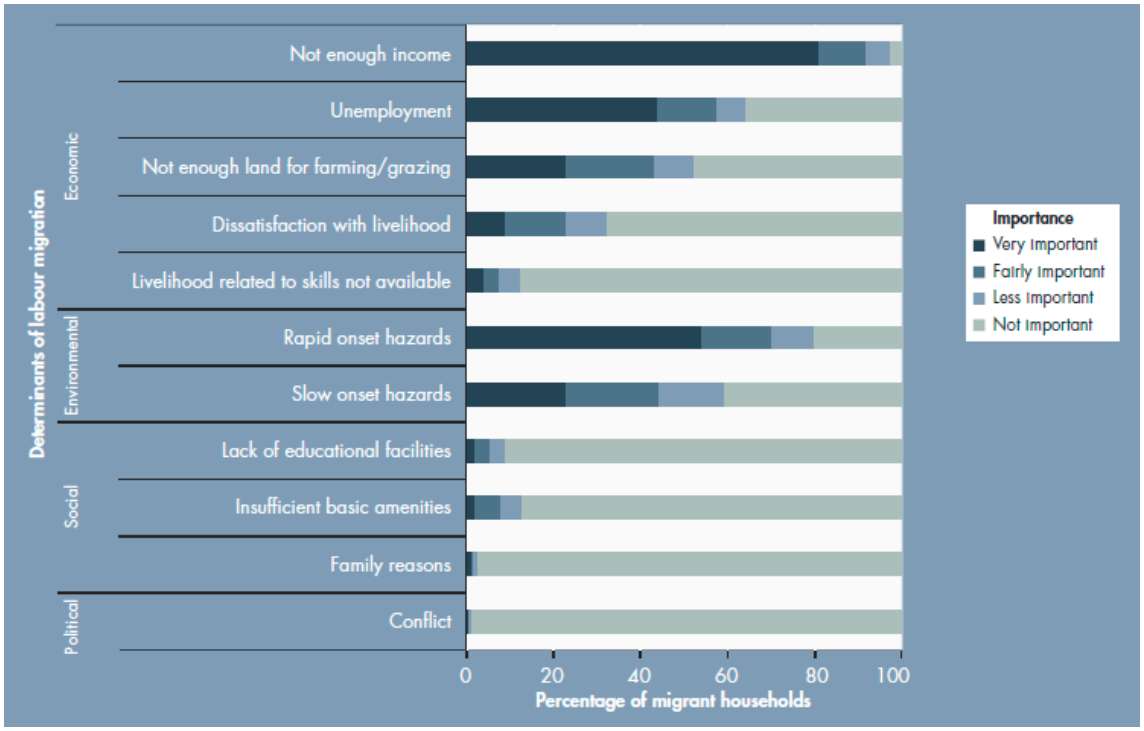
International organizations, besides providing relief to those hit by floods, also play a role with regard to capacity building and training of authorities. The International Organization for Migration (IOM), for instance, runs a program on "Migration, Climate Change and Environmental Degradation", in the framework of which it trains authorities in "Humanitarian Response in Emergencies, Shelter and Settlement Planning and SPHERE Standards to ensure a consolidated response to the advent of new disasters in the region" (IOM 2010).

31. A wide range of documents on the projects is available at http://www.managingclimaterisk.org/index.php?menu_id=9&pagetype_menu=2&content_id=MEN-9

32. For the policy document, see Government of Nepal (2007).

33. For a more comprehensive account, see the Government of Nepal, UNDP, EC (2010).

Figure 5. Determinants of labour migration and their perceived importance in the migration decision



Source: Banerjee et al. 2011:8.

CONCLUSION

The forgoing overview of GLOF and their link to migration in Nepal has demonstrated that thus far, the threat of such floods has not led to people moving in anticipation of the phenomenon. Evacuation of a part of the population living downstream of the Tsho Rolpa Lake for a period of around one month has been the only movement directly linked to this slow-onset environmental change. However, the ongoing and quickening process of glacial melting is likely to increase the likelihood of GLOF which will trigger displacement (as occurred after the GLOF at the Dig Tsho Lake in 1985) if no comprehensive prevention measures are put in place.

Actions taken by the government when an outburst of the Tsho Rolpa Lake was expected in 1997 have addressed several issues, yet several shortcomings remain, especially concerning problems regarding the early warning system put in place at that time and later abandoned. Moreover, the positive role played by the ICIMOD has demonstrated the importance of strengthening local capacity for research and risk assessment.

POLICY RECOMMENDATIONS

- Carry out more fine-tuned studies in the different regions (Terai, hills, mountains) to assess different vulnerabilities and capacities of the different communities.

  Migration patterns (and vulnerabilities to environmental change) differ from area to area, and even within districts. In order to fully understand the phenomenon, more detailed studies need to be carried out, ideally by local research institutions. Research in this area should identify different configurations of capital assets and role in both adaptation to environmental change, and migration behaviour.

- Implement the 2007 National IDP Policy and develop an effective registration mechanism

  According to various NGOs, little progress has been made on the implementation of the 2007 National IDP Policy. The Government of Nepal needs to implement the policy and also develop effective registration mechanism for people displaced by natural disasters in order to ensure that best assistance possible is provided to victims of such events.

- Design mechanisms to include the local communities in the decision-making process at state level

  Since environmental conditions and vulnerabilities are often highly localized, local actors need a role in setting State policy on environmental change, adaptation, and migration. International organizations and civil society may also contribute valuable technical knowledge and expertise to these processes.

- Provide information on anticipated environmental change to local communities, especially to those that are in remote mountain areas

  Access to information depends on several factors, the most important being the ability to acquire data and reports on anticipated environmental changes and their impacts. Access to information thus requires both education and resources (such as internet access), both of which are far from universal in Nepal. International donors can help fill these gaps. Moreover, data and knowledge on environmental change should be mainstreamed into development projects in Nepal.

- Provide funding schemes for communities to adapt houses to potential GLOFs and to allow for other capital-intensive adaptation measures

  Changing housing materials from mud to stone can be protective against GLOFs. However, as noted in this analysis, many mountainous areas suffer from food insecurity and a general lack of financial resources. Thus, international and national support may be necessary to fund such capital-intensive investments. However, any such program should avoid exacerbating local inequalities, including those fueled by remittance revenue.

- Foster development of expertise through the funding of research institutions

  Research institutions play an important role in understanding changes in the environment and how they will affect populations. They have provided valuable data and have also carried out awareness-raising training. The activities undertaken by ICIMOD, which has mapped risks resulting from glaciers in the Hindu Kush-Himalaya region is but one example. These sorts of locally-driven research institutions should be supported and nurtured, preferably through cooperation with international actors who might benefit from lessons learnt with regard to environmental change and adaptation strategies.

- Inter-agency cooperation in disaster response operations

  The different agencies responsible for disaster relief operations in Nepal do not always cooperate sufficiently, undermining efficacy. New organizational frameworks should be considered and developed.

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7. MIGRATION AND RELIEF ACTION IN DROUGHT-AFFECTED DARFUR

Charles-Édouard de Ramaix*

INTRODUCTION

Droughts are among those naturally recurring features of climate change that have caused mass migration throughout human history. Archaeologists now agree that drought was a leading factor in the massive migration of early humans 125,000 years ago out of Africa to the rest of the earth. Written records of ancient cultures from all over the world also speak of droughts and their disastrous consequences. The Epic of Gilgamesh speaks of a drought brought on by a Bull of Heaven that ceased only with the slaughter of the bull by Gilgamesh. Scholars now agree that this tale stems at least in part from the story of Joseph, son of Jacob, and the seven-year drought he faced in his lifetime. Egypt was then the only kingdom that had anticipated the drought by stocking resources vital to man and livestock. The Book of Genesis describes massive migrations of unprepared nations "from all over earth" towards this country. However, the severity of the drought is such that all the world's nations go bankrupt, including Egypt (Tanakh, Bereishit-Genesis). Although this story remains a legend, there is certainly some truth in it. If a worldwide drought sounds unlikely, it remains, however, perfectly conceivable that a drought did take place and that it did lead to massive migrations and instability in the region.

In modern times, droughts are still known for causing mass migration. Unfortunately, the drivers of migration are complex and it is difficult to establish causality. Moreover, data on migration induced by environmental changes has always been difficult to obtain (Jonson, 2010). The Darfur case is no exception.

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This case study concentrates on Darfur's drought and its linkages with internal displacement in the region. The environment-migration nexus will be explored to assess how it may be related to conflict in the region. Consequently, the challenges faced by the international community in dealing with the humanitarian crisis will be discussed, highlighting good practices for further steps in the rehabilitation of livelihoods in Darfur.

1. THE CONSEQUENCES OF RECURRENT DROUGHTS IN DARFUR

1.1. Socio-economic background of Darfur and historical migration patterns

The categorization of the different types of communities in Darfur may help understanding the possible tensions rising from their respective use of their environment. Indeed, ethnic groups in Darfur are numerous (over 80 tribes call Darfur their home) and complex, as can be seen on Map 2. Yet, potential environmentally-induced disputes may be understood through the division of the people of Darfur according to their lifestyles.

First, nomadic herdsmen and semi-nomadic farmers are generally Muslims of various Afro-Arabic origins, and originated from Northern Sudan, the Darfur region, and Chad. The second group consists of sedentary and semi-nomadic farmers, often Animists or Christians of sub-Saharan African origin and from Southern Sudan (Burr, Collins, 2008). The ethnic boundaries between these two groups, who have largely intermarried, are not clear-cut. Additionally, nomadic lifestyles in the region have always led to various migration influx.

Historically, nomadic tribes resided in the drier North of Darfur and relied on water holes, oases, wells and subsistence farming for themselves and

Map 1. Darfur, Sudan and neighboring countries

Source: Wikipedia, 2011

their herds. During the dry season, they would travel southward with their animals into the more temperate Southern farmlands and would migrate back North with the onset of the rains. Jonsson (2010) notes that the high degree of mobility of these populations is their strategy to cope with the high variability of the local climate.

Traditionally, only men would travel southward with the herds. Women and children would remain behind to tend the crops. These seasonal cycles corresponded to harvest seasons, historically. However, as drought worsened, the need for agricultural labor in Northern Darfur dwindled. (Burr, Collins, 2006). Indeed, in the 1980s, cyclical droughts began to plague Northern Darfur and its water holes and seasonal rivers vanished. The initial effect was crop failures. Those left behind were unable to feed themselves and their herds. As a result, the population was pushed away from home and pulled south, where they searched for fertile land to pasture. What had started as a traditional seasonal migration pattern involving adult men eventually became a permanent migration involving whole families (Bond, 2005).

1.2. Environmentally-induced migration patterns

Migration in Darfur may indeed obey to the push and pull theory, theorized by Lee (1966). Indeed, Lee's law distinguishes two types of factors that lead to human migrations: push factors involving deteriorated living conditions and pull factors attracting migrants by safer livelihoods. In the Darfur case, push factors would include desertification, famine or drought, natural disasters, and war, all of which were more prevalent in Northern Darfur. Thus, in Darfur, many migrants would have been pulled to the relative peace and prosperity of Southern Darfur.

Over the years, not only did rainfall patterns change, but rainfall also declined drastically.

Map 2. Map of Darfur Ethnicities

Source: Miller, 2004.

Repeated years of droughts induced desertification and environmental degradation and damaged the ecological balance, which once existed between sedentary agriculture and nomadic pastoralism (Braun, 2006). Ever since the mid-1980s, reoccurring periods of cyclical drought (1983, 1984, 1985, 1987, 1989, 1990, 1997 and 2000) have caused crop failure, loss of livestock and pastureland, and severe environmental degradation (Morrod, 2003). At the same time, even when the rains do not fail, the rainy season has shrunk from five months (May through September) to three (June to August; Bonde, 2005). By the mid-1980s desertification had become so severe that even the poorest populations migrated to escape starvation – confirming the understanding of migration as an adaptation strategy (Martin, 2007).[34]

Consequently, a snowball effect took place, when the nomadic herdsmen expanded the range of their circulatory migration routes and brought

34. Yet, this linkage is always complex to directly address. Indeed, because of the relationship between agricultural labor and climate, it is difficult to assign these sorts of migrations to "climate" or "economics." Additionally, as droughts are slow-onset events, it is very difficult to assign direct causality between environment crisis and migration. Further complicating matters, migration-related drought does not typically happen at the peak of the drought, but rather just before or after conditions are at their worst (Gemenne, 2009).

along their whole families in search of water. It resulted in over-grazing the little arable soil that remained throughout Northern Darfur and the disappearance of the little plant life that had survived the drought. In turn, this increased erosion and exacerbated the desertification process. Migration snowballed as those who had not yet migrated did so in response to desertification in the North. More migrating pastoralists in turn caused shortages of food and water; herders began to roam hundreds or thousands of kilometers in search of water and pasture land (Teklu, von Braun, Zaki, 1988). Even through the 1980s, however, migration remained highly seasonal: as shown in Figure 1, migration typically peaked in early fall.

Figure 1. Arrival Time of Displaced Populations around Omdurman in 1984

Month	Percentage of Population
March	0.9
July	3.0
August	5.6
September	34.0
October	40.9
November	10.4
December	5.2

Source: Khalil, 1987.

Pull factors that made other parts of Sudan more attractive were partially climate-related: less desertification and more natural resources. As long periods of drought extended over Darfur, the Nomads, originally from the North, lost most of their livestock and sought other employment in the South. However, the dramatic decrease in rainfall in the 1980s resulted in a drastic decrease in crops produced by the Southern Darfur farming community. At that point, Southern Darfur had become overpopulated while its available natural resources had susbstantially diminished (Bilsborrow & de Largy, 1990).

