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**Vulnerability to Climate Change: A Case Study of  
Environmental Migration in the Caribbean Islands**

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# **Vulnerability to Climate Change: A Case Study of the Caribbean Islands and Environmental Migration**

By Valeria Couttolenc González

## *Abstract*

Migration is not a recent phenomenon; however, the scale at which it is happening is unprecedented. Furthermore, the impacts of climate change have been diversifying as it has increased, so its effects on migration is a phenomenon that has started to be analyzed by different studies, finding links between migration trends and climate change. The Caribbean Islands, in their majority, have been directly affected by stronger natural disasters and the rise of sea levels, which threatens their coastlines as it is taken over by the ocean. Within this article, there are four countries that will be used as case studies: Haiti, Guyana, and Jamaica. Even with the implementation of adaptation, mitigation and resilience strategies by the national governments, international organizations and civil society, migration has continued to increase in the region. The objective of this investigation is to identify and compare migration trends that have surfaced in the region by analyzing statistics and data on previous and current trends. Plus, study how national governments have responded to environmental migration, and if they have. Furthermore, the conclusion of the article shows the possible scenarios in the region concerning the impacts of climate change and migration in the future.

*Keywords: climate change, environmental migration, rising sea levels, migration trends, Caribbean region*

## *1. Introduction*

While many have discussed what climate change is, its effects, and what it means for the future of the planet, there is still little research on its connection to migration. Furthermore, there is even less research on its influence on migration in the Caribbean region (Bishop & Payne, 2012) as the research is currently focusing on the Asian Pacific islands.

The objective of this investigation is to identify and compare migration trends that have surfaced in the region (Vilić, 2019) (Spencer & Urquhart, 2018) and how these have been affected by the national strategies of mitigation, adaptation, and resilience (Scobie, 2017) in the past 15

years. In other words, this research wants to shed light on the adverse effects of climate change in the Caribbean region, plus establishing a connection between those and migration trends (Baez, Caruso, Mueller & Niu, 2017).

This quantitative investigation offers a perspective, regarding the situation in the Caribbean so that a more global point of view can be analyzed further on. Numbers and figures will be used to analyze migration trends in the region as well as natural disasters, within an onset hazard so that a link with current and future consequences of climate change can be established. Furthermore, the article attempts to build on the topic of climate migrants as their hopes and situation gains more relevance on the international agenda.

Most of the countries in the Caribbean region are part of the Small Islands Developing States (SIDs), a group that has worked in the most recent years on calling attention to the adverse effects of climate change and championing initiatives to fight against it. There are 16 Caribbean members in the SIDs and the three that will be analyzed below are an active part of it.

The main issue that arose during the creation of this article is concerning the information mentioned above. It was problematic in three different ways: the first was the lack of data specifically on climate migrants per country, as migration numbers and statistics did not tend to discuss the types of migrants that left the country. There is also no specifics on what pushes people to migrate aside from the analysis on overall migration trends. The second one was concerning internal displacement, as the Internal Displacement Monitoring Centre (IDMC) did not have data on Guyana aside from 2017-2018, so it is hard to know the exact numbers of internally displaced people within that country. The third was that there is not enough information on the public policies and measures taken by local governments to deal with environmental migration. To solve this situation, connections had to be made, based on numbers and statistics of migrants as well as on a comparison of both past national climate plans and strategies to current ones, which are also sometimes hard to find. Finally, the quantity of literature on the topic of governmental measures (adaptation and Disaster Risk Management) within the region led to a selection of only the most relevant.

Furthermore, people are not migrating or being explicitly displaced only by climate change. They are migrating or becoming environmentally displaced persons (EDPs) due to the many consequences that climate change has on the region where they live. At the same time, their States do not have adequate responses to protect people's livelihoods. Thus, this lies the relevance of

writing this article now, as climate change worsens and governments are not doing enough worldwide, as migration rates rise and so do internally displaced persons.

## *2. Theoretical Framework*

The theoretical framework section of the article presents the definitions and concepts necessary to have a better comprehension of the analysis. It includes the concepts of migration, migratory flows and trends, specifically climate migrants and offers some insight into what the environmental migration means and what it might mean in the future. In addition, it offers definitions for the governmental measures and policies that will be analyzed in the case studies section. The objective of having this part of the article is to establish concepts and definitions, so that the reader can grasp the analysis being made.

### **2.1 Climate change, migration and IDPs: definitions**

Climate change is described by the United Nations Framework Convention on Climate Change (1992) as:

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (p. 7).

The effects and implications of climate change are the topics of many studies, but it would be hard to conclude the expanse of them as it is an ongoing phenomenon. It does not mean that there are not some apparent effects of it. One of its consequences is on the livelihoods of people in affected regions, which in turn leads to the beginning of a migration trend towards more environmentally stable areas.

As it occurs with global agenda topics, migration is a term with many definitions and is nowadays highly politicized. Thus, the definition here used is that of the International Organization for Migration (IOM) “the movement of persons away from their place of usual residence, either across an international border or within a State” (n.d.). While there are many types of migrants, the type analyzed in this article is climate or environmental migrants, with some mentions regarding economic migrants too. The definition of climate migrant is the following:

...persons or groups of persons who, predominantly for reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move within their country or abroad (IOM, 2011: 33 in IOM, 2014:13).

Climate migrants are also referred to as climate refugees, given that they are fleeing a situation that is out of their control. However, the term climate refugee is not part of international law and is not widely recognized in the field, as the 1951 Geneva Convention established the definition of a refugee did not foresee the current climate crisis. Nevertheless, it is important to note the recent ruling by the United Nations Human Rights Committee (UNHRC) which states that a country “may not deport individuals who face climate change-induced conditions that violate the right to life” (UNHRC, 2020). This will certainly affect the way that countries deal with climate migrants in the near future and can change any of the policies analyzed here.

For the academic purposes of the article, the term “climate migrant” will be used instead of that of “climate refugee”. Ionesco and the IOM (2019) make an emphasis on the main characteristic of current environmental migration being internal and not necessarily forced as it is sometimes a conscious decision.

The last concept regarding the mobility of people that must be comprehended before further analysis is that an “internally displaced person” (IDP), according to the IOM and the United Nations High Commissioner for Refugees (UNHCR), an IDP is

...someone who has been obliged to flee or leave their homes... to avoid the effects of armed conflict,... violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border (1998, p. 6).

