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Environmental Explanations of Central American Migration: Challenges and Policy Recommendations

Betilde Muñoz-Pogossian
Organization of American States

Diego Chaves-González
Migration Policy Institute

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ENVIRONMENTAL EXPLANATIONS OF CENTRAL AMERICAN MIGRATION

CHALLENGES AND POLICY RECOMMENDATIONS

AUTHORS
BETILDE MUÑOZ-POGOSSIAN
DIEGO CHAVES-GONZÁLEZ

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Acknowledgements

List of Abbreviations

ACLED	Armed Conflict Location & Event Data Project
CARSI	Central American Regional Security Initiative
GS/OAS	General Secretariat of the Organization of American States
IDB	Inter-American Development Bank
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displacement Population
IFRC	International Federation of Red Cross and Red Crescent Societies
IOM	International Organization for Migration
LAPOP	Latin American Public Opinion Project
OCHA-ROLAC	United Nations Office for the Coordination of Humanitarian Affairs—Latin America and the Caribbean
UNHCR	UN High Commissioner for Refugees
UNODC	United Nations Office on Drugs and Crime
USAID	United States Agency for International Development
WB	World Bank
WFP	World Food Program

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EXECUTIVE SUMMARY

Migrants from Central America have moved in large numbers in recent years. According to the most recent Global Trends Report of the United Nations High Commissioner for Refugees (UNHCR), the total number of asylum seekers, refugees, internally displaced persons, and returnees from Central America was 107,407 in 2014, while a total of 905,796 were registered by 2019. The arrival of so many internally displaced populations (IDPs), migrants, and refugees has created challenges and opportunities for countries in the region within a few years. Natural disasters and the COVID-19 pandemic have only added complexity to the situation.

As it has become clear that many displaced migrants will remain abroad for an extended period, if not permanently, the focus has begun to shift from the provision of humanitarian aid to understanding the root causes of migration to strengthen the countries of origin preparedness, infrastructure, access to services, and institutional reforms to address the situation. Such measures hold the potential to benefit the displaced populations, migrants and refugees, and the communities in which they live by boosting economic development and social equity and reinforcing social cohesion.

To examine the link between climate change and human mobility of migrants and refugees in this region, this report analyzes data from the Internal Displacement Monitoring Centre (IDMC), United Nations Office on Drugs and Crime (UNODC) studies, and various data from other sources, reports, and additional research resources. The report explores the correlation between three key dimensions that could trigger factors for human mobility northward— natural disasters, internal displacement, and violence—across the three Northern Triangle countries (El Salvador, Guatemala, and Honduras) that together comprise 86 percent of Central Americans arriving at U.S. borders, and as of 2017, 8 percent of the United States' 44.5 million immigrants.[1]

This study also examines the correlation of these variables across time, considering the accumulation (sum) of episodes in three years of variable b, which has a correlating effect on variable a. For example, when correlating natural disasters in any given year with the number of internally displaced population, this investigation totaled the number of internal displacements in the three consecutive year period and then correlated this number with the natural disasters that happened in any given year.

The analysis suggests all variables correlate positively. However, correlations are stronger when analyzing internal displacement and violence and violence with out-migration. The data and analysis of the findings presented in this report provide a valuable indication of trends and insights to support effective policymaking in the region.

INTRODUCTION

The Central American migration crisis has become a salient issue in U.S. and regional politics. It is cyclical in nature and has recently acquired more relevance given the consequences of the co-existence of the COVID-19 pandemic and recent climate events on migratory patterns. The International Monetary Fund (IMF) reported the compounded impact of those crises contributed to annual economic Gross Domestic Product (GDP) contractions of 8.6 percent in El Salvador, 8 percent in Honduras, and 1.5 percent in Guatemala.[2]

The numbers indicate unprecedented growth. According to the most recent Global Trends Report of the United Nations High Commissioner for Refugees (UNHCR), the total number of asylum seekers, refugees, internally displaced persons, and returnees from Central America was 107,407 in 2014, while a total of 905,796 were registered by 2019.[3] This represents an increase of approximately 800,000 people in six years. Comparatively speaking, the Central American migration crisis comes second after the Venezuelan migrant and refugee crisis in the Western Hemisphere regarding the numbers of people forcibly displaced. Half of those forcibly displaced are adults, and the other half are accompanied and unaccompanied minors. Of the adult migrant population, 48 percent are women.[4] With women and minors being the majority, they represent a forcibly displaced group who are highly vulnerable through the entire migration process to sexual abuse, gender violence, discrimination, labor, sexual exploitation, or human trafficking in the countries of transit, destination, and return.

There are multiple reasons for their displacement. Lack of opportunities, poverty, violence, crime, food insecurity, and aggravated socio-economic conditions because of climate change are all driving migration to the United States. It is, therefore, no surprise that, along with Venezuelans, citizens from Guatemala, Honduras, and El Salvador are currently the most prominent group seeking international protection in the United States.[5] A more recent trend between October 2018 and January 2020 was the so-called "migrant caravans" (*caravanas migrantes*), with thousands of Central Americans making their journey to the United States. These have received intense media coverage, sparking heated debates in the United States and abroad.