1.3. Drought, Migration and Conflict

Throughout history, different Darfuri ethnic groups had usually cooperated and lived together. However, when resource scarcity became an issue, it led to an upheaval among pastoralists who could no longer maintain their nomadic way of life because of the lack of both grassland and water (Burr, Collins, 2006).

By 1966, when the drought seemed at its worst, migration continued into areas in Southern Darfur populated by Christian and Animist populations. The two groups, even though competing over resources, traditionally depended on each other for survival. Pastoralists relied on the farmers' land and water, and farmers, in turn, relied on the nomads' herds to fertilize their land and carry their crops to market. Nevertheless, as the migrations towards the South continued, local officials imposed heavy taxes on the migrants. This aggravated the situation and led to rioting. Subsequently, tensions escalated as Southern officials fired on the rioters, killing more than 500. Muslim leaders in the North declared jihad against Southern populations in response, and one of Africa's longest and bloodiest civil wars erupted (Teklu, von Braun, Zaki, 1988).

In the 1980s, the government of Sudan suppressed the tribal councils that had for centuries been mediating disputes between the various ethnic groups and replaced them with government programs just at the time a severe drought hit Darfur. In the absence of a legitimate and fair system to resolve conflicts, social tensions escalated (Power, 2004). Furthermore, the Sudanese government dealt with the crisis by forcing relocation of IDPs, often to desert and barren areas (UN, 2005). In 1983, the civil war reignited. A peace agreement signed in 2005 ended this second phase of the Sudanese civil war.

Climate is not solely responsible for the conflict in Darfur. It is safer to argue, as Etienne Piguet does, in his 2009 UNHCR report, that environmental factors were a significant contributor to migration, which in turn was a major factor in causing the conflict. Meanwhile, Jonsson (2010) argues that environmental change leads to migration when it is magnified by underlying social and economic factors. This framework is useful, in that it enables more complex analyses of the phenomenon. This structure also allows for the consideration of migration as an adaptation strategy, particularly (as in the case of Darfur) when few other options exist.

2. FACING DROUGHT: POLICY RESPONSES

2.1. Humanitarian relief

The 1968-1973 Sahel droughts had localized impacts throughout Darfur. However, no aid relief was provided. In fact, between the mid-1950s and early 1980s, no institutions whatsoever provided help. The droughts of 1982-84 and the great famine of 1984-85 revealed the inability of the rural population to subsist on its own. The onset of the famine had been predicted by 1983

as northern populations had been moving south on a permanent basis (Teklu, van Braun, Zekly, 1988). In the 1980s, there were three major aid efforts in response to major crop failures. The first significant program was initiated in 1984 and ran through 1986.

Another crop failure in 1987 prompted a second relief operation. In response to this humanitarian crisis, in which over 200,000 people died of starvation, a relief operation in southern Sudan was coordinated by Operation Lifeline Sudan (OLS). Established in 1989, OLS is a consortium of U.N. agencies and three dozen nongovernmental organizations (NGOs) that operate in both government and rebel-controlled territories (Dagne, 2006).

It rained in 1988, the crop was good, but the next two consecutive years involved bad harvests because of severe droughts and necessitated a third wave of aid in Darfur. All these operations were about relief and did not involve much development aid. International recognition with regard to the underlying patterns of drought, migration, livelihood loss, and civil war was also quite low and full awareness did not emerge in the international community until the year 2000 (Blogicus).

The international aid actors faced in the years 2000s the dilemma of a complex emergency. Indeed, NGOs did what they could to face the emergency. For decades, Darfuris were provided with food in emergencies, with NGO actors believing that they would eventually find a viable way of supporting themselves. Analysts now agree that this was a misjudgment: had drought relief been instituted earlier on, it would have prevented the crisis scale of the past ten years (Anderson, 2004; Connell, 2004; Malek, 2005).

By 2006, despite the escalation in the number of climate migrants living in poor conditions, and professed commitments by the international community to help alleviate the suffering, the UN had taken only a few steps. The African Union Mission dispatched a small contingent of approximately 1,500 peacekeepers to deal with the violent conflict. However, due to these limited human resources, they were not able to achieve significant results. Living conditions continued to be appalling for the IDPs who remained targets of violent crimes, often from government officials. The UN Security Council failed to impose serious sanctions on Sudanese officials for their abuses of power. Furthermore, it did not authorize the use of force to protect civilians.

The first step in mounting a humanitarian intervention was UN Resolution 1556, proposed by the United States, which suggested sanctions on Sudan for war crimes, demanded Sudan disarm militants in Darfur, and dispatched international monitors. The problem was that these monitors were sent to watch the conflict, not to tackle its primary causes.

2.2. Adaptation and development strategies

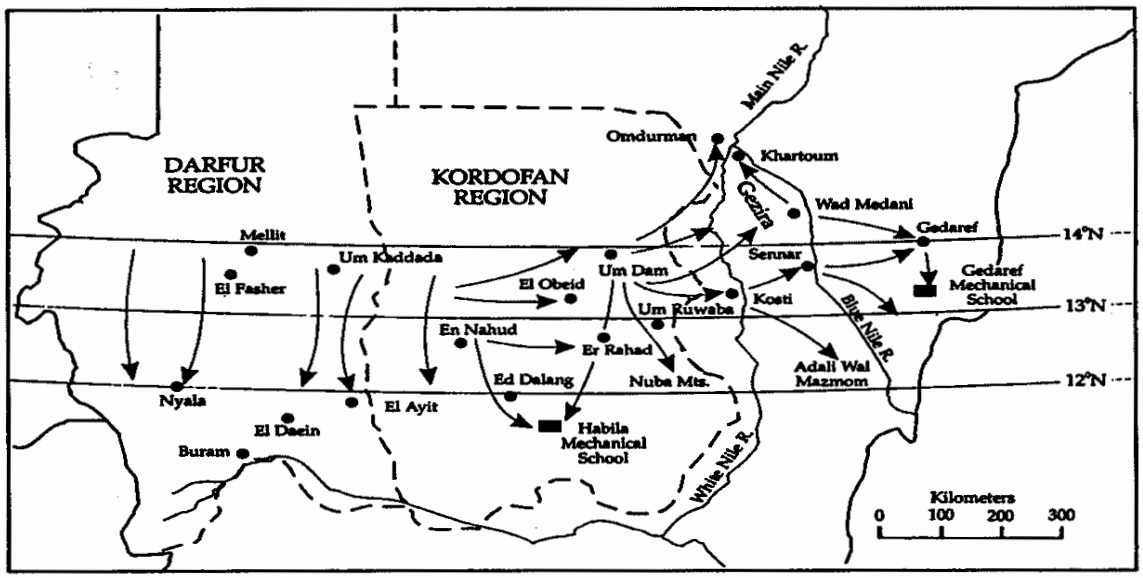
Starting in 1986, the regional government had implemented a rehabilitation project. The primary goals of this project were to restore the degraded natural environment through rehabilitation of forest and natural pasture, improve availability and distribution of the rural water supply, promote agricultural production, and provide support for households targeted for resettlement (Teklu, van Braun, Zekly, 1988).

In 1988 and 1989 a project to replant gum-arabic trees and other forest plants was undertaken by UNDP in villages with little tree cover. This project was intended to reverse the effects of drought, desertification, and overuse of tree products on the tree population. By 1989, the project had helped over 12,000 farmers, but the demand was much higher still. Not enough acacia trees were planted due to lack of funds. Also, the local population used them for cooking purposes before the trees had reached maturity, a period that averages between six to eight years (Teklu, van Braun, Zekly, 1988).

UNICEF and Oxfam also targeted additional programs at low-income, female-headed households with no livestock. Women were chosen because they have the most impact on child nutrition. By 1989, 400 female-headed households had each received two breeding female goats under the condition that they would use the goats to feed their children and not for sell. The project had positive economic effects and again there was great demand from other women to participate in the program; however, there was not enough money to meet such demand (Teklu, van Braun, Zekly, 1988). Other projects in this program included home garden development, irrigated culture, and grain storage. However, the NGOs again had a limited capital budget for the projects and could only offer them to a small portion of female-headed households. These projects were also put in jeopardy due to the persistent droughts (Teklu, van Braun, Zekly, 1988).

In 1986, the Sudanese government called for a broad-based strategy for sustainable growth in traditional, rain-fed agriculture. Again, drought, famine, migrations, and conflicts impeded the development of this program. Finally the military coup of 1989 put a stop to most development programs in the region (Teklu, van Braun, Zekly, 1988).

Map 3. Migrations trend of peasants farmers in the semi-arid and central parts of Sudan



Source: IFRI, 1998.

3. ASSESSING INTERNATIONAL AID

3.1. A conflict that was not forecast

Droughts are slow onset events whose impacts are difficult to forecast. Still, early warning systems could have helped anticipating the crisis. According to Burr (2008), many of the subsistence farmers of Darfur had already noticed the effect of droughts on their oases in the 1970s. Had a better information system been in place, it might have been possible to monitor the situation and mobilize the response at earlier stages, which would have saved lives and prevented the worst environmental impacts. By the time the UN acknowledged the civil war, in 2003, 300,000 people had already been killed and 1.9 million people displaced.

3.2. A failure of (non-governmental) organization(s)

Despite these efforts, capacity building in Darfur has also remained slow, in part because the crisis is considered ongoing. As Dr. Rony Brauman, MD, former head of MSF (Doctors without Borders), points out, notwithstanding good faith and laudable intentions, humanitarian NGOs are often overwhelmed by the quantity and urgency of work that remains to be done and must often satisfy themselves with basic "patch-up" jobs. Dr. Brauman also draws attention to the difficulty in dealing with slow-onset events as humanitarian NGOs have much more experience in dealing with the immediate effects of disaster. Again, this shows the urgent need for implementing new frameworks and policies to deal with climate change since it often takes the form of slow-onset events.

Fear of sanctions did force Sudanese officials to allow humanitarian NGOs to come to Darfur, but this authorization did not last. On March 4, 2009, authorities in northern Sudan ordered the global humanitarian organization ACF International to leave Darfur along with CARE, MSF, Oxfam, Mercy Corps, Save the Children, the Norwegian Refugee Council, the International Rescue Committee, Solidarities, and CHF International. These ten organizations provided 60-80% of the total amount of assistance reaching Darfur at that time (ACF, 2009). Later on, other humanitarian NGOs were expelled on the grounds they were acting against the Khartoum regime, which said it would handle most humanitarian aid from that point on.

In addition, humanitarian help in refugee camps acts as a magnet; it unconsciously adds incentive to migrate by populations in need of help. This increases migration flows, blurring the differences between war refugees, climate migrants, and economic migrants, and making it difficult for aid groups to satisfy demand. In addition, ethnic tensions in the region are seldom solved by NGO aid. Basic needs may be met, but underlying social tensions remain.

Lastly, capacity building is meant to let Darfur better handle its own affairs once the NGOs leave; however, it only reinforces the imbalance between different regions. By incentivizing migration into

camps, NGOs are undermining the capacity of those who do not or cannot migrate. Eventually, such people may be forced to leave their homes, as well.

3.3. A failure of the international community

What's more, the UN Security Council's action was only focused on the conflict itself, rather than on root causes. Efforts to address the conflict more thoroughly were stonewalled by UN Security Council members with economic ties to the oil-exporting central government, including France, China, and Russia.

Prunier (2007) acknowledged the failure of the international community, mentioning how "powerless in the face of this disaster" the UN and the AU (African Union) had been. They had only been able to produce "symbolic measures and stalling tactics" (ibid.) He then went on to explain how "totally ineffectual" the "under-equipped" African Union Mission in Sudan (AMIS) had been. He pointed out that "at least 35,000 men" would have been needed considering the size of Darfur, roughly that of France (ibid.).

That same year, UN Secretary Ban Ki-moon himself used the word inertia in describing a conflict that "claimed more than 200,000 lives during [the last] four years of diplomatic inertia." He wrote this when "Sudanese President Omar al-Bashir accepted a plan to deploy, at long last, a joint United Nations-African Union peacekeeping force in Darfur." (Washington Post, 16 June 2007). UNAMID, which was established in 2007, was in August 2011 the largest UN peacekeeping operation in the world involving 23,000 uniformed personnel and an annual budget, up to June 30, of more than $1.8 billion. However, it has since had to withdraw from the north, following the government's refusal to allow a temporary renewal of its mandate, despite concerted international pressure to do so.

In June 2011, Kyung-wha- Kang, UN Deputy High Commissioner for Human Rights, visited the Darfur Zamzam IDP camp. She described herself as "shocked" by the living conditions (in spite of her experience in such camps), and said that "the UN system, protection cluster, and humanitarian assistance" were "trying as best as they can" but admitted they are rather powerless considering the "enormous challenge presented by the high level of migration" (UN News Service, 24 June 2011).

4. STEPS FORWARDS: IMPROVING THE INTERNATIONAL RESPONSE

Migration is, for many Darfuris, the only viable adaptation strategy. NGOs and international actors should make migration one of several adaptation options. For example, by sharing seed technology that is more drought-resilient, NGOs can provide alternatives to migration for Darfuri farmers. Enhancing options for adaptation is much easier when interventions start early. In Darfur, much of the response came after a heated conflict was already underway. As a result, aid was limited to immediate and short-term assistance, instead of offering training on coping with drought. Such interventions trap refugees in a vicious circle where they grow dependent on the humanitarian groups and become more vulnerable and less autonomous.

1) Pre-emptive resettlement in anticipation of the drought could have been another adaptation strategy that could have helped mitigate the crisis. Indeed, most voluntary migration does not occur at the peak of a drought, but before or after (Gemenne, 2009). By encouraging people to move before conditions hit rock bottom, it may have been possible to move vulnerable populations out of harm's way and reduce ecological pressure. However, policymakers should be careful not to confuse such resettlement with the abusive forced displacements practiced in many parts of the world.