In this case, an IDP can also be an Environmentally Displaced Person (EDP), only adding environmental reasons as the main cause of migration. Thus, the terms will be used interchangeably throughout the article.

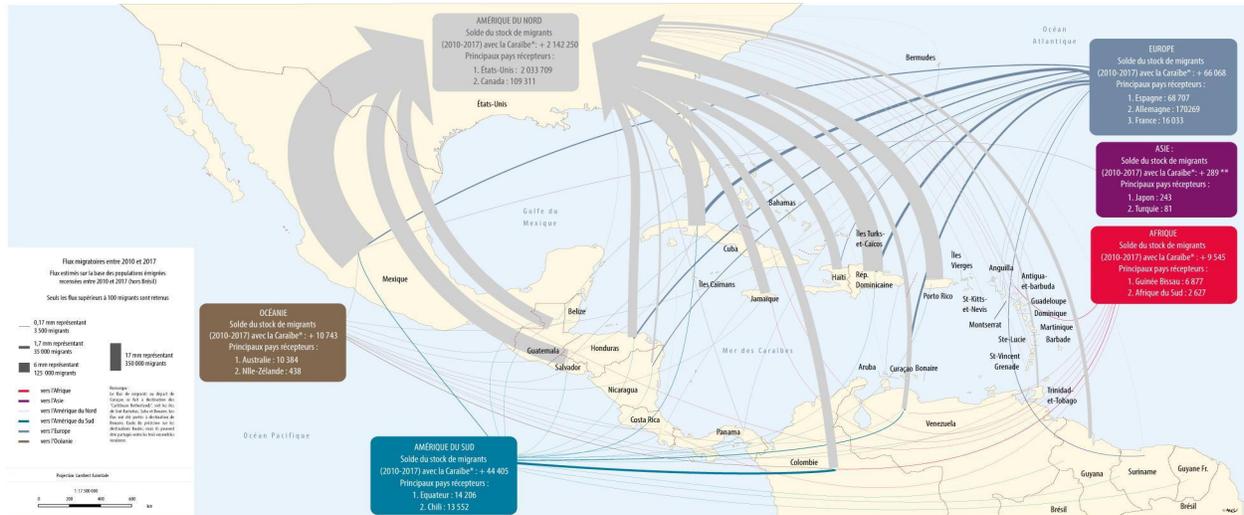
## *2.2 Migration trends in the Caribbean region*

To understand climate migration, one must look first at why people migrate. According to Bettini (2014) there is no one single reason why people migrate; it is usually a combination of factors that makes a person take this decision. Regarding migration in the Caribbean region, it is crucial to analyze migration trends in order to establish the causal connection to the environmental issues there.

Primarily, the region has been for several decades a sending and receiving region. For example, in 2017 at least 22% of the Caribbean population lived elsewhere (IMF, 2017). The receiving countries of Caribbean migration are also mostly located within Latin America, except

for the United States, the United Kingdom and Canada. The most popular receiving countries in the Caribbean region are the Bahamas, US and British Virgin Islands and Turks and Caicos. In addition, within Latin America, Mexico and Brazil are the top destinations. Most of this migration is economic and labor-oriented; however, it might also be caused by environmental factors. The following map (1) offers graphic insight into the migration flows mentioned within this paragraph:

**Map 1. Migration flows in the Caribbean from 2010-2017**



Source: Université de Caen, 2020.

The migratory flow in the region is not always interregional, as there is an important quantity of regional migrants. The Caribbean Community (CARICOM) established the freedom of movement concerning qualified skills and labor in the region with the treaty of Chaguaramas, so there is a relevant number of labor workers in the islands. As Audebert (2011) mentions, the trend in the region is geo-economic oriented as not all Caribbean economies are the same nor do they receive the same number of foreign investment and stimulus for growth. There is also political instability in countries such as Haiti, which cause the population to look for a place to live elsewhere.

Finally, the type of migration most studied in this article is “forced migration, which occurs when the person has no other option but to move (e.g. natural disasters). Therefore, it is unsurprising that a person from the SIDs will be three times more likely to be displaced or migrate due to a natural disaster than people living in other regions (Ginetti, 2015).

### *2.3 Governmental strategies and measures in the face of climate change*

Migration and climate change are the focus of many public policies by the governments, some effective and some not. These actions by the government mostly focus on three main aspects of climate policy: (1) adaptation (including adaptive capacity), (2) Disaster Risk Management (DRM), (3) mitigation and resilience. While not all measures will be discussed specifically, their existence will be mentioned, as it is an indicator of possible future action. However, the definitions will only be written for those that will be analyzed.

“Adaptation” includes the series of steps that the government takes to adjust to current and future climate change and its consequences (IPPC, 2014). While adaptive capacity looks at how governments, institutions and others are able to adjust and respond to the effects of climate change and the damage that it may bring (IPPC, 2012).

According to the IPCC (2012), DRM is the actions taken for “...designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk...” (p. 558). Lastly, “resilience” is the ability of socio-economic systems to withstand, respond, and manage the aftermath of hazards or natural disasters without sacrificing other government capacities.

### *2.4 The consequences of climate change and natural disasters in the Caribbean*

The effects of climate change in the Caribbean vary in their severity and frequency. They can also take different forms; some of the most notable include the rise of sea levels, floods, droughts, greater intensity of natural disasters, warming of the sea temperature, salinization of water resources, among others. The most relevant for this study are the rise of sea levels, the occurrence of natural disasters, floods, and droughts.

The rising of the sea level is one of the clearest consequences of global warming. As the ice caps melt in the ocean, the sea level rises, and islands and coastal areas are the first damaged. According to Douglas (2001) and Nicholls *et al.* (2002), this phenomenon represents both physical (threat to human settlements as well as territorial) and socioeconomic (directly affecting the countries' development) impacts. In the case of the Caribbean, the rise of sea levels can cause the recession and erosion of the coastline, flooding, and the salinization of freshwater resources. In

other words, while the sea level does not immediately threaten to disappear the island completely, it can and will reduce the size of the island and endanger the livelihoods of the people living near the coastline.

Natural disasters in the region have only gotten more intense by the years. The Caribbean Plate, the *El Niño* and *La Niña* phenomena, and the *Hurricane Belt*<sup>1</sup> are among the reasons for the vulnerability of the region. In numbers, taking into account both Latin America and the Caribbean, between 2000 and 2019 there have been 548 floods, 330 storms (with an average of 17 hurricanes per year), 75 earthquakes, 74 droughts, 66 landslides, 24 wildfires, 50 extreme temperatures and 38 volcanic events. Yet, it is floods that are the most prevalent in the LAC region, causing distraught to around 41 million people and costing close to 26 billion USD in damages.