These caravans are composed mainly of families, children, adolescents, pregnant women, and older persons, who are most affected by deteriorating conditions in their native countries, where some may require international protection. However, it is essential to note that out-migration to the United States is not necessarily the first option to cope and adapt to deteriorating conditions for these people. As this report explores, Central Americans may first migrate internally before making their journey out of the region and toward the United States. In fact, in Honduras and El Salvador, at least 320,000 internally displaced people fled their homes due to violence and lack of opportunities within their countries, according to UNHCR. In the case of Guatemala, data is still unknown as the government has not yet recognized the issue of internal displacement.

Migration patterns northward will continue to happen if countries, the international community, and relevant stakeholders in the region do not address the root causes causing the displacement. Within the root causes already mentioned, not only have climate events been increasing in Central America,[6] but the impacts of climate change tend to be disproportionally felt by these countries. Indeed, Central America and Southeast Asia are the two regions globally,

particularly vulnerable to climate phenomenon[7] and the least prepared to respond and quickly recover from them. In its 2020 report, the United Nations Office for the Coordination of Humanitarian Affairs—Latin America and the Caribbean (OCHA-ROLAC) indicated that Latin America and the Caribbean are the second most affected by climate change. In 2020, the region experienced COVID-19 with two hurricanes happening in one week, which has not occurred in the last 50 years. Unlike other countries in South America, Guatemala, Honduras, and El Salvador are highly vulnerable to climate change due to their extensive coastlines, economic dependence on agriculture, and the potential for storm damage. Other factors adding to this vulnerability include the lack of preparedness to respond to emergencies and the scarcity of freshwater.[8] Considering this, we should expect the migration crisis to worsen before it gets better in the coming months.

Is there a connection between the increase in the frequency and severity of climate events in Central America and migration? How would this relationship come about? What role does internal migration play? And what impact does the forced internal displacement of these populations affected by climate events have on community social and security conditions? Can internal displacement explain security threats for these countries? And how do these impact these populations' move toward the North? This report seeks to answer these questions by assessing the correlation between the variables mentioned above happening two ways, as stated in the following hypothesis:

- *H0: Internal displacement caused by natural events is not an underlying factor that incubates violence and social instability, so forced migration northward stimulated by violence should not be associated with the frequency of natural events*

- *H1: If internal displacement caused by natural events is an underlying factor that incubates violence and social instability, then forced migration northward stimulated by violence should also be associated with the frequency of natural events.*

Rationale: A natural event (Xa) triggers a process of internal displacement (Xb), which produces an underlying factor that incubates structural violence (Xc), creating patterns of human mobility northward (Y).

An attempt is made in this report to study to what extent natural events are an underlying factor that incubates violence by looking into the IDMC data set and its relationship to data on violence (UNODC dataset) in the Northern Triangle. Furthermore, it assesses migratory patterns northward between 2008 and 2018. The report identifies the types of natural events or hazards by country to evaluate impacts on patterns of violence that may have emerged and may have triggered human mobility northward. The report also examines the number of internal displacements caused by natural disasters using the IDMC dataset between 2008 and 2018 and correlates it with the different conflict-related events reported by the UNODC homicide data set.

The report first briefly reviews the root causes of human mobility from Central America, putting the lens on the effects of climate change and recent natural events in Central America and the Caribbean. In the second section, the report analyzes the literature on climate vulnerability and migration and describes how this report contributes to fill research gaps. Whereas the third section offers an argument of why this matters from a climate and environmental security risks perspective, shedding light on the issue of climate events preparedness and recovery and migration, the following section presents the correlations between climate events, internal

displacement, homicide/social instability, and outward migration. The final section provides some preliminary recommendations on how best to address climate drivers of migration and the critical elements of a whole-of-government and whole-of-nation approach.

CLIMATE VULNERABILITY AND MIGRATION: LITERATURE REVIEW

A review of the academic literature on international migration in the Americas reveals the complexity of studying the factors at the individual and community level, the historical and cultural contextual level, and in terms of the political and economic processes in the countries of origin and host countries that influence individual decisions to migrate. This review becomes more complex considering the multiplicity of disciplinary approaches used to understand and explain migration. These range from predominantly economic to political, social, and anthropological studies, among others.[9]

International relations theory has sought to understand the causality, evolution, dynamics, and impacts of migration, proposing the main migration theories. The common denominator in these studies is the proposition that migration has responded to dynamics associated with the globalization of markets. In other words, these studies argue that, as the capitalist system has spread from developed countries to less-developed ones, disruptive changes in the forms of subsistence and economic dynamics have motivated the displacement of people within and outside countries. Similarly, this literature points out there is a significant gap between the challenges countries and communities face when receiving these flows of people and the public policy responses that governments use to respond to the phenomenon of migration.[10] [11] [12] [13]

Several authors from Latin American and Caribbean academia have also contributed to the theory and methodologies of the study of migration. They have analyzed the region's problems that may influence people's decisions to migrate, including corruption and state fragility, poverty, inequality, violence, insecurity, gang recruitment, and sexual and gender violence, as factors that explain human displacement.[14] [15] [16] [17] [18] [19] These contributions have closed the gap in the literature going beyond the connections between migration and development, providing additional explanations of why people in Latin America migrate.

Poverty, inequality, and the lack of social mobility have been factors studied in the literature as some of the most important causes of migration. In other words, these authors have studied the experience of poverty and the limited expectations people have of escaping poverty as sufficient reason to change countries. This body of knowledge has also assessed the role of remittances, finding they have filled the gaps generated by the state in many cases, thus aiding the well-being of the population. This is certainly the case for Honduras and El Salvador. According to the Pew Research Center, remittances accounted for more than 20 percent of GDP in 2019, among the highest shares in the world. In Guatemala, they represent 14 percent of GDP. This illustrates the growing dependence of the region's economies on remittances as a source of income.