2) Two NGOs present in Darfur, Oxfam and the Danish Refugee Council (DRC), were involved in "peace-building linked to water and other basic services" until they were expelled (Bovey, 2008). Oxfam and DRC set up inter-tribal committees "to reinforce the local traditional authorities' capacities to solve and prevent local conflicts linked to basic necessities" (Danish Refugee Council, 2009). Prior to colonization, and until about some 60 years ago, the relationship between Arab nomads and African farmers was friendly and, as mentioned earlier, tribal councils addressed major issues of social conflict. The Oxfam/DRC project was geared at reviving these vital social organs. And it worked: local councils settled many conflicts, receiving help from the NGOs only when an additional mediator was needed (DRC, 2008). Local partnerships are more effective: Oxfam's IDP camps, for example, met basic water and sanitation needs in less time, with fewer resources and staff, than many other international actors, thanks to their community partnerships and their highly sustainable model of hiring national staff.

Some small NGOs have programs that could be implemented in Darfur. CARI (*Centre d'actions et de réalisations internationales,* Center for

International Actions and Achievements) for instance, helps African populations in arid areas in Sub-Saharan Africa and North Africa using agro-ecology. It works in desertification control, protection of oases, and access to water and sanitation (Burget, 2011). Again, as seen with Oxfam and the DRC, CARI works with local partners, as well as national and international actors, to implement the UN Conventions to Combat Desertification (UNCCD). Its expertise would benefit the Darfur region. But due to safety concerns, political tension with the Khartoum regime and the presence, often overwhelming, of international instances and major NGOs it is difficult for small NGOs first to be present, and when they are, to be heard as most are often kept out of meetings.35 Though such programs have a direct impact on environmental change (and therefore, on migration and displacement patterns in the region), their technical expertise has not been part of the international response (CARI, 2011). Similarly, designs for a "Great Green Wall" of trees along the Sahel-Sahara border are promising from an ecological perspective, but remain unimplemented politically in some places, including Sudan, which suffers from some of the region's fastest rates of deforestation.

CONCLUSION

The recent famine crisis in the horn of Africa reveals that the international community has learned little from Darfur: intervention is again happening only after the crisis is well underway, despite the consensus of experts that early action is essential. While vast sums are spent on humanitarian aid, little of it is being spent efficiently, in part because of this "crisis" mindset; a lack of coordination and collaboration is also problematic. Most of all, the entire humanitarian enterprise fails to account for deeper social processes of famine, drought, and migration in Northeast Africa, processes that in many cases do not adhere to national boundaries but are regional.[36]

In June 2011, the UN-backed International Conference on Water for Sustainable Peace in Darfur opened in the region. This conference was sponsored by the UN-AU peacekeeping mission in Darfur (UNAMID). Officials from the Sudanese government and the UN Country Team (UNCT) were involved. A $1 billion appeal was launched for 65 water projects across Darfur. So far this year, UNAMID has distributed 3,000 rolling water carriers to villages across Darfur. In the past year, it has procured 150 recycling waste-water treatment plants, drilled 43 wells throughout the region, and plans on developing 192 water sources (UN News Service, 24 and 27 June 2011). However, these resources are tiny compared with the region's vast size and population.

For all of the expert consensus about the causes and consequences of the conflict in Darfur, changing global mindsets remains elusive. "Crisis" brings international attention and funds, while sustainable development programs, many of them driven by smaller, less politically-powerful NGOs and civil society organizations with a community-based model, remain sidelined. The result is that the root causes of the conflict in Darfur remain. The land remains degraded by climate change and ecological disaster. Migration remains the only adaptive strategy for many households. Social tensions remain in place and methods for mediating conflict are few and far between. Considering such a situation, it seems likely that Darfur will continue to experience environmental pressure, no-choice migration, and weak social capacity for adaptation in the face of global climate change. To avoid such a fate, local, national, and international actors must change their paradigmatic understanding of the environment-society-migration nexus. ▮

35. Interview with M. Persichino, over the academic year 2010/2011.

36. Ibid.

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8. PATTERNS OF ENVIRONMENTAL MIGRATION IN BRAZIL: THREE CASE STUDIES

Nathalia Capellini, Carolina M. Castro and Eva Gutjahr

INTRODUCTION

This chapter combines tree individual case studies of environmentally-linked internal displacement and migration in Brazil. This chapter is not meant to be comprehensive of all forms of environmental migration in Brazil, but a tripartite analysis allowing for a more nuanced understanding of a complex phenomenon. It covers both slow-onset migration and disaster-related displacement; both "natural" and "human" causes are explored. Moreover, these case studies take into account the unique context for migration in three distinct parts of the country: the legal Amazonian region, the Northeast Coast, and the Southeast near the metropolis of Rio de Janeiro. In doing so, they present a glimpse at the emerging issues and debate on environmental migration in South America's largest country.

The first case study, "Drought and Migration in Northeastern Brazil" details one of the most important mass migration waves in Brazilian history. From the 1960s to the 1990s, millions of Northeasterners were driven by recurring drought to migrate to other parts of the country, especially the wealthy, industrialized Southeast. However, this study does not take a deterministic view of these migration patterns, but rather examines ways in which drought and migration have shaped social adaptation systems. Likewise, the study is careful to avoid strictly natural explanations for drought, exploring how local economic powers and political leaders have contributed to a socially unjust "drought industry." Because of the migratory linkages between the Northeast and Southeast, this study is also linked with the Rio case study at the end of this chapter.

The second case study, "Environmental Migration in the Brazilian Amazon: what is the role of policy?" analyzes internal migration and displacement in Brazil's 'legal Amazon' region. First, it analyzes cycles of settlement, deforestation, resources exhaustion and further migration that characterize migration in the region, as well as the social, political, and economic consequences of these patterns. Second, it examines linkages between massive infrastructure projects (such as dams and mines) and mass population displacement in the region. The case also explores the political economy of these large-scale projects and questions their role in the region's social welfare, suggesting that a different development model may be needed to avoid recurring patterns of "boom-and-bust" on the Amazon frontier.

The third case study, "Environmental and Human Disaster in the Hilly Regions of the State of Rio de Janeiro" focus on an environmental disaster that took place in the Hilly

Figure 1. Brazil's Regions

8.1. CASE 1: DROUGHT AND MIGRATION IN NORTHEASTERN BRAZIL

Nathalia Capellini

"…his fate was to pace around the world, walking up and down, aimlessly wandering as an errant Jew. A tramp pushed by the drought." (Ramos, 1975)

"Ceará is always between one drought that's going and another that is coming down the road." (Theophilo, 1922)

1. BACKGROUND AND CONTEXT

1.1. The Northeast region by the numbers

The Northeast region of Brazil[37] has an area more than 1.5 million square kilometers. It covers 18% of the country's territory and contains 53 million people, 29% of the national population (IBGE, 2011). Economically, it produces 13.1% of Brazil's GDP, though the region's GDP per capita is 53% lower than the national average (IPEA, 2010). It has large concentrations of poor people and contains 69% of Brazil's urban population (IFAD, 2009).

Though geographically diverse, semi-arid climates cover more than half of the region's territory, and droughts are recurring. Indeed, part of the region has been labeled the "polígono das secas", or "polygon of drought", for its frequent droughts. Significant parts of the region's public policies are geared towards drought crisis prevention.

The social impacts of the region's frequent droughts are exacerbated by its high population density; indeed, the region is the most densely-populated semi-arid region in the world (Sales, 2003). Socially vulnerable populations, particularly the poor, have historically been heavily dependent on state "rescue policies" for drought relief, or migrated elsewhere in the country as a form of adaptation to the droughts.

Though drought is partially a function of the region's climate, it is also true that the region experiences extremely heavy rains between September and March. However, these heavy rains are offset by rapid evaporation during the dry season (Centro Feminista 8 de Março, 2006). In such conditions, modern irrigation and water storage are vital, but such development is hindered by large-scale poverty. Thus, social vulnerability and climatic conditions interact to create and aggravate the environmental crises in the region.

1.2. Drought in the history of the region

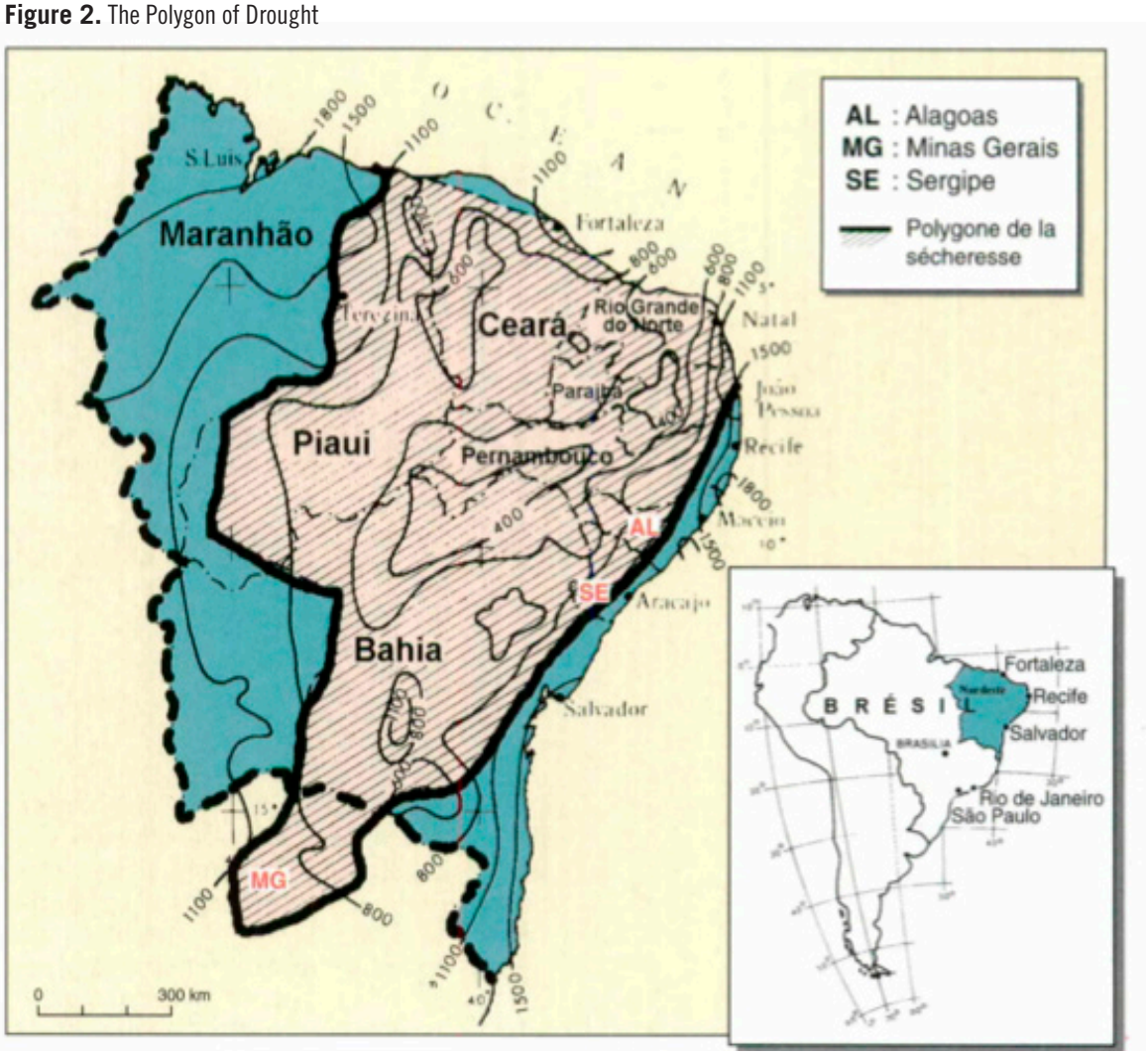
The region's first recorded drought occurred in 1499-1500; drought hit every 3-4 years throughout the sixteenth century. From 1877-1879, a particularly severe drought took 500,000 lives, 119,000 from the City of Fortaleza alone (Leprun et al., 1995).

Because of its susceptibility, drought has induced environmental migration in the region for centuries. For example, Campos and Studard (2001) found that indigenous populations often migrated as a result of climatic conditions; similar historical studies in post-colonial times have shown the same results. Thus, even in periods of low population density and small "human footprints", environmental migration has been a part of the region's social history.

In the late1950s, disparities between the rapidly industrializing Southeast and the poor and stagnant Northeast grew rapidly. The policy response from then-President Juscelino Kubitschek was to establish the Working Group for the Development of the Northeast, known as GTDN and headed by

37. Including the states of Bahia, Sergipe, Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará, Piauí and Maranhão.

Figure 2. The Polygon of Drought



Source: Leprun et al., 1995.

the well-known economist, Celso Furtado. The group recommended stepping up investment in the region and stimulating food production (Melo et al, 2009). In 1959, this report was adopted as the main strategy of the Superintendency of Northeast Development, SUDENE, a new body created to bolster regional development and address the urban social tensions created by drought.

1.3. The "drought industry" and clientelism

Because of the primacy of food, water, and health needs in the region, the path to political control is through the meeting of these basic needs despite the droughts. Therefore, regional elites have often used drought as a pretext for donations and policies from the federal government that benefit them personally. Local colonels and latifundiarios (large property owners) play a central role in this "Drought Industry".[38] They are abetted by Brazil's concentration of land: 1% of property owners control 45% of the land, when small farms (less than 10 hectares) make up just 2.5% of rural land (Serra, 2003).