### 3. Case studies

Three case studies will be presented concerning countries facing climate change effects in the Caribbean and the national actions that have been taken to protect them. The three countries analyzed will be Haiti, Guyana and Jamaica; islands within the Caribbean region who have experienced climate change effects and that will continue to be affected if effective policies are not supported.

The governmental measures that will be analyzed are (1) adaptation measures, yet it is also important to consider (2) the impact of mitigation and resilience measures to get a complete picture of all possible scenarios regarding climate change. Adaptation measures were chosen because the impact of their correct implementation after a disaster is a determining factor on whether people stay or leave their homes, becoming either EDPs or migrants.

#### 3.1 Haiti

Haiti is a country caught in between the Caribbean Sea and the Northern part of the Atlantic Ocean. It shares the island of Hispaniola with the Dominican Republic, but this case study will only focus on the Haitian side of the island. The lowest elevation point in Haiti is 0 meters concerning the

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<sup>1</sup> The Hurricane Belt involves the area that is hit by hurricanes in the Atlantic Ocean and the Caribbean Sea. El Niño is a climate phenomenon where water becomes unusually warm in the Pacific Ocean and causes floods and severe rainfalls in the Caribbean. And La Niña is the contrary phenomenon as water gets cooler and affects the Caribbean in a similar fashion.

Caribbean Sea, which means that any elevation of the sea level can negatively affect it and cause a recession of the shoreline.

The current coastline is 1,771 kilometers in length. A significant number of Haiti's population<sup>2</sup> lives in high-density coastal zones that are 1 meter above the sea or lower so that any rise of the sea threatens their livelihood. The World Bank estimates that:

More than 96% of the population is exposed to these natural hazards. Recovery efforts continue more than two years after Hurricane Matthew hit the country in 2016, which caused losses and damages estimated at 32% of 2015 GDP (2020).

The economic activities of the country revolve mainly around agriculture<sup>3</sup>, industrial and service sectors. However, Haiti is still dependent on foreign aid to grow those sectors and specially to increase tourism in the country. There is also a significant lack of funding in the Ministry of Environment and little or no education on climate change in rural areas (Singh and Cohen, 2014).

Some of Haiti's most populated cities such as Port-au-Prince, Carrefour, Gonaïves, Port-de-Paix, and Cap-Haïtien are located in the coastline of the country. This will become important when sea levels continue to rise, and flooding occurs, as that is the leading disaster affecting the country. Therefore, it should not be surprising that Haiti is such a vulnerable nation in the face of climate change.

### *3. 1.1 Adaptation measures*

The Haitian government has created several frameworks for adaptation measures since 2005.<sup>4</sup> Regarding risk management, the Haitian government published the Action Plan for National Recovery and Development (2010). The most important part of its DRM plan within it was the recognition of the link between human mobility and forced displacements in evacuations because of natural disasters (Government of Haiti, 2001: 29) as well as a focus on people's vulnerability to natural disasters and the need for a strong governmental response.

After the 2010 earthquake, there have been several critiques concerning the government's response in its aftermath, which explain the need for the creation of the Action Plan for National

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<sup>2</sup> Around 170,000 Haitians

<sup>3</sup> 66% of the workforce and contributes 27% of the GDP (World Bank, n.d.)

<sup>4</sup> National Adaptation Plan for Action (2006), the Strategic Program for Climate Resilience for Haiti (2013), the post-disaster needs assessment (PDNA) launched in 2017 and the Action Plan for the National Recovery and Development of Haiti.

Recovery and Development as a public policy response. It is important to recall that Haiti is especially susceptible to hurricanes, floods, and other types of natural disasters; thus, a good public policy to deal with the aftermath is essential for the development of the country. Currently, those regions, most at risk, are located in the southern part of the country, except for Artibonite. These departments are vulnerable to flooding due to their narrow coastal zones and low elevation territories. Singh and Cohen (2014, p. 10) report the following:

Heavily populated coastal towns, such as Jacmel, Les Cayes, and Gonaïves, lie in the direct path of the storms. The coastal plains contain important aquifers that are increasingly subject to the influx of saltwater, and as the soils become saltier as a result of ocean surges, farmers can no longer cultivate them.

One of the latest reported status of Haiti concerning adaptive strategies is their attempt to create an adaptive strategy for agriculture as well as diversification of its citizens' livelihoods, so that not all of them are impacted directly when a disaster strikes. As said above, the current migration trend in Haiti is rural to urban, so one can infer that Haitians will continue with this migration trend until there is an adequate alternative livelihood or a practical plan for adapting to climate change in their current reality. In the international agenda, Haiti has been a signatory of the UNFCCC since 1996.<sup>5</sup>

Furthermore, on adaptation, reforestation has been the principal measure taken by Haiti. Deforestation in Haiti is severe: according to the World Bank (n.d.), 98% of the Haitian forests have been cleared for fuel, which in turn has led to a speed-up of the degradation, erosion, desertification, flooding of the environment and a scarcity of water. Therefore, reforestation actions are vital for mitigation as deforestation can lead to flooding in the upper regions. Furthermore, droughts can cause food insecurity, so people might be forced to migrate. It is of the utmost importance that reforestation projects taken up by the Haitian government are successful, as many have failed before.

The World Risk Index (WRI) for 2019 places Haiti in the 16th place, with a very high-risk denomination in every single one of its categories concerning exposure, vulnerability, susceptibility, and lack of both adaptive and coping capacities. This offers a dark outlook for the government and the people that are meant to benefit from these policies and capacities. One can also infer that due to these, migration will only increase given the lack of current policies, the

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<sup>5</sup> National Communication (2002 and 2013) and Intended Nationally Determined Contributions (2015 and 2020).

mismanaged implementation of past ones, and the difficulty of reconstructing the nation while also dealing with the side effects of climate change.

However, not all is bad. According to Melde (2015) and the Environmental Migration Portal (n.d.), migration is now being considered as an adaptation strategy. The IOM (2015) explains it the best:

When people decide or are forced to move due to environmental and climatic changes –whether sudden or slow– their mobility is an adaptation strategy that allows them to minimize harm for themselves and/or improve their overall lives.