In addition to the factors described above, the Americas have the highest levels of violence in the world. Violence, gangs, organized crime, and failed security policies affect people's possibilities to fully participate in productive and political activities with severe effects on their lives and well-being. Therefore, it is no sur-

prise that it has also been an object of study and considered an expulsion factor for migrant populations in many of the region's countries, but perhaps more so in El Salvador, Guatemala, and Honduras. As the political, humanitarian, and human rights crises have worsened, recent migration research projects have begun to incorporate political and legal variables. These include internal conflicts and political crises to explain forced displacement and intra-regional migration, such as in the cases of Nicaraguan and Venezuelan migrants and refugees.

The literature review reveals that many aspects have not been adequately addressed in the theoretical analysis of outward migration in the Americas. On the one hand, there is the issue of irregular migration. In other words, understanding how migrants in receiving countries who crossed borders irregularly—through unofficial crossing points, for example, or exceeding their time allowed by their visas—remain in a protracted irregular status. Further studies need to explore the vulnerabilities (beyond migration) they face in accessing their rights or how best to account for them so receiving countries can capitalize from the brain gain upon their arrival. Considering that the vast majority of Latin American migrants are in an irregular status makes their particular situation and the question of how to measure irregular migration the object of further analysis.

Likewise, and considering some policies implemented in the region or due to the COVID-19 pandemic, another issue that will require further analysis is return migration. The literature review suggests that governments could benefit from more research on this type of migration, as it has distinct characteristics and requires specific public policy responses.

Finally, and more recently, new studies have also tried to address the role of climate change

as an explanatory factor of forced displacement, especially from the Northern Corridor of Central America. Most of the focus has been on precipitation and droughts as factors that trigger deteriorating socioeconomic conditions and food insecurity for rural communities in Central America. At the same time, some studies have also incorporated violence and conflict in the analysis. For example, Bermeo and Leblang[20] studied the interconnection between climate and violence linked to migration. They examine the changes in precipitation and increase in drought in Honduras and how these relate to violence and migration. The authors analyzed these patterns by looking at precipitation and violence data in Honduras and family apprehension from Honduras at the border. Their findings suggest that as cities in Honduras become more resilient to rainfall and find ways to resist its climate effects and combat violence, migration will likely decrease in the long run.

For its part, the World Food Program (WFP), the International Organization for Migration (IOM), the Organization of American States (OAS), and the Inter-American Development Bank (IDB)[21] assessed the relationship between food insecurity because of climate events and migration from the Northern Triangle. Their study also used the lack of precipitation to test for the correlation between food insecurity and migration to the United States from the Northern Triangle countries. While it can help to understand human mobility patterns for the Central American region, this study focused on the Dry Corridor, which has been affected by *El Niño,* and the impact this natural phenomenon has had on the food supply for families in this area. According to the study, the relationship between climate change and food supply can help explain increases in out-migration toward the North.

Other authors have considered different factors when studying the impact of natural disasters

on migration. An IOM report[22] focuses on community resilience in the face of climate events. Their study argues that the state of vulnerability in which the individuals were in, once the disaster hit them, influences how much this will affect them. They argue that poverty levels, violence, food insecurity, access to land, and support from the state contribute to the individual's final decision to migrate. Moreover, the IOM study proposes that any policy response to address migration must attempt to mitigate the consequences (disaster risks) of climate events as they influence the mobility of individuals. Regarding violence and conflict in the region, the study also found a prevalence of data regarding violence and conflict as a driver of migration and less on environmental explanations of migration. Moreover, they argue there is a need for more studies that correlate natural disasters and conflict as drivers of migration in Central America.

However, there have been studies on how violence and crime correlate with migration. Using data from the Central American Regional Security Initiative (CARSI) and the Latin American Public Opinion Project (LAPOP), Roth et al. conducted a clustered impact evaluation to measure CARSI's prevention programs.[23] They found evidence that victims of crime were more likely to express their desire to migrate (2020). Their findings complement the IOM study cited above by explaining that vulnerable communities exposed to violence or any economic or gender vulnerability are already more prone to suffering greater consequences from migrating.

This report builds on this literature on migration, paying particular attention to the incidence of natural disasters and conflict on migration and internal displacement. Several scholars have aimed to explain the correlation between conflict/violence in the Northern Triangle with migration. Yet, few studies have considered environmental factors as having a role in the equation.

CLIMATE-RELATED DRIVERS OF MIGRATION FROM CENTRAL AMERICA: WHY IT MATTERS

The reasons for Central American migration to the United States are multiple and vary from country to country. However, some are common to the three countries. First, Central America continues to be among the areas without war with the highest homicide rates worldwide, with increasing levels of violence and citizen insecurity, including forced recruitment in gangs, drug trafficking, and organized crime activities, as well as extortion. The region also experiences widespread sexual and gender-based violence and community violence, mainly affecting women and children.[24]

Added to this are persistent economic and structural causes, such as a weak rule of law, corruption and impunity, citizen distrust, high poverty rates, low levels of economic development, exclusion and inequality, lack of opportunities—especially for women, young people, and other vulnerable groups,[25] and food insecurity. As a result of the social and economic impacts of climate events, these have also entered the equation as another indicator to explain the increase in irregular migration from Central America to the United States.