In response to drought, agricultural policy has prioritized damming. Though this creates water reservoirs, these storage mechanisms are vulnerable to evaporation. Furthermore, the reservoirs are often not accessible to the population, as they are generally built on private properties. Patronage—what Kenny (2002) defines as personal connections determining or facilitating resource access— inevitably follows.

Even for those who do have access to the

38. "Drought industry" is a concept very used in Brazil, both by the academic field and by the medias and the population. See for instance Goncalves, 2001; Fernandes, 2003; Marin, 2002.

Figure 3. Main migration flows by period

Source: own elaboration

reservoirs, the labor of traveling many miles to fetch water and returning with heavy kegs often represents a full quarter-day's work for farmers. This work is often done by women (Centro Feminista 8 de Março, 2006). The water obtained from these reservoirs is often full of mud and debris, and is therefore unfit for consumption (Reboucas, 1997).

2. A CHRONOLOGY OF MIGRATION AND PUBLIC POLICY IN THE NORTHEAST

2.1. 1950 to 1990

Mass migration within Brazil began in the 1950s, as intense urbanization and widening regional inequalities created economic incentives to move. Concentration of economic activities in cities and surplus labor in the countryside led to rural-to-urban migration, though urban areas in poorer regions were unable to absorb this population growth (Patarra, 2004). The rapidly developing Southeast, particularly around Sao Paulo and Rio de Janeiro, became a destination for Northeastern migrants; the new capital of Brasilia, coffee plantations in Parana, and rubber plantations of the Amazon were also popular destinations (with the state sponsoring migration to Amazon destinations).

These flows coincide with two periods of severe drought: from 1951 to 1953 and again in 1958. During the 1960s, migration in and out of the Northeast stabilized, as government efforts to reduce regional imbalances halted—and may have even reversed—flows from the region (Patarra, 2004).

In 1970, and from 1979 to 1983, a major drought hit the region once again, triggering a remarkable exodus from most states. However, the states of Bahia, Sergipe and Alagoas received significant investment in oil and petrochemicals during this period, which reduced outflows considerably (Patarra, 2004).

During this period, the State also institutionalized its response to drought in the Northeast (Melo et al, 2009). The Inspectorate for Works Against Drought was formalized into the Department of Works Against Drought: a key institution that critics claim is dominated by the regional elite (Ibid.).

Meanwhile, SUDENE's efforts did enhance development in the Northeast, but the region remains deeply dependent on more dynamic parts of the country for both capital and demand (Reboucas, 1997). At the same time, urban areas in the region were ill-prepared for the influx of labor migrants from rural areas, leading to infrastructure shortages and urban decay in the form of underserviced favelas, or slums (Melo et al, 2009).

From 1979 to 1983, drought affected 96.5% of the districts in this region: 1.2 million farmers had to cease productive activities during these droughts (Leprun et al. 1995). Many rural workers were forced to migrate to nearby cities, where they came to inhabit favelas in peri-urban areas. This process is evident in 1980-1990 Census figures, which show urbanization in the Northeast occurring much more rapidly than the national average.

The second half of the 20th century was also characterized by intensive state investment in major irrigation projects. As Campos and Studart (2001) show, these projects were meant to be cooperatives, but the concentrated land ownership by wealthy elites made such projects infeasible. Instead, large landowners invested in their own regional water provision schemes, often with public subsidies and limited benefits to local, small-scale farmers.

Figure 4. People of more than 5 years old, by destination and origin regions (1986-1991)

Origin	Destination					
	Total	North	Northeast	Southeast	South	Mid-west
North	277 319		79 483	73 275	29 182	95 379
Northeast	1 354 461	216 979		917 482	21 582	198 418
Southeast	786 816	78 945	334 434		170 418	203 019
South	470 640	41 421	16 630	282 118		130 471
Mid-west	336 734	71 177	47 381	154 068	64 108	
Total	3 225 970	408 522	477 928	1 426 943	285 290	627 287

Source: IBGE, Census of 1991.

Figure 5. People of more than 5 years old, by destination and origin regions (1995-2000)

Origin	Destination					
	Total	North	Northeast	Southeast	South	Mid-west
North	292 751		86 836	68 186	22 956	114 773
Northeast	1 411 420	182 709		969 435	31 029	228 247
Southeast	946 283	75 467	462 628		214 914	193 274
South	349 813	26 989	27 897	205 975		88 952
Mid-west	363 185	70 721	70 012	161 276	61 176	
Total	3 363 452	355 886	647 373	1 404 872	330 075	625 246

Source: IBGE, Census of 2001.

2.2. 1990 to present

From 1991 to 1996, 55% of all rural migrants in Brazil came from the Northeast, though the region represented less than 40% of the total rural population at the time (Patarra, 2004).

In 1998, a severe drought struck; the State responded, through SUDENE, with an emergency program aimed at providing temporary employment to 1.2 million workers put out of work by the drought. The program was a milestone in that it marked the first time that emergency relief extended beyond food and water to emergency employment (Duarte, 2001).

Official state figures[39] showed that the drought caused a 148% increase in local unemployment. The state data also show that 51% of families reported decreased income. Meanwhile, the emergency employment, which paid around 35 Euros per month, constituted 68% of families' incomes.

In 2001, under the government of Fernando Henrique Cardoso, SUDENE was dismantled. The main argument of the government was that the body was highly corrupt; government figures showed that nearly 900 million Euros had gone missing. In 2007, SUDENE was re-instated, with a new mission: "(to) promote inclusive and sustainable development of the Northeast and competitive integration of regional production in the national and international economy"[40].

As Northeast-Southeast migration flows have taken place for decades, a social network has emerged to facilitate the journey for new potential migrants (Fusco and Duarte, 2010). Migration is also an important part of households' adaptation strategy to drought, as it reduces household food needs.

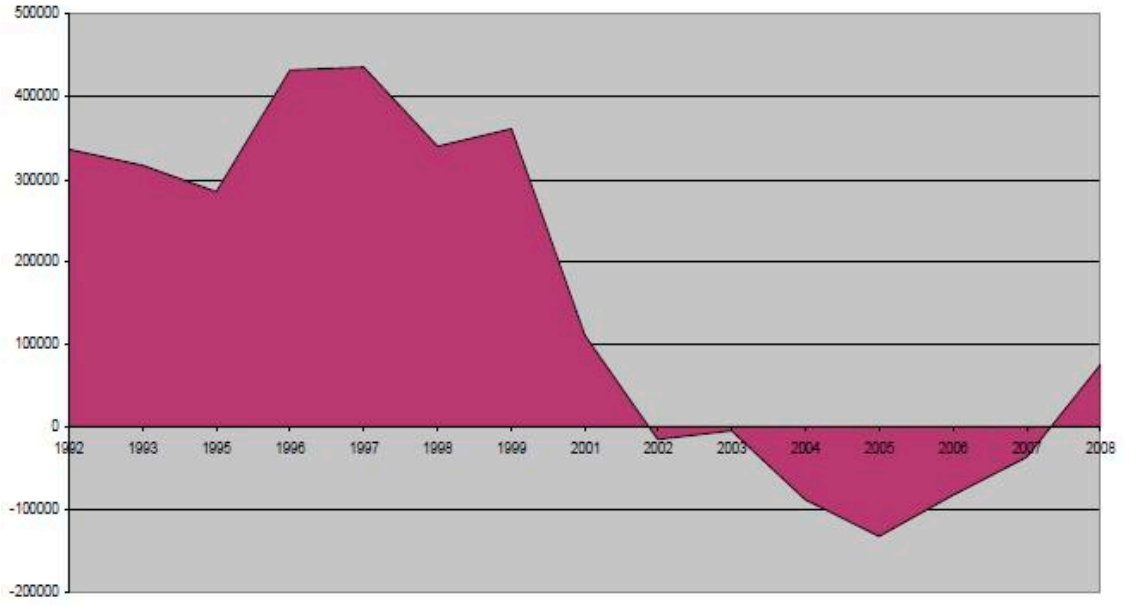
However, Figure 5 shows that these historic Northeast-to-Southeast patterns disappeared in the 2000s, and indeed were reversed. Baeninger (2008) asserts that economic changes, including a reconfiguration of national industry and economic stagnation in the Southeast, account for these changes. For example, survey data[41] show that Sao Paulo received 765,469 migrants from 2001 to 2006, compared with 1,223,809 migrants from 1995 to 2000. Migration to other parts of the country, including the Central-West (Brasilia) and within regions has also become more prevalent (Baeninger, 2008).

39. As Duarte (2001) shows in his article, a research was made with the people that participated on the program. This researched was ordered by the state, and was limited to a sample of 650 people.

40. See Sudene program website: http://www.sudene.gov.br/

41. The PNAD, National Survey by Household Sampling, is a survey conducted by the Brazilian Institute of Geography and Statistics (IBGE).

Figure 6. Net migration between the Northeast and the Southeast of Brazil



Source: IPEA (2010).

Public policies played a role in this new configuration. ASA Brazil[42] recently launched a program to build one million cisterns in the region; 255,000 of them (benefiting 4.4 million people) had been built by 2008 (CEDEPLAR/UFMG & FIOCRUZ, 20008). Meanwhile, in 2004, the Environment Ministry launched a Program for Fighting Desertification and Mitigating Drought Effects (PAN-Brazil). The program explores technology for small-scale, sustainable farming and energy use in the region, promoting resilience against the droughts. Lastly, the *Bolsa Familia* program (a nationwide conditional cash transfer program) and the food-security focused *Fome Zero* (Zero Hunger) program have also alleviated poverty and thus may have attenuated migratory flows out of the Northeast.

3. THE FUTURE: CLIMATE CHANGE AND DESERTIFICATION

3.1. Present and potential affected areas

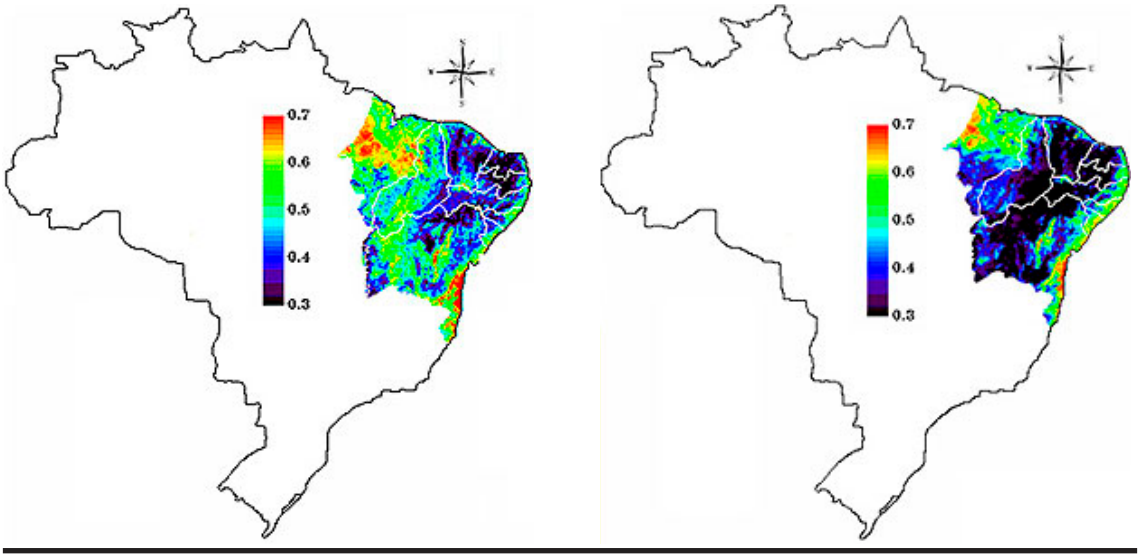
A recent report has analyzed potential climate impacts in Northeast Brazil (CEDEPLAR/UFMG & FIOCRUZ, 2008). It projects that 24% of the population of the region's poor cities will migrate as a result of climate change between 2030 and 2050. In spite of recent economic gains, climate scientists think that the most-affected areas will be those with both high population density and unstable environments, such as Northeast Brazil (Ojima and Nascimento, 2008). Indeed, parts of the Northeast may experience desertification, as increasing temperatures, decreasing rainfall, and inappropriate agricultural activities take their toll.43. According to the Ministry of Environment, 181,000 square kilometers of land in the region are vulnerable to desertification, which could cost $100 million annually (Sales, 2003).

The above image shows the areas of desertification in the Northeast in 1982 (first image) and in 2010 (second image). The darker areas are more desertified. Four are already called "centers of desertification": the cities of Gilbués (PI), Irauçuba (EC), Seridó (RN) and Cabrobó (PE) (Madeiros, 2010). In addition to climate change, natural climatic and soil conditions, as well as human practices (such as deforestation, forest fires, and overgrazing) are driving these processes. Irrigated areas may also be degraded by salinization from water reservoirs (Sales, 2003). All of these processes are likely to push poor populations off the land, decreasing quality of life for many

42. Network of NGOs, trade unions and civil society in the Region

43. Cf. Ecodebate, 2008 : "The increase in minimum temperatures on the planet, low levels of rainfall and inappropriate agricultural activities can lead to desertification in part of the Northeast, according to the Professor Augusto José Pereira Filho from the Astronomy, Geophysics and Atmospherical Sciences Center in the University of Sao Paulo".

Figure 7. Desertification in the Northeast region (1982 and 2010)



Source: Universidad federal de Alagoas - Image processing laboratory (2010).

households. Urban areas may see increased migration flows, with poor migrants likely to settle in *favelas* of peri-urban areas.