Such an adaptation strategy would then work around circular and seasonal mobility within the island. The main reason for the Haitian government to adopt this strategy lies within the findings of the Migration, Environment and Climate Change: Evidence for Policy (MECLEP) Project in Haiti. They found that natural disaster displaced persons in the island tended to live for a while without access to essential services, while those that used seasonal mobility and only migrated temporarily were less affected. Thus, circular mobility would have those seasonal mobility persons moving in a circle and diversifying their livelihoods, which is a plausible adaptation strategy for Haiti.

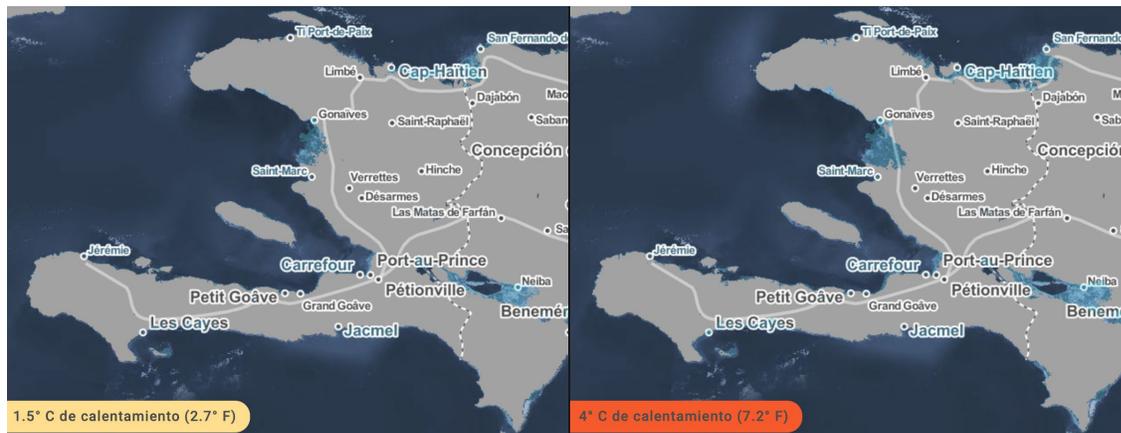
### *3.1.2 Rise of sea levels and natural disasters*

Sea-level rise (SLR from here on) is a phenomenon that is affecting all coastal areas. The IPCC has predicted that SLR will be 1.8 millimeters per year, and the main problem for Haiti would be coastal flooding and erosion. However, that is not the most concerning scenario for Haiti currently. The climate in the country has changed substantially during the last years, especially the rainy season that now begins three months later (Cohen & Singh, 2014). The importance of the delayed rain season is that no rain causes droughts, and if the rain season is more severe, there will be a higher risk of harder storm surges which, combined with SLR, might be devastating. According to the World Bank and their Global Facility for Disaster Reduction and Recovery (GFDRR) (2020), the island is at a high risk of coastal flooding and river flooding too.

Nevertheless, assuming that climate change will represent an increase in global temperatures of 1.5° C, Map 2 & 3 is a prediction of how the coast of Haiti would look. On the other hand, and assuming the worst, Map 3 offers insight into what the coast would look like at 4°

C. It is important to recall that about 170,000 Haitians live in areas that are below 1 meter as compared to sea level.

**Map 2&3: Sea rise level scenario at 1.5°C and at 4°C**



Source: Climate Central, 2020.

While there is no specific timeline on when this would happen, there is no doubt about the consequences of global warming on the island. Cities such as Gonaïves and Cap-Haïtien would be close to becoming submerged. These are some of the cities with the highest population density of Haiti; thus, the image offers a dark future and a prediction of the climate migration that is to come. However, if the climate temperature is kept at 1.5° globally as agreed in the Paris Agreement, while still at risk and with parts of the city submerged, less land would be flooded, and fewer people would be forced to migrate.

On the topic of natural catastrophes, Haiti has been hit by several natural disasters over the past few years, including six hurricanes in the past three decades. Its position in the Hurricane Belt has undoubtedly been a cause why it is hit more often than other islands. However, the growing severity of natural disasters is alarming. During the last ten years, Haiti has been hit by earthquakes, hurricanes, floods, and droughts. The first major earthquake that will be analyzed here hit Haiti in 2010, and it was a 7.0 in the Richter scale. It killed close to 217,000 people and displaced over 1.5 million people (IDMC, 2020).

Regarding major hurricanes, in 2016, Hurricane Matthew hit the coast as a category four storm. It killed approximately 546 persons and displaced over 175,000 Haitians, and it affected

over two million people (World Bank, 2017). In 2017, Hurricane Maria, a category five storm, passed by the island and caused floods. During the same year, Hurricane Irma caused 13,000 IDPs and floods across the country. Thus, Haiti is still impacted by several hurricanes. Moreover, while a significant natural disaster has not hit Haiti in the past two years,<sup>6</sup> its location confirms that it will be hit in the future. The GFDRR puts them as medium risk for earthquakes, high risk for cyclones, medium for intense heat, and high for wildfires.

### *3.1.3 Migration and IDPs: Data and predictions*

The political and economic situation in Haiti is the leading cause for migration, yet, given Haiti's unique position in the Caribbean, the aftermath of natural disasters has also become an essential reason for the migration and displacement of people. While there is no specific data on the actual or past number of environmental migrants, there is data on migration after the 2010 earthquake, which will be used to predict migratory flows in future situations.

Migratory flows from Haiti are not the typical North-South; they also include South-South migration, with destination countries such as Brazil, Dominican Republic, Canada, the United States, Switzerland, France, Mexico, the Bahamas, Belgium, and the Netherlands, among others. 25% of those migratory movements stayed within Latin America, even if the leading destination continues to be the United States (Marcelino, 2013, p.5) (Schulz & Batalova, 2017). The current push factors regarding climate migration are the 2010 earthquake and the 2016 Hurricane Matthew. Excluding climate factors, economic factors continue to be the top push factors (Mayes, 2019).

On the topic of IDPs, the IDMC considers both conflict and violence as well as climate-related events from 2008 to 2019<sup>7</sup>. Haiti's total of IDPs and EDPs is 2,018,200 people. Given that conflict is currently the main reason behind displacement of people, the amount of EDPs is much lower, about 24,000 people in only the 2017-2019 period. If we add those displaced in 2010 to the EDPs from 2017-19, we have approximately 1.5 million EDPs. Haiti's population is estimated to be at 11 million in 2020, so EDPs would represent close to 14.4% of the population. This is the most significant percentage of EDPs out of all the case studies presented.