Each country faces different climate-related challenges, although some are shared from country to country. There is a high susceptibility to hurricanes and severe storms in Guatemala, but the country is also subject to volcanic activity and earthquakes. Similarly, droughts have affected the country since early 2010 and, more pronouncedly, starting in 2014-2015. Current environmental issues also include deforestation

in the Peten rain forest, soil erosion, and water pollution. Its Caribbean coast is susceptible to hurricanes and severe storms, and coastlines on the Pacific and Atlantic oceans and territories surrounding rivers are affected by flooding.[26]

For its part, El Salvador has seen a consistent increase in extreme events, mainly storms, floods, and droughts. The country is also experiencing severe deforestation and land degradation, making it even more vulnerable to climate variability and change. The Dry Corridor covers a big part of El Salvador, and recurrent droughts and heavy precipitation events often lead to flooding and landslides. Coastal areas, home to more than 30 percent of the population, are highly vulnerable to the combination of sea-level rise and *El Niño*-related climate events.[27] Finally, while the Dry Corridor also covers parts of Honduras, the country faces similar risks to its neighboring countries with severe vulnerability to climate events such as hurricanes, tropical storms, floods, droughts, and landslides affecting agricultural production and critical infrastructure.[28]

These adverse climate-related conditions have had an impact on these countries' economies. For example, Hurricanes Eta and Iota in 2020 resulted in $1.9 billion[29] and $780 in damages and economic losses for Honduras and Guatemala,[30] respectively. The human losses were also devastating. Apart from the financial and human losses, people, families, and communities' day-to-day material conditions for subsistence are also affected by poorly-managed climate events. As this happens, they also tend to force intrastate migration, cause more significant economic hardship in the cities where people migrate, and eventually increase social tensions or violence. As people face poverty and social conflict/violence, out-migration becomes the only choice to ensure access to

fundamental rights. The 2017 study mentioned above by WFP, IOM, OAS, and IDB confirmed that the droughts in the Dry Corridor of Guatemala caused food insecurity due to reductions in agricultural production.

Furthermore, it found a significant correlation between precipitation deficits since 2014 due to *El Niño* and the increase in irregular migration to the United States for subsequent years. The patterns were similar during the COVID-19 pandemic with hurricanes Eta and Iota. A survey conducted by the WFP in early 2021 in Guatemala, Honduras, and El Salvador found that around 15 percent of the people surveyed were reportedly already making concrete plans to migrate, up from 8 percent in 2018.[31]

Climate events do not have to generate these levels of human and economic losses, which may eventually cause internal displacement and out-migration. Investing in disaster preparedness on damage assessment, epidemiology, health services, infrastructure protection, water and sanitation, administration, logistics, and communication will reduce damages and losses. This is even more important as the frequency and intensity of climate events increases. Indeed, as climate-related events continue evolving in terms of frequency and severity, additional strains will be put on the Guatemalan, Honduran, and El Salvadoran governments. These countries will continue to face complex challenges in their capacity to address ongoing development barriers, including extreme poverty and inequality, low levels of education, acute environmental degradation, and rampant crime and violence, while also responding to climate events and recovering after they occur. In this regard, leaders must prioritize new strategies to help these countries prepare for and recover from severe climate events, therefore mitigating the root causes of migration. Indeed, the Central American region needs to move away from

reactive responses to climate events and turn to more proactive, comprehensive, and intersectional approaches to prevent and mitigate the adverse effects of climate events. At the same time, the international community must focus on helping these countries prepare for climate events, and ultimately, reverse deteriorating trends in political, social, security, and economic conditions that force people to leave.

NATURAL DISASTERS, INTERNAL DISPLACEMENT, HOMICIDE, AND MIGRATION: ASSESSING CORRELATIONS

Building on the findings and conclusions of disaster and conflict scholarship, together with natural disaster and conflict-event data covering 2008-2018, this report analyzes the linkages between natural disasters, violence, and forced displacement by using a multivariate model to test the results statistically.

This report argues that, in general, climate events that occur when communities have not built resilience have the potential of depleting people's material and socioeconomic well-being. This can contribute to conflict and aggravate community violence because it creates competition for scarce resources, exacerbates inequality with the unequal distribution of aid, changes power relationships among individuals, groups, and the organizations that serve them, and can create power vacuums and opportunities for non-state (criminal) actors to usurp power.

The quantitative research analysis in this study endeavors to determine the strength of the climate event-conflict-mobility hypothesis. The analysis seeks to validate the traditional determinants of violence and indicates the importance of incorporating system shocks, such as

natural events, into studies and explanations of human mobility. For example, floods in El Salvador forced conflict IDPs to move due to the flooding, which increased hardship on communities hosting them. In Honduras, rural areas hard-hit by flooding (2008-2018) were already having difficulties growing sufficient food for their communities.[32] The arrival of newcomers displaced by the fighting in other parts of the country increased the strain on these communities.

Natural events, directly and indirectly, can create the conditions for instability and conflict by exacerbating social grievances and resource scarcities and accelerating social systems changes. Despite a plethora of studies in the conflict realm, negligible attention has been devoted to the study of violence in the aftermath of internal forced displacement caused by natural events and how it can create northward mobility. This report takes a preliminary step in that direction, analyzing the wide range of environmental, social, spatial, and political effects of natural disasters in conflict-ridden and conflict-free areas of the Northern Triangle.