3.2. Public policies for the future

The risk of desertification and climate change will further increase threats to vulnerable populations. To combat these threats, the government must pursue a new development policy that weakens existing patterns of patronage in the region. Moreover, alternatives to the status quo, such as new methods for water storage and the organization of rural cooperatives, should be pursued, to increase water access sustainably.

Survey data shows that 51% of families in the region do not adequately prepare for droughts, instead waiting for government assistance (Duarte, 2001). Such attitudes imply a sense of helplessness that results from the rigid political context of the region. This political context may allow for infrastructure development, but these projects serve to consolidate and enhance existing inequalities.

For example, the federal government has recently undertaken a two billion-euro project to "integrate the Sao Francisco River watershed." In theory, the project will irrigate large parts of the region. However, critics argue that benefits will accrue to a tiny percentage of the semi-arid land in the region (0.3%), while triggering massive negative environmental changes in the riparian ecosystem (Centro Feminista 8 de Março, 2006). Others argue that large landowners will continue to benefit from the project, which they see as a continuation of the "Drought Industry" (Ab'saber, 2005).

Adapting to climate change, including the effects of drought and desertification, must take place in the context of a more democratic—and sustainable—process than has been the norm in the Northeast for the last half century. Small farms and cooperatives can be sustainable, but only if preceded by meaningful land reform. While such reforms have never been undertaken for reasons of political will, they are the best hope for an end to the cycles of chronic crisis and emergency relief that constitute the status quo.

Meanwhile, migration policy must take on two dimensions. First, receiving areas must have sufficient resources to welcome new arrivals. Second, action must be taken to address environmental push factors out of rural areas, so that migration becomes less desperate and more voluntary (Ojima & Nascimento, 2008). What's more, by strengthening local adaptive capacity in the rural Northeast, such policies can simultaneously reduce displacement and improve quality of life in the region.

Migration out of Northeastern rural areas will likely increase unless the State carries out major, structural reforms in the region. Northeasterners need access to water, for their subsistence and their livelihoods, as well as public health and education services. Though many actors can be part of the solution, only the State can guarantee rights of access to basic needs for all its citizens, most especially those living (precariously) with droughts.

8.2. CASE 2: ENVIRONMENTAL MIGRATION IN THE BRAZILIAN AMAZON: WHAT IS THE ROLE OF POLICY?

Carolina M. Castro

Migration in the Brazilian Amazon takes two main forms: 1) displacement based on the social, political, and economic consequences of deforestation, that results in land degradation and social conflicts and prevent people from keeping their livelihoods; and 2) displacement caused by major development projects (hydropower and mining) aimed at extracting the regions considerable natural resources.

While migration dynamics have been discussed in other works, few have examined the issue through the lens of environmental change. This angle is instructive, since humans not only contribute to environmental change, but also are affected by these changes, which can induce a disruption of livelihoods and social networks, as well as social unrest.

1. A HISTORY OF STATE INTERVENTION AND POLICY-INDUCED MIGRATION: IMPACTS ON THE ENVIRONMENT

The Brazilian Amazon is globally important due to its role in biodiversity, climate, and geo-chemical cycles. The region's biomass, hydropower, and natural gas resources have led to it being labeled "the world's last reserve of energy." Yet to date, the region has not been fully developed, economically.

In this context, the Amazonian development model of rapid forest clearing has been viewed through the paradigm of the "frontier economy", based on the continuous incorporation of land and natural resources. This paradigm associates the idea of "clearing the forest" with "progress" (Becker, 2005).

The region has experienced the rise and decline of economic cycles: economic expansion (and concomitant labor in-migration) has been closely tied to international market prices for raw materials; and has often been followed by long periods of stagnation and out-migration (Becker, 2001). The appropriation of forestry resources has led to unsustainable extensive practices and ebbs, as well as significant flows of migration.

1.1. Early economic immigration

One of the first important waves of in-migration occurred in the late nineteenth and early twentieth century. At the time, the region experienced the rubber boom, when thousands of Northern migrants (the seringueiros) first came to the Amazon to work on the extraction of latex. However, structured settlement patterns only emerged with the establishment of the modern Brazilian state, following World War II. In the 1950s, President Kubitschek constructed a number of major roads (such as the Belem-Brasília and Brasília-Acre highways). The Amazon region's population rapidly expanded through migration, increasing from one to five million during the decade (Becker, 2001).

In the 1960s, the military government established a new ideological paradigm. The Amazon region represented a "demographic vacuum" that should be occupied in order to secure sovereignty over the territory. With minimal consideration for local context, the federal government launched ambitious projects of colonization and development. These policies were mainly aimed at the expansion of the productive frontier, through road

construction, support to agriculture, ranching and logging, and public investment in large mining and hydroelectric projects. This model accelerated deforestation, migration, land conflicts and violence in the region (Hochstetler & Keck, 2007; Becker, 2001).[44]

Between 1970 and 1974, the National Institute of Colonization and Agrarian Reform (INCRA) sent more than 400,000 settlers to occupy lots along roads in the region (Ibase, 1985 apud Lui & Molina, 2009). In particular, many migrants were sent to take up residence near the 4,000 kilometer Transamazonica Road, inaugurated in 1972 in Para state (IPAM/FVPP, 2009).

Government policy also shaped migration and development patterns indirectly. For example, land titles were given in proportion to the amount of land cleared. Because livestock-raising had low start-up costs (and was government-subsidized), settlers started building ranches as a cheap way of acquiring land. However, these policies backfired: overgrazing and decreasing economic returns created a massive ecological disaster. From 1970 to 1980, more than half of primary forest that was converted to pasture became so degraded that it had to be abandoned; much of the remainder was highly unprofitable (Buschbacher et al 1988 apud Hurtienne, 2004).

The ecological failure of the 1970s did not lead to a roll-back of frontier settlement. Conversely, settlers migrated deeper into unoccupied forest: by 1975, 40% of families had abandoned their government-issued plots (Oliveira, 1991 apud Henchen, 2002). The legacy of government colonization in the region has thus been an "arc of deforestation", which is still expanding to this day.

In addition to cattle farming, mining was a main economic activity in the Amazon, and attracted large numbers of migrants (Santos, 2002). Mining was lucrative but highly unsustainable and weakly integrated with the rest of the regional economy, so that its social benefits were scarce (Carvalho, et al., 2005).

Mining generally requires very large capital investments[45] and nearly all capital control takes place outside the region (Monteiro, 2005). Except for substances used in the construction industry, almost all mining products are exported, creating very little added value for the local economy (DNPM, 2008). Moreover, steel and other metals require energy-intensive processing (Monteiro, 2005), consuming about half of the region's hydroelectric power capacity.[46]

1.2. Development-induced displacement

Large hydroelectric projects in Amazon have also faced recurring criticisms on the basis of social and environmental concerns. In the 1980s, such projects (including Tucuruiin Para and Balbina in Amazonas) displaced communities, flooded huge tracts of land and destroyed local fauna and flora. The construction of Balbina hydroelectric usine has meant the flooding of Waimiri-Atroari reserve, fish mortality, food shortages and hunger. 30,000 hectares of indigenous land were flooded and one third of that population was displaced. The river Uatumã was then considered biologically dead according to the National Institute of Amazonian Research (INPA). And because of the construction of Tucuruí, almost 10,000 families had to leave their land. Many migrated to other regions in the same state. Besides, the environmental change caused an intense proliferation of mosquitoes, bringing a qualitative change in people's lives (Silva, 2009).

There are no systematic data on the number of people affected by hydropower projects in Brazil, but according to the Brazilian Movement of People Affected by Dams (MAB), nearly one million Brazilians have suffered the ill effects of dams (the government and the dam industry contend that the figure is much lower, around 300,000; Carneiro Filho, et al., 2009). Population flows that have ensued from dam's construction and mining activities follow two movements in the Amazon: the territorialization of groups in search of labor, and the de-territorialization of population displaced from the areas of the plant. In this context, plans to build the Belo Monte dam in the Xingu River Basin (projected to provide up to 11,000 MW) have been facing controversies for the last 20 years. Social movements and indigenous leaders believe that the socio-environmental impacts are not adequately sized and after Belo Monte, five other dams will be built, changing completely the local life (Fearnside, 2005).

Roads influence migration and development patterns, as well. By lowering transportation costs, they reduce barriers to in-migration. At the same time, they increase incentives for individual farmers to participate in extractive activities. Once the land is exhausted, the farmers simply sell it (if he or she has property rights) and relocate deeper into the frontier, expanding the "arc of deforestation"

44. Ironically, Amazonian settlement was also perceived as a response to social tensions arising from the expulsion of small farmers in the Southern region, due to the modernization of agriculture.

45. Over U.S. $ 1 billion in many cases (Monteiro, 2005)

46. Notably, approximately 20% of the electricity produced in the country is consumed for exports goods production, especially aluminum.

and replicating the pattern of boom-and-bust (Celentano, et al., 2007).

1.3. The boom-and-bust pattern of recent population mobility

Boom-and-bust economics often generates population movements. In the early years of economic development and clearing of the territory, a rapid but short-lived increase in income and employment occurred, attracting migrant labor. This period was followed by social, economic, and environmental collapse, leading to out-migration (Celentano, et al., 2007). In the Amazon, logging set off economic booms and immigration, followed by cattle ranching. This ultimately led to ecological collapse, inducing an economic bust and mass emigration (a pattern that Rodrigues et al [2008] demonstrated through an assessment of 286 frontier municipalities.) Our own statistical analysis shows that people do indeed migrate to an area where deforestation is underway, only to vacate the area again once resources are depleted.[47]

We can assert that people migrate to municipalities in which economic activity associated with deforestation is high, but tend to emigrate after the depletion of natural resources and the disruption of local economy. After deforestation, migration rates decrease, meaning that people stop immigrating.

In summary, development projects and deforestation affect human migration patterns in Brazilian Amazon. Those projects attract labor migrants, while also displacing many indigenous people due to their environmental impacts. Additionally, the deforestation process caused by logging, cattle, agriculture, etc., make Amazonian lands unproductive, disrupting local economies and livelihoods. This is followed by subsequent migration flows heading either to regional cities or to new frontiers of deforestation.

Indeed, as the International Organization for Migration notes, environmentally-induced migration increases pressures in urban areas, exerting additional pressures on already fragile urban infrastructures and services, what has happened in the Amazon context (IOM, 2008). 70% of population growth in the region occurs in cities, in the form of migrants returning from the frontier (Moura & Moreira 2001).[48] Most immigrants going to the inner frontiers are coming from nearby consolidated frontiers, showing how the frontier perpetuates itself.

47. Analysis based on 2000 Census data.

48. However, these author judiciously stress the caution we should have in adopting the concept of "urbanization" to perform analysis on macro areas of the Amazon region. They prefer the term "new rurality" for most of frontier agglomerates, since most of them do not even count on basic urban services.

The boom-and-bust pattern

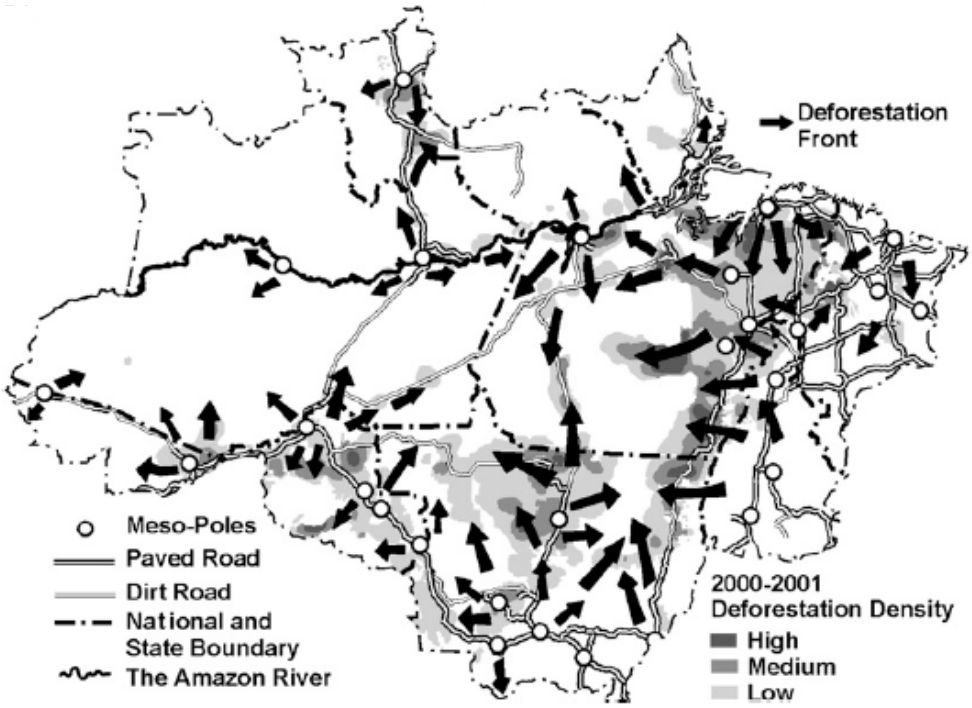
This pattern is grounded in the deforestation process. That is, in the early years of economic development and clearing of the territory, there was a rapid and transient increase in income and employment (boom), followed by a social, economic and environmental collapse (bust) (Celentano, et al., 2007).

In the short term, there is a growth of economic indicators, and HDI is favored by income growth and immigrant's arrival. But when there are no more trees standing, loggers give way to cattle ranching and look for another area nearby. The income falls with the livestock industry and the deforested areas show lower socio-economic indicators than those of regions where deforestation is taking place (Celentano, et al., 2007).

Based on this model, we intend to show the relationship between environmental degradation and migration patterns in the region. Migration rates from the 2000 IBGE Census of all Amazonian municipalities are grouped into seven classes (A to G) describing their position relative to deforestation frontier in 2000. Both deforestation activity (rate) and deforestation extent are considered.