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<sup>6</sup> Except one earthquake (5.9 in the Richter scale) which only affected a small part of the country.

<sup>7</sup> Specifically the years of 2008, 2009, 2010 (Earthquake), 2012, 2014, 2016, 2017, 2018 and 2019.

Furthermore, concerning the risk of future internal displacement, the IDMC estimates a yearly increase of 50,647 persons due to natural disasters and onset hazards. Thus, by the end of 2020, there would be around 1.6 million EDPs, or 14.9% of the population. In other words, it would grow about .5% in just one year.

Overall, migration within the country consists of rural-urban flows. Most importantly, migration is recognized as an urgent issue regarding climate change in Haiti's NAPA (2006) and as a coping mechanism for those that are more vulnerable. Furthermore, the NAPA stated that the government planned to work on managing migration by diversifying livelihoods of migrants and planning sustainable organizations. However, as the government takes on reconstruction after each natural disaster, migration falls into the backbench, and migrants or IDPs can continue in that position for several years.

### *3.2 Guyana*

Guyana is a country located in South America. Its coasts (459 km in length) border both the Atlantic Ocean and the Caribbean Sea, and the lowest elevation in the country is of 0 meters above sea level. Thus, one can say that the coast in Guyana is low-lying and can be considered below sea. According to the Union of Concerned Scientists in the Climate Hot Map website (n.d.), around 80% of the Guyanese citizens live close to the shoreline and within the coastal region.

The livelihood of its citizens is also at risk, given that about 90% of the population depends on the coast for their economic activities, which include agriculture near the Essequibo and Courantyne rivers; mining, as extractive industries compose the largest percentage of the country's exports; and fishing. Recent discoveries of oil offshore will represent a new venue for petroleum production, but also a recession of the measures against climate change.

Even if Guyana's coasts are about 7% or less of its total territory, they are where most of the economic and political-administrative institutions are. The most populous cities, including Georgetown, New Amsterdam, Anna Regina, and Bartica, are all located on the shoreline. Moreover, there is also Linden, which is not directly on a coastal zone but is located next to a river. As such, all of these cities can be threatened by floods.

According to the Guyanese government (2015), the country is highly vulnerable to climate change, to name a couple of reasons: because of its socio-economic situation, lack of connectivity, low-lying coastal zones, energy insecurity, and a dependency on fossil fuels. The coasts are

especially vulnerable nowadays because of a lack of upkeep on sea defenses and the destruction of mangrove forests that served as a buffer.

### *3.2.1 Adaptation measures*

The biggest threats for the Guyanese are an increase in the shoreline recession and deforestation as well as droughts and water scarcity. As such, adaptation measures must focus on these events occurring and on being able to avoid the most robust consequences of climate change. Guyana is a signatory of the 1994 United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.<sup>8</sup> They are also an active member of the SIDs.

The Guyanese government has created the Office of Climate Change (OCC), a governmental institution dedicated to building resilience by implementing adaptation and mitigation measures. The OCC is also the body responsible for reporting the actions regarding climate adaptation to the UNFCCC. Currently, there are ten ongoing projects listed by the OCC.<sup>9</sup>

Alongside CARICOM and the Federal Ministry of Economic Cooperation and Development of Germany (BMZ), the Guyanese government is currently implementing the Caribbean Aqua-Terrestrial Solutions (CATS) Program. It consists of aiding rural communities and their economies to adapt to climate change, manage their natural resources found in the coast, and protect and conserve the biodiversity in that region (Velasco, 2014).

Georgetown, the capital, is very threatened by climate change. As such, the government has worked on maintaining the seawall for protection against the high tide. However, this maintenance has not been thorough, and the seawalls will offer no protection if the sea level rises above their height. Thus, another strategy must be considered for the most populated city, or its citizens might be forced to migrate due to floods.

The 2019 WRI places Guyana in the 5th place; it is the worst-rated country out of the three studied in this article; it is a high-risk country, with problems of exposure, vulnerability, lack of adaptation and coping capacities, and medium susceptibility. Therefore, the implementation of

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<sup>8</sup> National Communication (NC) (2002 and 2013) as well as their Intended Nationally Determined Contributions (2014) (2020).

<sup>9</sup> Climate Adaptation Program (CCAP), the Caribbean Online Risk and Adaptation Tool, the National Climate Change Policy and Strategic Plan 2020-2030, the Japan-Caribbean Climate Change Partnership Project (JCCCCP), etc.

effective measures is crucial to counteract the consequences of climate change and to manage and control disaster risk.

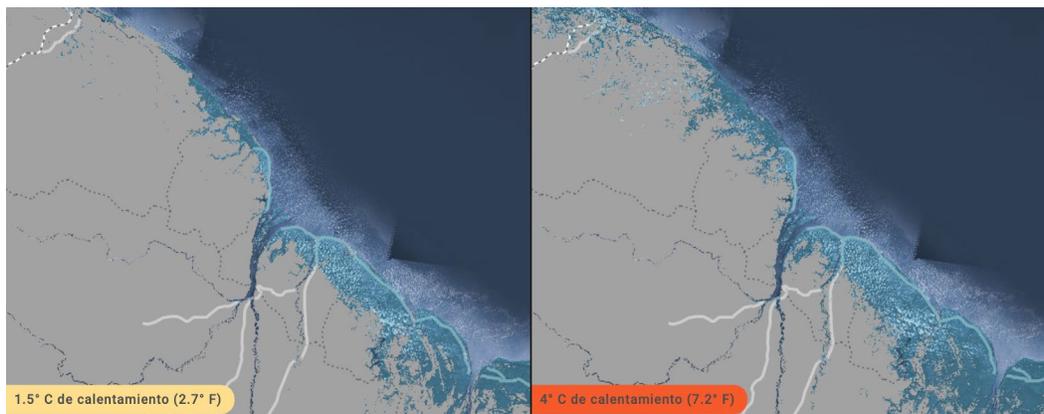
On the topic of DRM, Guyana has frameworks in normative character as well as in legislation. In their national budget, there is a specific section for DRM and mitigation of risks; also, there is a national DRM platform and Early Warning System for floods. The National Land Use Plan ensures that vulnerability in infrastructure and buildings is reduced. Furthermore, there are national, regional, and local plans for contingency preparedness and response.