As explained earlier, this study considers internal displacement and migration from Central America as dependent variables when running the correlations. These variables are affected by two other independent variables at different levels: natural events or hazards and conflict/violence. For this study, internal displacement is defined under the 1998 Guiding Principles on Internal Displacement.[33] Internally displaced persons (IDPs) are "persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or 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."[34]

Regarding the other dependent variable, namely migration, this report uses the definition proposed by the IOM, which understands it as "the movement of persons away from their place of usual residence, either across an international border or within a State." For Central American migration, there are variations of the term that can help explain it, including concepts such as climate migration, displacement, international migration, irregular migration, labor migration, migrant, and safe, orderly, and regular migration, among others.

The report argues that both internal displacement and migration are affected by natural events and conflict/violence. In this sense, the paper considers natural events as particular natural events that have large-scale effects on the environment and people. Therefore, this analysis addresses the impact of floods, storms, earthquakes, extreme temperatures, dry mass movements, volcanic eruptions, and wet mass movements.

For its part, this study adopts the UNDP approach in terms of the classic definition of conflict as "a process of contentious interaction between social actors and institutions which mobilize with different levels of organization and act collectively to improve conditions, defend existing situations, or advance new alternative social projects."[35] However, the study uses the proxy of violence to analyze the conflict criteria.

The data for this report comes from three different sources. The information for internal displacement came from the IDMC's database. At the same time, this report used the UNODC homicide count per country and per year data for the conflict and violence variables and U.N. data from the U.N. Population Division to explain the number of displaced populations from each country to their country of destination to

account for emigration. The period selected for this study is 2008-2018, and the countries selected are those known as the Northern Triangle: Guatemala, Honduras, and El Salvador. When accounting for external migration, the countries considered are those in the Northern Triangle, Mexico, and the United States.

The IDMC collects its data yearly by relying on government agencies, U.N. organizations, the International Federation of Red Cross and Red Crescent Societies (IFRC), local authorities, and humanitarian clusters to offer displacement figures. When the data provided by governments is incomplete or insufficient, IDMC considers data from international and local non-governmental organizations (NGOs), civil society, non-state armed groups,[36] local media, and affected populations, among other sources.

The data from the UNODC comes from statistics that U.N. Member States submit to it on drugs, crime, and criminal justice. The UNODC also collects data through national surveys implemented alongside national governments and scientific literature. Similarly, the U.N. Population Division data comes from official statistics on the foreign-born or foreign population by country of origin. One caveat is that the data from the U.N. Population Division only provides estimates for 2010 and 2015.

The methodology used for this study consisted of using correlations to measure the association between natural disasters and internal displacement in that same year and two consecutive years. The correlation between internal displacement and the number of homicides per country and year is evaluated, considering the total number of homicides every year with two consecutive years added. Finally, the same method of accounting for three successive years was used to assess the correlation between violence and migration northward.

As explained above, the disasters included in the variable for the number of natural disasters per year from IDMC include floods, storms, earthquakes, extreme temperatures, dry mass movements, volcanic eruptions, and wet mass movements. The variable that looks at internal displacement from natural disasters includes the number of new displacements due to each natural disaster type. For violence/conflict and instability, we used homicide data from the UNODC, given it is the most complete dataset we found regarding violence in these three countries. Moreover, given that displaced populations tend to be excluded and marginalized, we considered homicide a good indicator of violence. People tend to be more affected by this form of violence. This variable accounts for the number of homicides in each country per year. Lastly, the variable for northward migration includes the number of migrants from each country that migrates to Mexico, the United States, and Canada per year.

For our analysis, we used the *ggcorr* package within R to create heat maps representing the correlation between the different variables using the Pearson correlation coefficient as our measure.[37]

The formula for the Pearson correlation coefficient is:

$$r = (x_i - x)(y_i - y) x_i - x^2 (y_i - y)^2$$

Where:

r=correlation coefficient

x_i=values of the x variable

x=mean of the values of the x variable

y_i=values of the y variable

y=mean of the values of the y variable

In this case, there are four main variables used interchangeably as the x and y variables. These are the variables for the sum of the natural disasters in the three countries of study, the variable for the total sum of internal displacement per country in three-year groups, the variable for total homicides in the region in three-year groups, and the variable for the total sum of migration toward the northern countries.

These were then crossed following the transitivity principle in which, if A influences B, and B influences C, then C must also be influenced by A. In this case, the hypothesis is that if natural disasters correlate with internal displacement in the Northern Triangle countries, they could increase the number of homicides (used as a proxy for violence) in the region. The increase in violence could be correlated with migration toward northern countries (Mexico, the United States, and Canada). Two important caveats to keep in mind is that correlation does not imply causation. Although there might be a correlation between the variables, one cannot make any claims of causality between the different variables solely based on the existence of this correlation. Secondly, we discovered a limitation of available data in this case, which could provide an important opportunity to identify new gaps in the prior literature and present the need for further development in this particular area of study. These two caveats are explored further in the following sections.