The classes ranged from pre-frontier municipalities, with essentially intact forest (A), to progressively deforested regions with high (B to D) and low (D to F) deforestation activity, and to heavily deforested post-frontier municipalities with almost all their natural resources depleted (G). The results show a slight but significant difference between migration rates of each group of municipalities.

Figure 9. Major deforestation fronts, derived from the integrated analysis of the Amazon urban network, population movements and socioeconomic index, laid over 2000-2001 deforestation hotspots



Source: Alencar et al, 2004

2. ADVERSE CONSEQUENCES OF ENVIRONMENTAL MIGRATION

The Amazonian case draws on a context of human mobility widely associated with the use of natural resources and subsequent environmental changes. Nevertheless, it is worth noting that if on the one hand the pressure on the environment results from socio-economic patterns, on the other hand, these changes also induce disruption of local economies and change in social and cultural life, making the issue a multidimensional process.

For example, the impacts of environmental change on traditional floodplain agriculture, inland fisheries, and forest productivity have provoked serious disruption, affecting populations such as indigenous and riparian populations who have practiced varzea (floodplains) agriculture for many years. Fishing is another important economic activity that has been disrupted by environmental change. Rivers have become polluted from mining activities and social tensions have been registered between traditional fishermen and commercial fishermen in places such as Southern Para (Lopez, 2001).

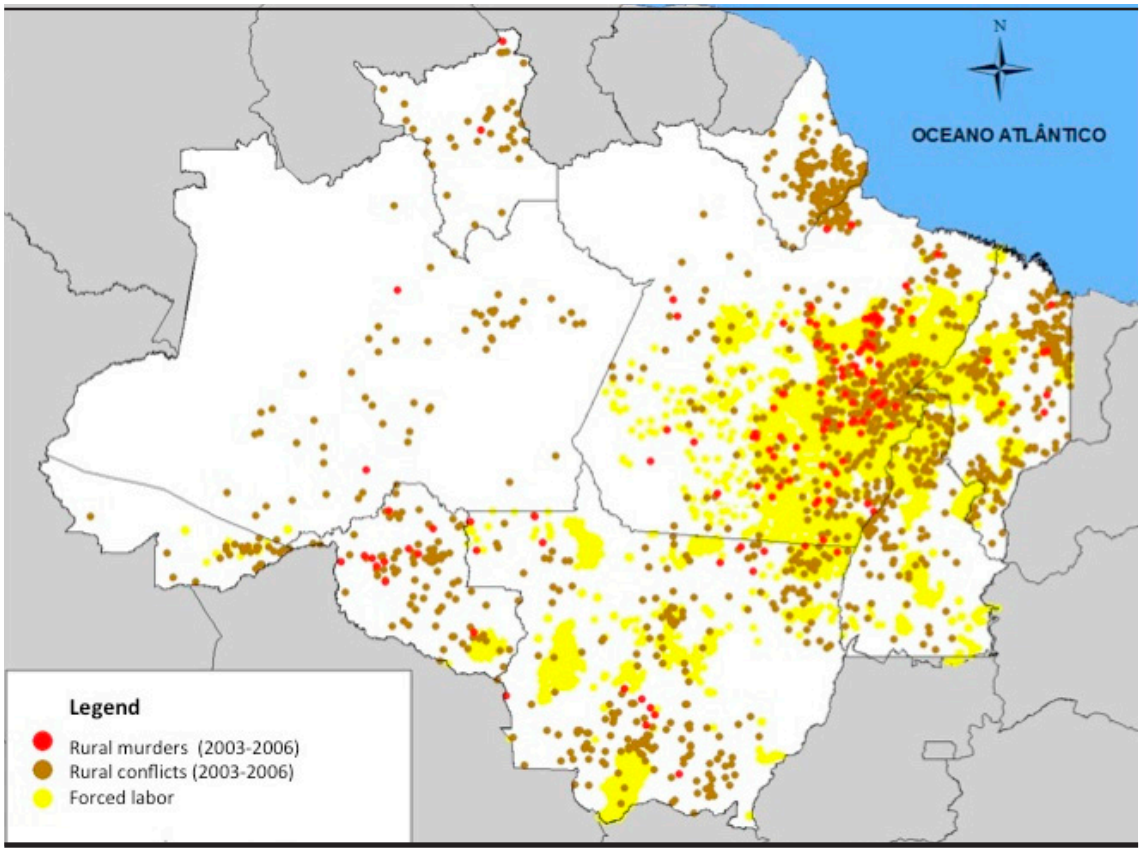
All these aspects led to constraints on income and labor of the riparian populations. Environmental change, in large scale, is responsible for prior social, political, and economic variables that contribute to so-called "side effects", or secondary impacts, that can precipitate disputes.

Recent narratives about climate change have maintained that environmental change itself leads to social conflict. However, Lopéz (2001) posits that migration flows and economic disruptions—rather than environmental change itself—drives social conflict. Drawing from the case of the Amazon, the general web linking environmental change to social conflicts follow three different phases: (I) environmental change; (II) side effects, such as economic disruption and population displacement; and (III) conflict-issues, such as land and mineral conflicts.

Society in the Amazon region is composed of a fragile constellation of social actors, including landless people, posseiros (settlers without legal title), grilleiros (land grabbers), large landowners, and indigenous people. Environmental change, and associated population movements, alters the social order in ways that places two or more of these groups in conflict with one another, increasing the risk of violence.

Clearly, social tensions run higher in the case of the Amazon deforestation zone. Indeed, 43% of rural murders in the Amazon region between 2003 and 2006 occurred in the zone of deforestation, and the area had a much larger homicide rate than the regional and nationwide rates. Land conflict

Figure 10. Rural violence in the Amazon Region, 2003-2006



Source: Verissimo apud CPT 2004, 2005, 2006 e 2007.

and slave labor rates were also higher in the deforested area, leading to high rates of violent crimes (Celentano, et al., 2007). Such social unrest often reflects the land tenure issues that were brought upon by deforestation.

In a nutshell, environmental change in the Amazon region has provoked large population displacements and livelihoods disruption, with a clear influence in the dynamics of manifest disputes.

3. CLIMATE CHANGE, ECOSYSTEM DEGRADATION AND VULNERABILITY: THE ROLE OF POLICYMAKING

The Amazonian case should also be discussed in the light of adaptation strategies to climate change. Recent studies indicate that the region faces alarming risks. For example, climate models show that the region will experience considerable warming and drying in the coming decades. General Circulation Models project a regional increase of 2-3°C by the year 2050 and a decrease in precipitation in the Amazon during dry months, leading to widespread drying (WWF, 2010). Land use and climatic changes may turn the Amazon from net sink of atmospheric CO_2 into a source of emissions. Such changes would not only be globally devastating, but would have serious local impacts, including soil erosion, ecological degradation, loss of biodiversity, decreased agriculture yields, and increases in infectious diseases. At the biome level, it is projected that evergreen forests could be succeeded by mixed forests, savannah and grassland in Eastern and in parts of Western Amazonia (Cramer et al., 2001; Cramer et al. 2004 quoted WWF 2010). According to the INPE (Brazil's National Space Research Institute), between 30% and 60% of the Amazon rainforest could become a dry savannah.

The forest can also be threatened by secondary effects of climate change, such as a potential increase in the frequency and intensity of fires (Nepstad et al., 2001; Laurance and Williamson, 2001; Laurance et al., 2001; Cochrane and Laurance, 2002 all in WWF 2010). A decrease in rainfall during critical dry months may also lead to increased evapotranspiration and pest infestation, which will undoubtedly negatively impact agricultural yields (IPCC 2001). The result would be that more land would need to be cultivated to meet population food needs.

A key concept in mitigating forced migration caused by environmental change should be the reduction of vulnerability and adaptation policies. The Amazon region must undergo a total shift in its socioeconomic model, which even under current conditions leads to displacement, land concentration, environmental degradation, and social conflict. State policy should aim to improve people's ability to cope with environmental change rather than simply encourage deeper expansion into the frontier. However, current State capacity in the Brazilian Amazon is weak. Many regions on the frontier lack even the most basic public services. In many regions, especially those inner to the forest (far from infrastructure access), people must travel days by small boat to access hospitals or other public facilities. For most, the Army is the only form of contact residents have with public officials of any sort. In such a context, institutional capacity for planning or law enforcement is very low. The State must act to establish its writ and to develop comprehensive systems of public administration, including banking, education, health, housing, sanitation, and land ownership. At the same time, it should not ignore existing local and regional civil society organizations, which have played key roles in the region's recent history.

Programs that comprise economic and social changes should be implemented if the Brazilian State wants to reduce the already existing social instability in the Amazon region and its high vulnerability in a context of climate change. This requires for instance more interaction between Environment and other ministries such as Energy and Agriculture, eschewing conflict of agendas such as those that were exemplified in Belo Monte dam project. Institutional capacity is a structural problem and depends in a large sense on the presence of public sector in remote areas.

In the most stressed communities, it is a challenge to reconcile forest conservation with immediate employment needs and income generation. Forest management systems need to be strengthened, combined with mechanisms for the payment of environmental services. In forested areas, it is necessary to halt the advancing frontier of deforestation with the creation of protected areas. The Amazon Protected Areas Programme (ARPA) is one of the largest forest conservation programs in the world and represents an important step in this direction.

In the long term, the economic model of the region must shift from the supremacy of primary activities with low value-added to an economic model in which forest products and services are valued and the income generated contribute to improving community's quality of life. To do so, it is necessary to expand investment in science and technology in the region. Though NGOs and private actors have been working in these areas, the idea of a "forest economy" is still largely missing from the Brazilian Amazon.

Large-scale infrastructure projects should also be revisited in terms of their social and environmental impacts. Small hydroelectric stations are more appropriate to a region with such fragile and rich ecosystems and with turbulent social dynamics. Mining projects, which consume more than half of power produced in the region, should also be re-evaluated, with greater consideration for environmental impacts and local economic benefits.

4. MOVING FORWARD

The linkages between environmental change, migration, human security and social conflict in the Brazilian Amazon are multiple and complex. Environmental change results in resource scarcities that alter social dynamics and contribute to social tension, instability, and violence.

Even though social groups strongly depend on the natural environment, manifest violence could arise not only because of scarcity of resources, but because of incompatibility of different social structures materialized in different patterns of resource use. Ecological scarcities contribute to other political, social, and economic conditions that more directly precipitate violence. These shift in conditions occur due to continuous flows of environmental migration, which are mostly intra-regional.

Frontier expansion, having been initiated by the State, now reproduces itself, through boom-and-bust cycles that attract migrants and then drive them deeper into the forest, in search of resources. Ironically, the State, having initiated this pattern, now finds itself unable to control the process. Therefore, the route to a solution begins with the State asserting itself in the Brazilian Amazon. But recent suggestions and initiatives based on the role of civil society and private sector are also promising in shifting Amazonian economic and social model. It is necessary in order to reduce current insecurities, and long-term vulnerabilities caused by climate change.

8.3. CASE 3: ENVIRONMENTAL AND HUMAN DISASTER IN THE HILLY REGIONS OF THE STATE OF RIO DE JANEIRO (JANUARY 2011)

Eva Gutjahr

This case focuses on an environmental and human disaster that took place in the Hilly Region (Região Serrana) of the State of Rio de Janeiro in Brazil in January 2011. With this event as a backdrop, it also explores larger issues of environmental disaster, social vulnerability and internal migration in Brazil, including the current debate over settlement and risk in environmentally-protected areas. Finally, this case covers issues of disaster prevention in the short- and long-term, as well as linkages between exposure to environmental risk and internal migration patterns in Brazil.

This case is particularly of interest because it is a rapid-onset disaster and displacement event with linkages to slow-onset migration from other parts of the country. This context links the case with the previous two cases, on the Northeast Semi-Arid Region and the Amazon Frontier. Furthermore, though this case studies the floods and landslides of 2011, these sorts of phenomena are common in the Brazilian Southeast, and are likely to be repeated in coming years.

1. CONTEXT AND VULNERABILITIES

1.1. The January 2011 floods and landslides

On January 11-12, 2011, the area known as Hilly Region (Região Serrana) of the State of Rio de Janeiro in Brazil, comprising the municipalities of São José do Vale do Rio Preto, Nova Friburgo, Teresópolis, Petrópolis, Bom Jardim, Sumidouro and Areal, was the scene of a major catastrophe: storms leading to landslides and floods caused the death of 910 people (Shäffer et al. 2011).

The disaster began with heavy rains in the final days of December 2010, which saturated the soil. Then, on January 10-11, it rained for 32 consecutive hours, as cold fronts from the south collided with warm, humid air from the Amazon. Meteorologists note that the rainfall overnight on January 11-12 matched expected totals for the entire month of January in the region (Vieira, 2011).

The'Hilly Region of the State of Rio de Janeiro comprises four 'micro-regions': the 'hilly micro-region' or microrregião serrana (composed of the municipalities of Petrópolis, São José do Vale do Rio Preto and Teresópolis), and the micro-regions 'Nova Friburgo', 'Santa Maria Madalena' and Cantagalo.

The population of the Hilly Region[49] amounted to 713,652 inhabitants (approximately 5% of the total population of the State of Rio de Janeiro), according to the Brazilian Institute of Geography and Statistics (IBGE) 2010 Census. The region is characterized by steep hills and valleys, and very little topsoil, so heavy rain frequently causes mudslides. Moreover, as river valleys and floodplains become developed and covered with infrastructure or asphalt, they reduce water absorption and increase runoff, increasing the likelihood of rapid flooding.