### 3.2.2 Rise of sea levels and natural disasters

The SLR in Guyana represents a threat as the coastal zone is already below sea level and being affected by the mean high tide; any rise can flood certain parts of the coast. Mangrove habitats are threatened by the rise of sea levels, and further salinization of their habitat can have disastrous consequences as they offer a buffer against coastal flooding.

The GFDRR (2020) states that Guyana is at high risk for floods (urban, river, and coastal) as well as for wildfires; at medium risk for tsunamis and extreme heat; and low to very low risk concerning cyclones and earthquakes. The cities with higher risk are the coastal zones; however, the regions next to Suriname and Georgetown are at high risk too.

#### **Map 4 & 5: Sea rise level scenario at 1.5°C and at 4°C**



Source: Climate Central, 2020.

Moreover, by looking at the predicted scenario of a 2° C increase in global warming, in an undefined period, this is how the coastline of Guyana would recede due to global warming. Climate change has drastically affected Guyana already, especially because of global warming and the changes in weather trends. As such, it is no surprise that as stated by the Guyanese government in

their Second National Communication, "temperatures can increase by up to 4°C and weather patterns will become more extreme" (2013, p. 19). Therefore, the Guyanese undoubtedly consider the scenario shown above as a future reality. If the floods happen as predicted, they would destroy cities and coastal infrastructure, and endanger freshwater resources by salinizing them.

Guyana is not as prone to natural disasters as others are in these lists; however, it is still affected by natural disasters and hazards. Heavy rainfalls affect the nation terribly because it causes floods. Its most recent and disastrous flood occurred between 2005 and 2006, and such heavy rainfall was unprecedented as the rain season usually falls between the early summer months and not during December-February. These floods killed 34 Guyanese, affected around 275,000 people and cost close to 59% of their GDP at the time (UNDP, 2009).

### *3.2.3 Migration and IDPs: Data and Predictions*

An economic push factor characterizes migration in Guyana. According to the Caribbean Migration Consultation (CMC), "more than 55% of its citizens reside abroad" (n.d.). Their economic migrants are skilled workers and often send remittances, making Guyana one of the top remittance receivers in the region. The destination countries of Guyanese migrants include the US, Canada, the United Kingdom, Venezuela, and Suriname, among others. Other push factors include labor, tourism, education, and family reunification (Gahunde, 2012). So migratory flows are both North-South and South-South, plus regional concerning the freedom of movement within CARICOM countries for labor migrants.

Environmental migration appears to not represent a significant push factor for Guyanese migrants yet. Currently, environmental migrants flee because of floods and sometimes do not even recognize themselves as such types of migrants as they do not know what climate change is. In the future, this category will undoubtedly grow as coastal cities face shoreline recessions, and floods get worse due to climate change.

There is no information on the quantity of internally displaced people in the IDMC, except for 170 people that were displaced in between 2017-2018. However, there is no previous or later information and the country does not have a profile, so there are also no predictions to be made by

them. Guyana is also not a signatory of the 1951 Geneva Convention, and thus, it is harder to find information on refugees and IDPs from the country.<sup>10</sup>

However, the United Nations Office for the Coordination of Humanitarian Affairs through their Humanitarian Data Exchange offers the following number of EDPs due to floods and storms: between 2017 and 2018, there were 363 EDPs. There was another flooding event in 2008, but there is no information on the EDPs that originated from it. Considering that the population of Guyana is of approximately 778,085 people (CMC, n.d.), then the counted EDPs would be 0.04%. This percentage would be the smallest out of all the case studies; nevertheless, there is a possibility that the number is more prominent than what is reported.

### *3.3 Jamaica*

Jamaica is the third biggest island in the Caribbean region, located to the west of Haiti. Its coastline is 1022 km in length, and its shores have an elevation of 0 m to the sea level; as such, they are considered to be below sea level. Its position within this region makes it especially vulnerable to natural disasters and meteorological phenomena such as hurricanes and severe storms.

Currently, there is a significant economic dependency on the coast, as the economic activities there make up close to 90% of the country's GDP. The main activities are tourism, agriculture,<sup>11</sup> fishing, and industries. Unfortunately, the sectors that would be the most hit by the side effects of SLR would be fishing, because of changes in the sea temperature, as well as agriculture and tourism because of flooding (USAID, 2017). The services sector employs at least 65% of the working population in Jamaica (Central Intelligence Agency, 2020) so any adverse effects of climate change on the coastline would mean a hard hit to Jamaica's economy.

Jamaicans living on the shoreline amount to more than 50% of the total population, so SLR could also put them at risk and cause migratory movements if flooding is imminent. According to the Climate Risk Profile of Jamaica created by USAID (2017), "beaches have experienced accelerated erosion in recent decades and are projected to disappear within the next five to ten years due to shoreline erosion and retreat" (p. 3). These are some of the threats posed by climate change; however, there are still other impacts like a decrease in the freshwater supply if it is

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<sup>10</sup> There is also the question of displaced persons from Venezuela to Guyana, but these will not be considered in this article given that they are not EDPs.

<sup>11</sup> 17% of Jamaica's working population (USAID, 2017)

salinized, freshwater scarcity, food security, damages to infrastructure alongside the shoreline and coral reefs, among others.

The most populated cities in Jamaica are Kingston, New Kingston, Spanish Town, Portmore, and Montego Bay. Coincidentally, all but Spanish Town are located on the coastline, so they are threatened by climate change and the livelihoods of the people living there are also threatened. Thus, there is a great need for adaptation measures to avoid a massive exodus of people from the coastline and the losses of livelihoods that would affect the island and its citizens economically.

### *3.3.1 Adaptation measures*

There are several, some multi-sectoral, adaptation measures taken on by the Jamaican government. The first to be discussed are community-based adaptation projects. These projects concern the shoreline and the agricultural sector precisely. They offer Jamaicans the possibility to further their adaptation to climate change by direct actions, especially on their livelihoods, water and resources management, and maintaining their lands in a state where they are not as affected.

There is an Evacuation Plan already set out for the city of Portmore, one of the most populous cities and one of the lowest in elevation. An evacuation, if it were to occur, would force the citizens to migrate, and it might leave internally displaced persons. To avoid this, the plan outlines all actions necessary before and after the disaster occurs and mentions providing shelters and welfare assistance to those affected. To conclude, there is the will to adapt this plan to other low-lying places when the time comes.