RESULTS

The results corroborate previous studies relating to the relationship between migration, internal displacement, conflict, and natural disasters. After running the four different correlations that this report proposes, the findings suggest a weak but positive correlation between natural disasters and internal displacement. The Pearson correlation coefficient is

0.21. When testing for the significance level of this correlation coefficient at a 90 percent confidence level, the p-value obtained was 0.601. Given that this value is greater than 0.10, the null hypothesis that the true correlation is equal to zero cannot be rejected. In other words, the findings indicate that the existence of floods, hurricanes, or earthquakes, among other natural events, may not be the only determinant of internal displacement in these three countries. Still, it is definitively influencing people's decision to move. As more variables are included in the correlations and more factors are considered, the correlations get more potent, as Figure 1 shows.
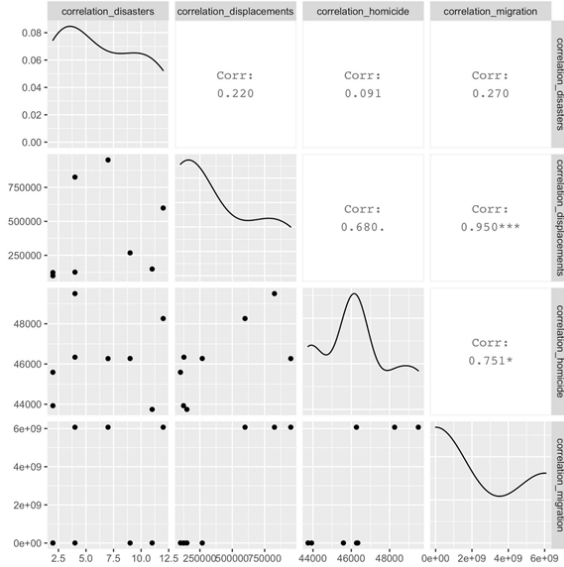
When assessing the second correlation between internal displacement due to natural disasters and homicide, the correlation coefficient is 0.7. This shows that the relationship between internal displacement caused by natural disasters and homicide is strong. This correlation coefficient was found by comparing the three-year sum of the internally displaced people due to natural disasters in each country with the total homicides in the region. When we tested for the significance of the Pearson correlation coefficient, the p-value obtained is 0.063, which is lower than the alpha level of 0.10 (confidence interval of 90 percent), so we can reject the null hypothesis. In other words, there is evidence that internal displacement caused by natural disasters in these three countries may exacerbate violence measured by the number of homicides occurring in communities that have received IDPs due to natural disasters. Since this correlation between IDPs due to natural events and homicides is strong, this study recommends further studies that account for other factors and use alternative methodologies such as linear regressions.

Moreover, there is a correlation between homicide and migration. The correlation coefficient, in this case, is 0.8. When testing for the significance of this coefficient, the p-value was 0.031. At a 90 percent confidence level, this p-value is significant because it is less than 0.10, meaning the null hypothesis that the correlation is different from zero can be rejected. Given these results, there is an essential and strong correlation between homicide and migration toward the North. What Figure 1 suggests, then, is that this study shows strong results when it comes to the correlation between homicide and migration toward the northern countries. As it still exists to some degree, a correlation between displacement and natural disasters (r=0.220), did not yield a significant result at the 90 percent confidence level. Therefore, this study cannot rule out the possibility there might not be a correlation at all. In other words, all variables are positively correlated. However, as we crossed the different variables, the levels of correlation became stronger.

Furthermore, the significance tests applied to measure the confidence levels rejected the null hypothesis of this research. In this sense, this study is an invitation to create more accessible data on human mobility associated with environmental factors that are sufficient and of quality. Thus, the region could make visible and provide a better understanding and attention to migration triggers, allowing and thereby substantiating policies, actions, and decisions at the regional and national level.

FIGURE 1: CORRELATIONS BETWEEN NATU-RAL DISASTERS, INTERNAL DISPLACEMENT, HOMICIDE, AND MIGRATION TOWARD THE NORTH (MEXICO, THE UNITED STATES, AND CANADA) SHOWING THE LEVELS OF SIGNIF-ICANCE FOR EACH CORRELATION


Exactly 0. No evidence found that the variables correlate
0 to 0.25 Very weak evidence that the variables correlate
0 to -0.25 Very weak evidence that the variables inversely correlate
0.25 to 0.49. weak evidence that the variables correlate
-0.25 to -0.49. weak evidence that the variables inversely correlate
Exactly 0.5, evidence found of variables correlating
Exactly -0.5, evidence found of variables inversely correlating
+0.1 to 0.49. Strong evidence found of variables correlating
-0.1 to -0.49. Strong evidence found of variables inversely correlating
+0.50 to 0.99. Very strong evidence of variables correlating
-0.50 to -0.99. Very strong evidence of variables inversely correlated
Exactly +1. Complete evidence found of variables correlating
Exactly -1. Complete evidence found of variables inversely correlating

Source: Prepared by the authors for this study

Putting these results into perspective and contextualizing them, as Figure 2 shows, the correlations intensify as more variables are factored into the model. This report argues that this is the case since emigration is a process that occurs progressively after an initial shock (in this case, natural disasters). The study accounts for countries that have suffered years of deterioration and have not improved their resilience mechanisms to defend themselves against these shocks. Thus, there are increases in internally displaced populations and migrants who look for opportunities in Northern countries.

FIGURE 2: INTENSITY OF CORRELATION BETWEEN NATURAL DISASTERS AND MIGRATION TOWARD THE NORTH
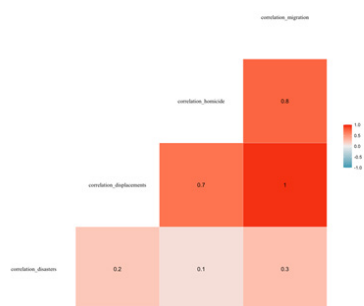
Source: Prepared by the authors for this study

After assessing the results, the report suggests different reasons why the correlations result as they do. First, looking at the results from a vulnerability perspective, when a natural disaster strikes a country, the level of vulnerability individuals face is of a certain magnitude. However, as displacement begins to occur because of these disasters, their vulnerability levels increase, reflecting the Pearson correlation coefficient increase.