Region-wide, it was estimated that 12,768 people were made homeless by the disaster. Another 23,315 were temporarily dislodged (forced to abandon their homes because of the risk). One month after the disaster, there were still 662 people registered as 'missing' (Shäffer et al. 2011).

49. According to the Brazilian Institute of Geography and Statistics, "IBGE" 2010 census, the total population (urban and rural alike) of each of the Municipalities where the disaster took place are: Petropolis: 295,917 inhabitants; Teresopolis: 163,746 inhab.; São José do Vale do Rio Preto: 20,251 inhab.; Areal: 11,423 inhab.; Sumidouro: 14,900 inhab.; Nova Friburgo: 182,082 inhab.; Bom Jardim: 25,333 inhab.

Episodes of intense rain leading to environmental and human disasters are not rare in the State of Rio de Janeiro or in Brazil, especially in its highly urbanized Southeast region. In 1966, 1967, 1988, 2006 and 2010 (to cite only the most dramatic examples), tragedies of this kind have marked the summer rainy season (December to March) in the region. Nationwide, 71,380 people were estimated to have been dislodged or made homeless by rains in January 2011 (Mota, 2011). Moreover, 51% of human deaths due to natural disaster in Brazil are associated with flooding; another 15% are due to landslides (Globo Rural On line, 2011).

1.2. Lack of prevention and preparedness

Since November 2008, public authorities in the State of Rio had information regarding the vulnerabilities of the region to flooding and landslides. The State Government of Rio had commissioned a team of researchers from the Federal University of Rio de Janeiro, under the coordination of geographer Ana Luiza Coelho Netto, which produced a map of vulnerable areas of the state, especially those that had suffered from natural disasters between the years 2000 and 2007 (Coelho Netto, 2008). Their analysis pointed out huge vulnerabilities caused by irregular patterns of urbanization and settlement.

For example, the Netto study showed that most of the population in the municipality of Nova Friburgo lived in "areas of risk", while Petrópolis and Teresópolis presented "several different risk factors", because their communities were located on mountainsides and along river valleys considered to be most vulnerable to landslides and flooding. In spite of this study, the government responded with no preventive measures.

Strikingly, the Government of the State of Rio spent 10 times more on rescue measures (36 million Euros) than on disaster prevention (3.6 million Euros) in 2010. Similarly, in 2010, the Brazilian Federal Government spent 14 times more on reconstruction than on prevention, having 'invested' 350 million Euros in emergency measures for people and areas that had been victims to flooding and landslides, and to the reconstruction of transportation routes (Spinelli, 2011).

1.3. Deficient alert systems

On January 11, the National Institute of Metereology (Inmet) and the Centre for Weather Forecast and Climate Studies (CPTEC/INPE) released an alert bulletin informing the National Civil Defense of "meteorological conditions favorable to the occurrence of moderate to heavy rain" in the Hilly Region[50]. The National Civil Defense transmitted this information to the Civil Defense of the State of Rio de Janeiro. However, this last body did not warn the population, as it followed the recommendation of another institute, the Meteorological Service of the State of Rio (Simerj). The decision not to warn the population was mainly due to the fact that Simerj used a different weather forecasting model, which predicted only "moderate rain."

On January 12, the National Institute of Meteorology (Inmet) released another alert bulletin again warning of "meteorological conditions favorable to the occurrence of moderate to heavy rain". The National Civil Defense transmitted this information to the Fire Brigades in the City of Rio de Janeiro and to the State Office of 'Public Order', who passed on the message (through e-mail) to all the municipalities in the State of Rio. Nonetheless, the population was once again not warned. The exception was the municipality of Areal, where the mayor, worried about the intensity of the storm, took the initiative, recording a message of "high alert" via a car driven through the town's streets, equipped with a loudspeaker. 800 people were preventatively resettled, and Areal was the sole municipality registering no deaths in the disaster (Oliveira, 2011).

It should also be noted that none of the smaller municipalities in Rio state possess public alert systems. Only the City of Rio has a system for detecting extreme weather events; it then distributes information to community leaders in highly vulnerable areas, such as favelas, via mobile phone (Agencia O Globo, 2011).

In July 2011, six months after the disaster, municipalities of the Hilly Region considered implementing alert-systems similar to those in the City of Rio, including warning sirens when rain levels exceed 40 millimeters per hour. If bad conditions persist, inhabitants are urged to leave areas of risk, such as floodplains. These systems should be integrated with existing river level monitoring systems, installed in Nova Friburgo the month after the disaster. Critically, these systems can function even in the event of a power outage, whereas traditional media (TV and radio) are power-dependent and thus failed in the January 2011 disaster. Moreover, as the storms also knocked out phone service, affected municipalities have wisely invested in amateur radios, which can play an important role not only in early warning, but also in rescue activities in isolated areas (Carlyle, 2011a).

50. Jornal Nacional, TV Globo. 13/01/2011.

1.4. Protected areas and social vulnerability

The Rio flooding and landslide disaster was due not only to climatic factors, but also to the patterns of settlement in risk areas. Many people living in the most vulnerable areas are low-income, including many migrants and their families (including, as was detailed in the first case, a large number of migrants from the Northeast of the country seeking a better life in the wealthy and industrialized south) (Hogan, 2005).

Some of these vulnerable settlements lie in protected areas, including public "Conservation Units" and "Areas of Permanent Protection".[51] According to specific environmental legislation, human settlement is illegal in these areas. Moreover, illegal settlements contribute to deforestation of hills and occupation of valleys, thus increasing the risk of erosion, flooding, and landslides. Many communities damaged in the Rio floods were illegally located in protected areas. For example, in Nova Friburgo, 50,000 of the town's 83,000 homes were in such areas (Agencia O Globo, 2005).

For many poor families, the only housing options lie in these protected areas. Because of their risk, lack of infrastructure, and irregular legal status, real estate values are lower, bolstering accessibility for the poor.

Previous case studies of flooding disaster in Brazil have shown a similar relationship between environmentally protected areas, social vulnerability and environmental risk: for example, the 1983 floods in the State of Santa Catarina (South of Brazil) studied by Hermann[52] (Hermann, 2006). Hermann found linkages between natural protected areas, unsafe settlement, and socioeconomic vulnerability. Such problems were exacerbated by a lack of infrastructure, including poor waste management and sanitation. Besides, the migrant (or descendent of a migrant) status is also directly related to social vulnerability (Hogan, 2005). In short, vulnerability is self-replicating, as vulnerable people were forced to inhabit environmentally risky areas that exacerbated their vulnerability to disasters (Fonseca Alves, A. P. & Gama Torres, 2006).

1.5. Natural and socio-economic characteristics

80% of the population from the Hilly Region live in the Municipalities of Petrópolis (39%), Nova Friburgo (23%) and Teresópolis (18%)[53]. The concentration of population in these cities is due to the historic settlement pattern of the area and their proximity with the city of Rio de Janeiro, the State's most important economic centre.

These three cities also have the highest Gross Domestic Product and are the largest suppliers of services in the Hilly Region. Although some of the rural activities that characterized the region in the past persist, the Hilly Region's economy has diversified to include industry, commerce and services, information technology, and rural tourism. "Rural Tourism" and "Green Tourism" are among the most important economic activities in the region, known for its hilly landscape and temperate climate. Other important economic activities are the beverage industry, the wooden furniture industry and activities in the mechanical and textile sectors. The textile sector has been particularly fast-growing in the municipalities around Nova Friburgo, and textiles have come to characterize the economy of the region, according to a study by the Rio branch of the Brazilian Support Service to the Micro and Small Enterprise - "SEBRAERJ." (SEBRAERJ, 2010). The sector accounts for 25% of the national textile sector, providing 20,000 jobs in the region, and produces more than 125 million articles of clothing per year (Mariano, 2011).

2. IMPACTS OF FLOODINGS AND LANDSLIDSES

2.1. Damages and migration

Most of the population of the Hilly Region displaced by the floods and landslides went to

51. 'APP' following to the Brazilian 'Forest Code' articles 2 and 3, and Federal Laws nº 4771/1965, 7803/1989 and 7875/1989. The Brazilian Forest Code determines that all river sources, river borders, top of hills and mountains, as well as areas presenting a declivity superior to 45 degrees are 'Permanent Protected Areas' (APP), and as such they should not be occupied by any type of settlement or neither be submitted to deforestation. These areas are subject to regulations no matter if they are localized in urban or rural areas. Legislation also establishes that deforestation is forbidden in APP areas of declivity between 25 and 45 degrees. This last case is related to protection from erosion, areas of declivity being the most erosion-prone. Areas that are now being appointed as lacking legal protection are those localized at the bottom of high declivity mountains and hills, which are the most vulnerable to landslides and are not under specific protection legislation.

52. Herrmann, M. L. P. (Org.) Atlas de desastres naturais do Estado de Santa Catarina. Florianópolis: IOESC, 2006. Cited in: Schäffer et all.; 2011

53. Petrópolis and Teresópolis have also become known as 'imperial cities', having hosted the Portuguese royal family during the 18th and 19th centuries. Petrópolis was the official capital of the State between 1894 and 1903.

public shelters offered at the municipal level (in schools, churches and sports stadiums), or were hosted by family or friends living in the same city. Though official figures show 12,768 people were made homeless and 23,315 dislodged (Shäffer et al. 2011), it is still difficult to find data showing displacement and migration patterns in and out of the affected area.

In the aftermath of the landslides, a lack of workers was one of the main reported problems, particularly in the textile sector, even one month after the disaster (Gandra, 2011). On January 19, the Federation of Industries of the State of Rio the Janeiro (FIRJAN) reported that, of 278 companies consulted, 62.2% suffered some kind of impact, and that economic losses were estimated at 67.2 million Euros, mostly related to loss of production time, raw materials and stock. Of the 117 affected companies affected, 92.3% registered absences among blue-collar workers and 41.9% reported absences of administrators, implying that poorer, less-educated workers were most severely affected by the disaster.

Nova Friburgo, where 79.8% of companies suffered some impact, was the most economically damaged. Second came Teresopolis (68.8%) and third Petropolis (30.7%). Among all companies in the region, 67.6% reported missing workers, while 83.3% reported power outages, and telephone lines were down in 73.4% of businesses. Meanwhile, 38.2% of companies were affected by flooding in their vicinity and 21.4% suffered flooding within their industrial plants. The return to normal activities was postponed by internal and external infrastructure problems, as 62.4% had difficulties shipping their wares, and 59.5% encountered trouble bringing in raw materials due to transportation outages. [54]

After the incident, industries pledged not to dismiss personnel, so people who left their jobs probably did so voluntarily (Gandra, 2011). According to the president of the Council for the Development of the Textile Sector of Nova Friburgo and the Region", Nelci Layola, most of the workers who left had migrated elsewhere within the state, in search of work (ibid.). However, such assertions are hard to verify in the absence of precise labor migration data. It is also possible that some left the state altogether, fearing economic stagnation brought about by the difficult economic conditions following the floods (ibid). In addition, for those employed in farming rather than factory work, the disaster had more serious ramifications on communities, and may have forced families to migrate elsewhere in search of new livelihoods (Carlyle, 2011b).

2.2. Health and sanitation impacts

Within a month of the disaster, there were 28 registered cases of leptospirosis in the Region, 26 in Nova Friburgo and 2 in Teresópolis.[55] Leptospirosis is a potentially deadly disease transmitted by a bacteria found in rat urine. Proliferation risks tend to increase during episodes of flooding and its aftermath, with the accumulation of mud and debris and increased human contact with contaminated water. In the following days after the episode, the State Undersecretary of Health distributed 200 textbooks about the disease and visited 150 shelters to raise awareness about the risks of the disease among displaced people.[56] Other diseases related to the disaster were hepatitis, diarrhea, tetanus and infections. One week after the incident there were 200 registered cases of diarrhea; meanwhile, 13,000 affected people had been vaccinated against tetanus (Caruso, 2011).

Six months after the incident, the Ministry of Health reported an investment of 1.26 million Euros in the construction of basic health units in 7 cities of the Hilly Region (Carlyle, 2011c).

2.3. Migration for reconstruction purposes

Despite the difficult conditions, the public and private sectors have launched initiatives to attract or retain workers in the Hilly Region, especially for reconstruction purposes (Portal Brazil, 2011). These initiatives can be seen as state-support efforts to encourage return migration in the wake of the disaster. As part of these efforts, the Ministry of Employment and State Secretary of Employment are promoting continuing education classes in civil engineering for 1,000 workers in the 6 most-affected municipalities. The idea is to contribute to reconstruction of the region, bolster the regional economy, and employ people living in shelters (ibid.). However, investment in reconstruction will also likely draw migrants from

54. From the 278 companies consulted 129 are located in Nova Friburgo, 88 in Petrópolis, 48 in Teresópolis, 7 in Areal, 5 in Sumidouro and one in São José do Vale do Rio Preto. 272 companies are in the transformation sector and 6 in civil construction. Micro-entreprises are the most representative group, accounting for 65,8% of the total. Source: Sistema FIRJAN. 62% das empresas da Região Serrana foram afetadas pelas chuvas. 18.01.2011.

55. Notícias R7." Sobe para 28 o número de casos confirmados leptospirose na região serrana". 02/02/2011.

56. Id.

other parts of Brazil, who may come in search of new work opportunities. Such patterns echo other internal population movements in Brazil (described in cases 1 and 2), as people move from region to region in search of a better life.

However, historically, as all three cases have demonstrated, internal migrants in Brazil have found insufficient public services and basic infrastructure in their new homes. These shortages often force migrants to occupy environmentally vulnerable land. It remains to be seen if these potential "reconstruction migrants" to the Hilly Region suffer the same fate.