Recent events such as hurricanes, droughts, and increasingly intense rainfall have severely affected Jamaica economically. Due to this, the government created the National Climate Change Policy Framework (2015) (USAID, 2017), also with the purpose of meeting the 2030 Sustainable Development Goals outlined in their Vision 2030 Jamaica (2009). Nonetheless, the latter does not mention migration or displacement in the report. Similar to Guyana, Jamaica has a ministry that focuses on climate change as well as three other agencies.<sup>12</sup> The National Climate Change Policy Framework stands out among the other case studies because aside from recognizing migration, it looks at it from a human security point of view. It states the following:

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<sup>12</sup> Climate Change Division, a Climate Change Advisory Committee, and a Climate Change Focal Point Network

Climate change poses a significant risk to human security in multiple ways. The negative impacts on livelihoods that may result from the impacts of climate change can lead to changes in migration patterns and a rise in both internal and external migration. These changes may give rise to tension and conflict within communities, changes in cultural practices, and a strain on the institutions that exist to manage the settlement and integration of migrants (Ministry of Water, Land, Environment and Climate Change, 2015, p.17).

The recognition of this climate change-migration nexus is quite significant. It can help manage the exodus of people by providing adaptation measures so that Jamaicans are not forced to migrate and lose their livelihoods. It also can present an opportunity for the Jamaican government to present and control migration by transforming it into an adaptation strategy. Concerning international treaties, Jamaica has been part of the UNFCCC since 1995, of the Kyoto Protocol since 1999, and the Paris Agreement since 2017. As part of them, they have submitted all the documents required concerning their actions against climate change.<sup>13</sup>

The 2019 WRI places Jamaica in the 30th place. It still has a very high risk on the overall index. On the specific categories, it ranks very high for exposure, and medium in vulnerability, lack of adapting, coping capacities, and susceptibility. Jamaica, in this sense, is an interesting case study as it is still considered a very high-risk country; however, in most of the categories of the index, it is medium risk. Nevertheless, the risk is still prevalent, and actions must be taken to reduce it.

On DRM, Jamaica has taken diverse approaches,<sup>14</sup> both nationally and with international support. One outlined in their Third National Communication is implementing Disaster Risk Management in the fishing industry. In a similar vein, the government has created, alongside the European Union and the World Bank, the Guidelines for Coastal Protection and Beach Restoration (2017) and the National Strategy for Resettlement (not implemented yet) for when natural.

Regarding resettlement, the Jamaica Social Investment Fund has created the Resettlement Policy Framework for the Rural Economic Development Initiative (REDI II). It is essential to have resettlement options for a country that has such a high risk of natural disasters and hazards plus a population that might not be able to afford the complete resettlement if their livelihood is lost.

### *3.3.2 Rise of sea levels and natural disasters*

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<sup>13</sup> Three National Communications (2000, 2011 and 2019), two Intended Nationally Determined Contributions (2015, 2020) and a Biannual Update Report in 2016.

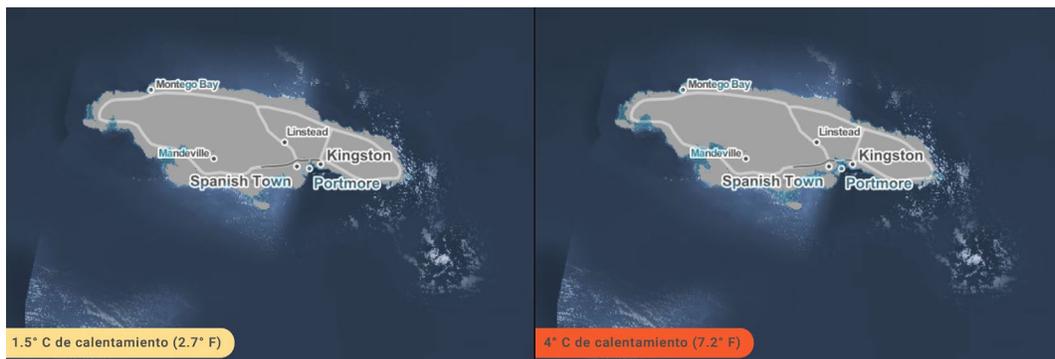
<sup>14</sup> Draft Comprehensive Disaster Risk Management Policy, Disaster Risk Finance Initiative (DRFI), Climate Change Adaptation and Disaster Risk Reduction Project (2011-2013).

SLR is one of the biggest threats to Jamaica. One of the factors that has not been mentioned but is vital are the natural protections that habitats such as mangroves and coral reefs can offer the mainland. Nevertheless, these needed areas have been removed due to the industrialization and current use of the Jamaican coastline, which in turn has increased the vulnerability of both the island to natural disasters and of the marine wildlife plus its ecosystem (Ministry of Water, Land, Environment and Climate Change, 2015).

Climate has already changed on the island. Rainfall patterns have changed (especially with more severe rains), the number of droughts has increased, the shoreline has begun to become eroded, and there has been an increase in natural disasters hitting the area. All of these have cost Jamaica economically already, increasing the need for adequate measures to mitigate and adapt to climate change in order to not further risk the livelihoods of people, the territory of the island, and its economic growth as it is a developing country.

According to the World Bank and their Global Facility for Disaster Reduction and Recovery (2020), the island is at high risk for floods (river, urban and coastal), landslides, cyclones, and wildfires. It is also at medium risk for earthquakes and extreme heat, and at low risk for tsunamis and water scarcity. The parishes where the most populous cities are (Saint Catherine, Saint Andrew, Kingston) have a high or medium risk of coastal flooding. Nevertheless, assuming that climate change will represent an increase in global temperatures of 2° C, these maps (6 & 7) are a prediction of how the coast of Jamaica could look in an undefined period:

**Map 6 & 7: Sea rise level scenario at 1.5°C and at 4°C**



Source: Climate Central, 2020.

While there is no specific timeline on when this would happen, there is no doubt about the consequences of global warming on the island. Portmore will ultimately become flooded, as well as Port Royal, the Norman Manley International Airport in Kingston, and the Sangster

International Airport in Montego Bay. In that vein, Kingston, Montego Bay, and New Kingston would also be deeply affected, as their current coastline would flood. Furthermore, other parts of the island, such as Old Harbour Bay, Lionel Town, Black River, Rocky Point, and the parishes of Hanover and Westmoreland would become partially or wholly submerged.