FIGURE 3. COUNTRY OF HAZARD TYPE

Hazard Type	El Salvador	Guatemala	Honduras
Drought			1
Dry mass movement		2	1
Earthquake	3	6	2
Extreme temperature		6	
Flood	11	25	20
Storm	5	5	4
Volcanic eruption	1	6	
Wet mass movement	2	3	
Wildfire			1

Source: Prepared by the authors for this study

Data related to violence, conflict, and economic factors prevail as primary triggers of human mobility in the region. Other more easily identifiable factors often hide the environmental trigger, either by the absence of studies and the production of specific data, practical and methodological difficulties to generate this type of data, or the limited perception of the environmental factor as a mobility inducer. It is necessary to reinforce the relationship between multiple vectors of mobility in the region and, especially, how environmental factors are the trigger and are related to economic vulnerability, insecurity, conflict, and violence.

Generating evidence and data about the phenomenon requires two aspects: (i) developing, testing, and validating specific methodologies, and (ii) reinforcing, improving, and coordinating methodologies and existing data sources. The absence of characterization and precise definition of the phenomenon and its categories and a defined and coherent methodology with the region's specificities are the main barriers.

It is necessary to invest in data production systems with integrated indicators on the environment and human mobility. This can generate a set of regional indicators of human mobility induced by climate change and disasters, which requires an integrated analysis and coordination between different databases and data sources and the development of specific methodologies.

This study, therefore, indicates the need to expand the availability of specific data, identify and fill gaps in data on the phenomenon, produce new data where it does not exist, and develop methodologies, standards, and common protocols for harvesting, analysis, and data collection. In addition, creating collaborative platforms for the dissemination and exchange of data to improve its accessibility and applicability is highly recommended.

POLICY RECOMMENDATIONS: HOW TO SUPPORT THE WHOLE-OF-GOVERNMENT AND WHOLE-OF-NATION APPROACHES TO RESPOND TO CLIMATE-RELATED DRIVERS OF MIGRATION

Promoting economic prosperity, improving security, and strengthening governance in the Northern Triangle must be at the core of U.S. engagement in the region, primarily to mitigate the root causes of migration. This should also be a priority for the region. Some vital preliminary recommendations to address the climate drivers of migration are offered. These ultimately require a combination of political work, financial and technical assistance, and inclusive engagement with other stakeholders at the local level. Responses should also include providing international protection and regularization options for these populations in transit and destination countries. Recommendations include the following:

Political Engagement

a. Provide incentives for leaders to show progress toward implementing international commitments and frameworks to address climate change, adaptability, and resilience of local communities. These could be in the form of additional or new forms of financial or technical cooperation.

b. Promote awareness among political and military institutions in the regional leadership (political, military) on the need to provide an integrated response to climate events. This would include designing and implementing strategic plans and preparing logistical, infrastructure systems, and personnel to respond to climate events that may jeopardize their already fragile economies, re-

sources, and adaptive capacities.[38] Considering that half of the irregular migrants from Central America are women, particular attention should be paid to the unique needs of women and girls in the development of these responses, as recommended by U.N. Resolution 1325 on Women, Peace, and Security.

c. Develop concrete military cooperation initiatives for disaster preparedness and response, focusing on protecting the most affected resources and services during a climate event: water, shelter, health services, and food. There should be a specific focus on the most vulnerable populations, including women, who ultimately are forced to migrate to the North and face additional vulnerabilities.

d. Bring the political discussion on the environmental explanations for Central American migration to the highest level, including using the Summit of the Americas process (currently led by the United States) as a forum to promote a regional conversation on the issue. It would be strategic to encourage a discussion on leveraging public, private, and international financing to respond to climate events in Central America. This way, the costs of the response and stabilization after natural events are not primarily absorbed by the United States via financial and technical cooperation.

International Financial and Technical Assistance

a. Assist institutions in the region with generating data or information for analysis that would include the experiences and situations of women and men and how climate events impact them. For example, the basis for developing agricultural policy and targeting cooperation programs to prepare for

climate-related events should be data-driven and disaggregated by gender and age. This would allow assessing who produces what—and how—to provide information capable of identifying differences and inequalities to address through technical and financial interventions.

b. Provide safety nets, skills training, drought insurance schemes, and small business grants to farmers—especially women farmers, including assistance with climate-sensitive agriculture and innovative, climate-related solutions to seeds and production to help people in rural agricultural areas prepare for natural events. Ultimately, these types of interventions improve people's material conditions in general, and more so, in case of a climate event, helping anchor potential migrants to their communities of origin. A good example of effective U.S. aid is the USAID-financed program called Climate, Nature, and Communities of Guatemala, which showed promising results in helping rural Guatemalans respond to climate change through crop diversification, water conservation, and reforestation.

c. Provide cooperation to support facilitated migration to "intermediary cities,"[39] and for infrastructure preparation in these cities to help individuals and communities secure better livelihoods while lifting pressures in destination areas within the country. Comprehensive programs to generate opportunities for internally displaced people must also be considered, including the provision of unconditional cash transfers in urban areas with high numbers of IDPs.