3. POLICY RESPONSES

3.1. Mitigation and Reconstruction

Three months after the flooding and landslides, 60 families in Nova Friburgo were still living in shelters and receiving food offered by the municipality and donors. Though donations had begun to dwindle, many families were still stuck, with no place to go. As the weeks went by, many chose to return home, despite the risks, rather than to remain in the shelters indefinitely.

The main public and private measures directed to the victims of the disaster in the Hilly Regions of Rio were:

1. The 'Bolsa-família' allowance given to 31,000 people.
2. A credit line provided to the commercial sector, by the Ministry of Social Integration.
3. The plan for the construction of 6,000 'social' houses to the victims whose houses have been either destroyed or expropriated for reasons of risk, and the construction of another 2,000 houses by a pool of construction companies on land donated by the State Government.
4. A 'lottery' game by the National Lottery had been created, with proceeds reverted to the disaster victims.
5. The option to access 2,421 Euros of the FGTS (Retirement Fund) for workers in the region.
6. An extension of two months on the payment of home and vehicle taxes.
7. The implementation of a 'Reconstruction Program for the State of Rio de Janeiro', by the National Bank for Social Development (BNDES), with a total funding of 179 million Euros to finance, under special conditions, companies and entrepreneurs in the affected municipalities.
8. An emergency credit line implemented by the National Program for the Strengthening of Family Agriculture, with a funding of 5,8 million Euros, directed to the reconstruction of productive infrastructure, irrigation systems, and agricultural inputs.
9. 'Social security' allowance of 225 Euros to cover rent expenses for dislodged families.

But such benefits were only available to those who had sufficient identification. However, many families had lost their documents in the disaster, and requests for new documents flooded issuing agencies. And the fund of 225 Euros allowance to cover monthly rent expenses failed to account for a lack of available housing options in the region (Castro, 2011).

International financial support included:

1. A credit of 341 million Euros by the World Bank for the reconstruction of houses, expropriation of land, resettlement and demolitions.
2. A credit of 448 million Euros by the Inter-American Development Bank for the rebuilding of roads in the State of Rio de Janeiro.

3.2. Long-term initiatives

National long-term initiatives included:

1. The Federal Program PAC 2 (Growth Acceleration Program) planned an investment of 5 billion Euros for construction of drainage systems in all vulnerable regions in Brazil.
2. The Federal Program, 'My House My Life' (*Minha Casa, Minha Vida*) planned to invest 76 million Euros for relocating families living in vulnerable and disaster prone areas.
3. The BNDES (National Bank for Social Development) will financially support a study to identify areas of risk in the whole country to support national risk management plans.
4. The Federal Government also announced its willingness to invest in continuing education and equipment to municipal Civil Defense Forces, the institution responsible for the reduction of disasters including prevention, preparation for emergencies, responses to events and reconstruction.
5. In March 2011 the government launched the 'National Monitoring and Alert of Natural Disasters System' (Sistema Nacional de Monitoramento e Alerta de Desastres Naturais).
6. The creation of a "Civil Defense Payment Card" from May 2011 onwards. The objective of the card is to improve transparency and efficiency in the transfer of funds for rescue, assistance and rehabilitation in events of disaster. It is also supposed to serve as a tool to accountability, monitoring the use of resources.

Table 1. Sequence of events in the 15 affected Municipalities of the "Hilly Region" of Rio de Janeiro

Date	Events	Consequences
Last days of December 2010	8 to 10 days of intense rain	soil overly wet
10th and 11th January 2011	32 hours of uninterrupted rain	soil overly wet
11th to 12th January 2011	4,5 hours of very intense rain	landslides and floods
12th January 2011	Intense rain, landslides and floods	12,768 homeless 23,315 dislodged 662 'missing persons' **910 deaths**

Source: Own elaboration.

CONSIDERATIONS AND RECOMMENDATIONS

Few public official documents have been prepared related to the January 2011 disaster. Nonetheless, starting in November 2008, Rio State authorities had information on vulnerabilities to flooding in their state (Coelho Netto, 2008).

Two public official documents were prepared in the aftermath of the event. The first is an inspection report produced by the Brazilian Ministry of Environment and the Rio State Office of Biodiversity and Forests, "Areas of permanent protection, conservation units & areas of risk, How are they related?" (February, 2011) (Shäffer et al. 2011). It is noteworthy that this report relates only to the environmental and legal—but not social—context. It notes the occupation and settlement of natural protected areas, but fails to refer to the social vulnerability of the populations in such settlements. It emphasizes the need for enforcement and improved monitoring and control of irregular occupation in such protected areas, but makes no recommendations regarding social policy. The team did not include a social scientist or urban planner and thus, it did not develop an integrated approach in its analysis, with no discussion of the human, sociological, or historical context. The team also failed to explore ways that the environmental sector could engage with other public sectors on these issues.

The second official document is the report "Diagnosis of the mega-disaster in the Hilly Region" prepared by the Geological Service of the State of Rio de Janeiro (2011). This report was produced one month following the disaster and consists mainly of an analysis of the geology of the area. It relates to the Civil Defense's rescue response but says nothing regarding disaster risk reduction efforts.

The Hilly Region floods have also triggered an interesting public debate about questions of responsibility for the disaster. Many victims were perceived as having occupied the area voluntarily, and thus chose to place themselves at higher risk. Alternatively, the media has run stories of a wealthy family who lost its home in the disaster, obscuring the fact that the disaster hit hardest among the poor.[57] Others point out that public authorities are responsible for preparedness, and thus should be blamed for what happened, rather than blaming "nature" or the victims themselves.

The overlap of environmental and social factors makes this issue a challenge for public authorities, as inter-sectoral cooperation is essential. Moreover, the disaster is a challenge for academic and analysts, as one must include environmental, geographic, sociological, economic and historical information, rather than adhering to traditional disciplines. Lastly, such analysis requires sophisticated technology and highly trained operators—neither of which may be ubiquitous, even in a large country such as Brazil.

Regarding public sector capacity, a few suggestions emerge from this case. First, early warning systems clearly failed, as a result of miscommunications between various meteorological and civil defense agencies. These communication breakdowns and the resulting confusion likely cost lives. Second, it is essential that various public sectors be more harmonized, particularly at the local level. Third, adaptation, mitigation, and rescue practices are all essential, but disaster prevention is both vastly important and vastly overlooked. The state must consider investment in significant infrastructure to prevent future extreme weather events from turning into deadly disasters.

Lastly, this case study has shown the links between internal migration and residence in environmentally-sensitive areas. In Rio, as in many other parts of the country, massive infrastructure projects have attracted migrant labor to cities unprepared to deal with the new arrivals.[58] The result

57. The Conolly family, including, Erick Conolly, CEO of the 'Icatu holding' and his daughter Daniela Conolly, a famous Brazilian stylist. Seven members of this family died in the disaster, as they were hosted in the farm-house of the even more wealthy 'Gouvêa Vieira' family, one of its owner being a deputy of the State of Rio. In: Lage (2011).

58. Articles report to 7,030 civil construction workers only for the hydro-elecritc of Santo Antônio, 84% originary

has been unplanned urbanization, often in areas of environmental risk. Thus, it would be wise for future large-scale projects in Brazil to include not only the classic Environmental Impact Assessments, but also "Social Impact Assessments", which would establish if the community in question is – or should be - equipped to deal with the inflow of labor associated with the project. As this case shows, such analysis would be a critical part of any disaster prevention system, by preventing the establishment of irregular settlements in environmentally-sensitive areas that can so easily turn into disaster areas.

BRAZIL'S CASE STUDIES: GENERAL CONCLUSION

The three cases we have presented here illustrate different aspects of Brazilian environmental migration. From historical and current examples of slow onset migration to a very recent event of disaster-related displacement, we intended to analyze a diverse range of causes of this process, which may affect and create social instabilities at the local and regional levels.

Although we have studied regions with different social and ecological conditions, and our data vary in sources and scope, all three cases yield similar considerations. First, both long-lasting migration and short-term displacements were clearly (and generally, negatively) correlated with environmental changes. Indeed, the environment was relevant in the three examples, but the impacts were not solely the result of nature. Negative outcomes, such as economic disruption and population displacement, are highly dependent on the social and political contexts. In each case, a lack of urban and regional planning and the dominance of extractive and patronage-based development models increased social vulnerability to these negative outcomes of environmental change.

Vulnerability is a key concept in these cases and is the consequence of structural problems which can only be tackled through public policies and transformation of current socioeconomic systems.

The historical drought process in the Northeast has negative impacts on people's lives, but these effects become deeper and more insidious when associated with the region's patronage system, which creates vicious cycles and halts development. Thus, drought (and its negative impacts) has more or less become "institutionalized".

The Amazonian case is the result of decades of destructive economic and demographic policies, founded on the idea that the forest should be cleared in order to assure national security and progress. To date, the region's development has been based on low value-added resource exploitation, a process that has led to ecological catastrophe and a cycle of voracious expansion into frontier zones. Combined with a total lack of state services and authority, this development pattern has resulted in high rates of violence, continuous environmental degradation, and economic disruption, as well as large-scale voluntary and involuntary migration.

Structural problems are also present in the Hilly Region of Rio de Janeiro, where migration flows, the occupation of risky areas, deforestation, and absence of flood prevention measures produce glaring vulnerabilities each rainy season. The disaster displaced thousands of families, and reconstruction itself may bring new migrants to the area.

Climate change is expected to exacerbate severe droughts, desertification, and flooding: the three environmental changes covered in these cases. Brazil's ability to adapt to climate change will be hindered by these socially-rooted structural factors in each of the regions in this chapter. Moreover, having made massive infrastructure investments in the three areas, it will be difficult for Brazil to change course quickly in the face of global environmental change.

Public policy is the only comprehensive way to tackle these challenges. Each case in this chapter has set forth policy recommendations. More broadly, urban and regional planning, deploying basic services and functions of the state, and formulating infrastructure projects consistent with on-the-ground realities are all crucial strategies for dealing with migration and instability in the face of environmental change. Moreover, while the State must have a central role, it must also work alongside private and civil society actors. Building capacity to deal with environmental change is not a peripheral concern, but is central to Brazilians' quality of life and human security.

from the State of Rondônia, and 16%, 1,124 workers originary from other States. Strikes and uprisings have taken place over the year 2010 because of critic working conditions. "Superexploração dos trabalhadores na usina hidrelétrica do Rio Madeira", PSB Nacional, 5/07/2010.

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CONCLUSION

François Gemenne, Pauline Brücker and Joshua Glasser

Numerous disasters marred 2010, displacing more than 42 million people worldwide. At the same time, slow-onset changes in many countries significantly increased environmental risks for millions more. In this book, we set out to describe "The State of Environmental Migration." Yet our case studies have demonstrated an immense diversity of environment-migration circumstances and linkages: there is no simple prototype for an "environmental migrant."

Yet we can grasp common threads from the case studies presented here. In nearly every case, environmental migrants desired intensely to return home, or at a minimum, to return to a state of normalcy and security. Moreover, there is no such thing as a "perfect response." The complex circumstances and intense pressure took its toll on every country, regardless of national wealth or geographic location. However, policy does matter. Planning for environmental change, by reducing social vulnerabilities, reducing risks, and preparing for disaster response, can save lives and improve human welfare. On the other hand, ignoring potential hazards, or refusing to consider the adaptive actions taken by local people (up to and including migration) is a recipe for disaster.

With the advent of human-cause global warming, environmental change and related migration have rocketed to the top of the global agenda, attracting attention from actors as diverse as global financial institutions, environmentalists, heads-of-state, humanitarians, and the world's most powerful militaries. Yet the phenomena in question remain poorly understood and frequently caricatured. We hope that this volume's case studies have provided nuance and empirical evidence to the ongoing global debate and policymaking process.

With an issue as complex, novel, and politically-charged as climate change, it may not be possible to consider every nuance or bit of local evidence in establishing a framework for action. Yet we can do better. We can move past the deterministic migration paradigms that color today's debate, to a more detailed understanding of how populations use (or refuse to use) migration as a tool for adaptation. We can move past a view of environmental events as "acts of God," to a more sophisticated understanding of the complex ecological relationships that precede disastrous calamities. And we can move past our current, response-oriented approach to disaster, to a more holistic approach that places emphasis on disaster risk reduction and coordinated planning for displacement.

This volume also shows that environment-migration linkages are not strictly the problem of small island states: though not all will be equally affected, no community can afford to ignore these issues. Encouragingly, the charter of the Green Climate Fund (established at the 2010 Cancun Climate Negotiations) recognized that policies and programs migration and displacement should be entitled to the Fund's support; we hope that other local, national, and international financing bodies will follow suit and that all parties will work to put financial resources behind such declarations of principle.

As the world prepares for climate change, a number of enormous issues remain to be resolved. Yet environment-migration linkages must be addressed: the problem is simply too massive and complex to escape the attention of actors from the local to the global. Moreover, it is crucial that such issues be addressed from an empirically-robust, evidence-based framework. By putting forward a series of case studies from recent world events, we hope that this volume can contribute to the essential work that lies ahead.

The State of Environmental Migration 2010

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This volume is intended to be the first of an annual series, which will aim to provide the reader with regularly-updated qualitative assessments on the changing nature and dynamics of environmental migration throughout the world. The idea for it stemmed from the course «Environment and Migration», taught at the Paris School of International Affairs (PSIA) of Sciences Po. The course, which is thought to be the first of its kind in the world, examines the complex relationship between environmental change and migration flows. For their final assignment, students were asked to select and analyse a case of environmental migration, be it a sudden and violent natural disaster or a slow-onset environmental degradation. The best of these papers have been selected and edited, and are presented in this volume. Most of them constitute the first detailed analyses of the migration flows that were induced by some of the most dramatic events of 2010, paving the way for future scholarly works.