Other effects of SLR for Jamaica include the possibilities of warmer water surface temperature, coral bleaching, toxic algae blooms that could endanger their exports of shellfish, a decline in fish stock that might cause fishers out of their lines of work, beach erosion and sedimentation. All of this would be endangering the livelihoods of the coastal biodiversity and posing risks to tourism, fishing, and livelihoods of those that work on the coast (CARIBSAVE, 2012).

Natural disasters in Jamaica are usually floods (coastal, river, and urban), droughts, hurricanes, and tropical storms. The most recent (past 15 years) and severe hurricanes include Dennis, Emily, and Wilma (2005), Dean (2007), Sandy (2012), and tropical storms Gustav in 2008, Nicole in 2008 and 2010, plus Matthew in 2016. Specifically, in the aftermath of Wilma and Dean (plus Ivan in 2004), the shoreline receded up to 5 meters at Long Bay (Simonelli, 2018). While most of those listed caused floods and heavy rainfall, the harsher consequences came in economic and human terms. For example, Hurricane Sandy caused agricultural losses valued at 11 million USD (USAID, 2017). The human terms came in displacement, either for a short, long or medium term of people, as it will be discussed below. Shelters are opened across the nation and the number of people/households that arrive there is documented by the Planning of Jamaica in the Assessment of the Socio-Economic and Environmental Impact of Tropical Storm/Hurricane/Natural Disaster on Jamaica.

### *3.3.3 Migration and IDPs: Data and predictions*

According to the IOM (2018), outward migration from Jamaica to the UK, the US, and Canada has been a trend for years. However, recent migration trends include a decline in the number of permanent migrants, with a focus on short-term labor migration. There is also an increase in rural-urban migration, as 7.2% more of Jamaicans moved to urban areas (IOM, 2018). Furthermore, the Jamaican diaspora in the countries mentioned above can facilitate migration.

Fortunately, Jamaica's territory indicates that not all would be forced to leave the country, as they could resettle in points of higher elevation (Simonelli, 2018). Nevertheless, this would only

work if adaptation strategies function correctly, and if the diversification mentioned before makes the population less economically dependent on coastal activities.

The IDMC lists four disasters in the past fifteen years (2008, 2012, 2016, and 2017). The sum of internally displaced people due to them, plus seven people from 2018, is 7,036 persons. If we consider that Jamaica has an estimated population of 2,934,855, one can note that IDPs only represent approximately 0.24% of Jamaicans. These 7,036 persons have been internally displaced because of floods and heavy rainfalls, which thus would make them fit in the category for EDPs.

However, the IDMC predicts a likely increase in the number of EDPs, calculating an average risk of future displacement of 14,903 people per year due to the onset hazards, such as earthquakes, floods, and tsunamis, all of which are exacerbated by climate change. If this were to happen, that would mean that by 2019 there would be 21,939 EDPs, and by the end of 2020, there would be 36,842. If these predictions turned out to be correct and considering a population size similar to the last census from 2018, in 2020, 1.25% of Jamaicans would be internally displaced due to environmental reasons.

#### *4. Conclusion*

As has been exposed throughout this article, the topic of climate migrants is just beginning to enter the world's agenda and it will definitely be discussed for many years to come. Migration will most probably be internal migration, as was mentioned in the case of Jamaica, where people move towards regions with a higher elevation, so they are not threatened by rising sea levels.

Furthermore, while the future is always hard to predict, there are predictions about where the world will stand in the future concerning climate change. There are three main issues that SIDs will face: different forms of climate change; lack of effective adaptation, mitigation and resilience measures; and no infrastructure or funds to make the former measures effective. Finally, it is important to note that these issues can represent a cause of environmental migration and solving them could halt the flows up to a lesser level; as well as to consider that for the moment, climate migrants are not only migrating because of climate, it is usually accompanying an economic or political push factor.

Primarily, climate change does not take one single form here; the SIDs will not only be affected by rising sea levels. They will also be affected by the erosion of the coast and flooding, as well as by the effects of the change in temperature of the sea and what this does to the wildlife that they

depend on for survival, and last but not least, the threat of the salinization of their freshwater resources. Even if some of these factors would have happened without climate change, the acceleration that climate change has caused has made these problems more severe.

All climate migrants are losing their livelihoods and the safety net they have back home, yet those who are losing the most live in these small islands that could disappear. These islands are designated as SIDs simply because they are countries that are still developing economically. Some of them have an economy that is dependent on tourism, agriculture and fishing, so the threat of losing their livelihoods is quite concerning for their future. Climate change's consequences will not only be physical; they will also increase poverty and the wealth gap. The diversification of livelihoods of those dependent on the coast or natural resources is crucial.

There is a need for implementation of effective public policies in the region on both adaptation and mitigation so that the adaptive capacity and resilience of the nations is not endangered. While the scenarios presented above might take some time to occur, the SIDs are the most vulnerable if nothing is done about climate change at a global level. For effective implementation, collective action is needed and so is financial support in the implementation of public policies.

To conclude, migration management is necessary in order to avoid a future crisis in the region. Migration as an adaptation strategy, as seen in Haiti, remains the best option for the region, especially given that it already has migration trends and flows because of economic reasons. Thus, the governments must look at ways to facilitate migration and implement it as an adaptation strategy to avoid a mass exodus in the future. As of now, neither of the countries in the case studies is completely ready to face the looming threat of climate change and the migration that will come with it. Moreover, it is crucial to begin keeping score of those migrating for environmental reasons, as the numbers will begin to rise once that the planet gets warmer.

One final note: as this article was written during the COVID-19 pandemic, it is important to consider the effects that it will have on the topic of the article. The environmental consequences of the global quarantine and lockdown due to the pandemic have already been noticed as pollution levels have decreased worldwide. There is also the argument that while major economic problems may arise, it has been beneficial to the fight against climate change. Nevertheless, for countries that are already being hit by other diseases, such as the cholera outbreak in Haiti, the pandemic could have disastrous consequences, because of high levels of deaths. The SIDs will have an increased vulnerability, and mass migration, both internal and external, might occur once it is

possible to travel. The future that the world will head into after this might be uncertain, however, climate change is happening and those countries that are gaining power due to the shifts in the world order must act with it in mind. International cooperation will be needed and intergovernmental organizations must be ready to step up in the aftermath to deal with the uncertain future that the world is facing.

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