Effective inclusive engagement with local actors

a. Engage with academia and the intelligence community (in the United States and Cen-

tral America) to close the gaps in information and knowledge in all the dimensions of climate change impacts at the region's economic, social, and environmental levels. Concrete outcomes may include the generation of data and the sharing of methodologies and tools to monitor, share, and track information and events at the local, national, and regional levels, as well as devising locally relevant whole-of-government efforts to inform their choices about adapting to and reducing vulnerability to climate change.

b. Engage the private sector as a pivotal contributor to fostering climate event preparedness and inclusion opportunities for local communities. In addition, the private sector[40] could be an ally in identifying specific climate-related disruptions of critical systems of life support that may lead to security-relevant outcomes such as political instability, violent conflict, humanitarian disasters, and internal displacement and out-migration. International financial institutions such as the WB and IDB should also be engaged.

c. Encourage local solutions to economic, social, and environmental sustainability and provide seed funding for the launch and implementation of programs. Providing support to organizations at the regional level, such as the Tropical Agricultural Research and Teaching Center, or through a multilateral entity such as the Inter-American Institute for Cooperation in Agriculture, would be an optimal way to encourage local solutions. These organizations work through their programs to generate innovative ideas and actions that improve the livelihoods of local populations while providing goods and services. Research and data collection are also part of their mandates and would sup-

port the development of evidence-based policy responses to climate change.

d. Engage migrant and diaspora networks in the United States to support local development, climate events preparedness, disaster recovery, and climate change adaptation in Central American countries.

International Protection and Regularization

a. For countries in the region, continue evaluating and taking steps to facilitate further regularization processes for migrants and forcibly displaced people who consider their migration's root causes to prevent irregularity and take advantage of their talents and contributions.

b. Consider resettlement frameworks or humanitarian visa programs for climate-related migrants and forcibly displaced populations. Good practice in this regard is the process that began in 2014, developed by Argentina, Brazil, Chile, and Uruguay, to contribute to the provision of international protection to citizens from Syria.

c. Along with regularization options, invest in access to identification documents by migrants and refugees as both actions can decrease human trafficking and migrant smuggling at the border.

d. Continue global discussions to consider a particular category of protection of environmental migrants and refugees to include and protect people who, because of depleted livelihoods and losses due to climate events not adequately managed, have no choice but to flee.

In conclusion, this study serves as a starting point for further analysis regarding the interrelationships between climate change and migration. It shows promise in studying the inter-

section between natural disasters, migration toward the northern countries, and conflict and violence. One limitation was the type of data available on this topic. Moreover, another recommendation is for more rigorous analysis to consider other factors such as income levels, gender, type of natural disaster, level of crime, and different types of violence and conflict. Furthermore, to better assess the impact or causal relationship between these variables, studies such as randomized controlled trials exploring the various effects over time would help to better evaluate the relationship among these variables.

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40. Regional business associations and networks can collectively contribute to efforts made by governments in preparing to address the effects of climate change, as well as the countries and regional chambers of commerce and federations (such as the Federation of Chambers and Industrial Associations of Central America or the Federation of Private Entities of Central America, Panama, and RD. Influential think tanks like FUSADES (El Salvador), CIEN (Guatemala), FUNADEH (Honduras), and INCAE at the regional level can also influence the political conversation. Regarding the U.S. private sector, attention should be paid to private-sector actors organized around Vice President Harris's Partnerships for Central America, which seeks to offer practical solutions to advance economic opportunity, address urgent climate, education, and health challenges, and promote long-term investment and workforce capacity building to support a vision of hope for Central America. For more information, visit https://www.centampartnership.org/.

ABOUT THE AUTHORS

BETILDE MUÑOZ-POGOSSIAN

Betilde Muñoz-Pogossian is director of the Department of Social Inclusion of the Secretariat for Access to Rights and Equity at the Organization of American States and is responsible for directing social inclusion and access to human rights with special consideration to populations in vulnerable situations. She has edited, published, and co-authored several articles and volumes on Latin American issues. Her contributions include the policy brief, "Creativity within the crisis: Legal options for Venezuelan migrants in Latin America," Migration Policy Institute (January 2019), and "Where are the Women? Why Expanding our Understanding of Venezuela's Humanitarian Crisis Matters," *Georgetown Journal of International Affairs* (May 2020). Betilde is also a founding member and coordinator of the Network of Latin American Female Political Scientists #NoSinMujeres," a project that seeks to promote, make visible, and empower the work of women dedicated to Latin American political science. She is a regular columnist for the Venezuelan daily *El Nacional* and the web portal "Caracas Chronicles" and a guest columnist in various regional media. Muñoz-Pogossian has a master's degree in international relations from the University of South Florida and a Ph.D. in political science from Florida International University.

DIEGO CHAVES-GONZÁLEZ

Diego Chaves-González is a migration expert at the World Bank Group and Senior Manager for the Latin American Initiative at the Migration Policy Institute. The United Nations previously placed him in the Border Management Office of the Presidency of the Republic of Colombia to support its efforts to register and regularize irregular Venezuelan migrants. He also coordinated the Displacement Tracking Matrix in Latin America to collect information on Venezuelan migration flows, assisted governments in adjusting their capacity to manage large-scale migration and comply with international standards, and implemented programs for Venezuelan migrants and host communities. Chaves-González holds a master's degree in economics and social development from Cardiff University, a master's degree in public policy from Tecnológico de Monterrey, and a bachelor's degree in political science and specialization in international relations from Pontificia Universidad Javeriana in Bogotá, Colombia.