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Building Back Better: Disaster Risk Reduction Within the Haiti Reconstruction Effort

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Introduction: Tragedy Upon Tragedy

On January 12, 2010, a magnitude 7.0 earthquake struck the country of Haiti 10 miles from its capital city, Port-au-Prince, killing an estimated 230,000 people, injuring 300,000, and displacing another 1.5 million.[1] Nearly 105,000 homes were completely leveled, 208,000 severely damaged, along with another 1,300 schools and 50 hospitals. Haiti's national government faced the deaths of countless officials and the collapse of the Presidential Palace, Parliament, courts, and administrative buildings.[2] According to the United States Agency for International Development (USAID), the earthquake led to infrastructure damages amounting to 120 percent of Haiti's gross domestic product in 2009.[3] But the 2010 earthquake was not the country's only run-in with disaster this decade. In 2004, and again in 2008, Haiti was ravaged by a number of tropical storms and hurricanes from which it was still recovering from when the earthquake struck.

The destruction of lives and property wrought upon Haiti by these series of hydro-meteorological disasters began Haiti towards systematically addressing its relationship to risk through the implementation of various Disaster Risk Reduction (DRR) measures. DRR is based on the notion that disasters are not solely the product of hazards, but a result of the intersection of human behavior and natural phenomena. Disasters can often be traced to a number of decisions made, or not made, by human communities in terms of where to live, how to build, and how to sustain themselves. Because our choices are a vital component in determining our degree of susceptibility to hazard, proponents of DRR believe that we can make decisions that minimize vulnerabilities and risks, or limit the negative impacts when disaster does occur. This paper will

[1] http://www.usaid.gov/ht/helphaiti.html.
[2] Haiti earthquake PDNA: assessment of damage, losses, general and sectoral needs (p. 5). (2010). Government of the Republic of Haiti. Retrieved from http://www.refondation.ht/resources/PDNA_Working_Document.pdf.
[3] Haiti: from rescue and relief to reconstruction (p. 1). (2001). United States Agency for International Development. Retrieved from http://www.usaid.gov/ht/docs/eqdocs/usg_factsheets/USG_relief_to_reconstruction.pdf.

outline how the Haitian government, local and international non-governmental organizations, major international aid agencies, and donors have sought to make Haitians less vulnerable and more resilient in the face of disaster. It will assess the DRR measures that were being implemented in Haiti following the tropical storms and hurricanes of 2004 and 2008; the role the earthquake has played in augmenting the risks facing Haiti; and the DRR objectives to be incorporated in the reconstruction and recovery process.

Haiti Under Water

Though the January 12 earthquake is perhaps the single most devastating disaster event the country has ever faced, Haiti has a much more extensive and equally tragic history dealing with the effects of hydrometeorological hazards. Located in the midst of Hurricane Alley, a stretch of warm water running from the western coast of Africa to the eastern shores of Central America, where hurricanes traditionally form, Haiti is menaced yearly by tropical storms and hurricanes between the months of May and November. In fact, Haiti has been declared one of the countries most vulnerable to climate change, with 20 major disasters in the twentieth century, four in the past decade alone, and 96% of the population facing 2 or more climate-related risks.[4] Worse yet, scientists have noted significant increases in the wind speeds and precipitation intensities of Atlantic hurricanes over the past three decades as a result of rising ocean temperatures, predicting more destructive storms in the future as climate change persists.[5] Though the 2010 earthquake is at the top of the list of disasters in terms of the number of people

[4] Haiti Earthquake PDNA, 2001, p. 25.
[5] Haiti: 'a gathering storm'--climate change and poverty (p. 17). (2009). Oxfam International. Retrieved from http://www.oxfam.org.uk/resources/policy/climate_change/downloads/oi_report_climate_change_haiti_gathering_storm_en_301109.pdf.

affected and the magnitude of economic loss, over the past thirty years, most of Haiti's suffering can be directly attributed to major storms and flooding.[6]

Top Ten Natural Disasters Reported (People Affected)

Disaster	Date	Affected
Earthquake*	2010	3,700,000
Storm	1994	1,587,000
Storm	1980	1,165,000
Drought	1992	1,000,000
Storm	1988	870,000
Storm	2004	315,594
Flood	2003	150,000
Storm	2008	125,050
Storm	2007	108,763
Drought	1980	103,000

Top Ten Natural Disasters Reported (People Killed)

Disaster	Date	Killed
Earthquake*	2010	222,570
Epidemic	2010	2,761
Storm	2004	2,754
Flood	2004	2,665
Storm	1994	1,122
Storm	2008	529
Storm	1980	220
Storm	1998	190
Storm	2007	90
Storm	2008	85

[6] Natural Disasters from 1980 -2010. In *Haiti Disaster Statistics*. Retrieved from Prevention Web http://www.preventionweb.net/english/countries/statistics/index.php?cid=74.

Top Ten Natural Disasters Reported (Economic Damages)

Disaster	Date	Cost (US$ x 1,000)
Earthquake*	2010	8,000,000
Storm	1980	400,000
Storm	1998	180,000
Storm	1988	91,286
Storm	2004	50,000
Storm	2005	50,000
Storm	1994	50,000
Flood	2002	1,000
Storm	2004	1,000
Storm	2005	500

Overview

No of events:	74
No of people killed:	233,919
Average killed per year:	7,546
No of people affected:	9,952,766
Average affected per year:	321,057
Economic Damage (US$ x 1,000):	8,823,906
Economic Damage per year (US$ x 1,000)	284,642

In 2004, and again in 2008, Haiti's vulnerability to tropical storms became dramatically exposed. From the 17th through the 18th of September 2004, the torrential rains of tropical storm Jeanne inundated 80% of Haiti's third largest city, Gonaïves,[7] causing the deaths of 2,326 people and the destruction of about 5,000 homes,[8] leaving nearly 170,000 people without food, water, or

[7] Heavy rains cause chaos in Western Haiti. (2004). Oxfam International. Retrieved from ReliefWeb http://www.reliefweb.int/rw/rwb.nsf/db900sid/JMAN-652HN9?OpenDocument&query=Haiti%20hurricane%20jeanne&cc=hti.
[8] Haiti's clean-up progresses in the Caribbean. (2005). US Agency for International Development. Retrieved from ReliefWeb http://reliefweb.int/node/165784.

electricity.[9] Before Haiti got a chance to adequately recover from Jeanne's destruction, four years later the country was again being wracked by tropical cyclones. On August 15, 2008, tropical storm Fay began what would become a spate of storms to pass over the country in the matter of a week or so. After Fay, Haiti successively suffered Hurricane Gustav on August 26, and hurricanes Hanna and Ike on September 3rd and 7th respectively. Again Gonaïves was left under water. Aerial assessments discovered inundation up to three meters high in some locations, nearly 20,000 homes flooded, and the north-south road that connected the city to other parts of the country entirely impassable, cutting the region off from outside aid for four days.[10] When the wind and rain of Hurricane Ike reached Haiti on September 7, access to the city of Gonaïves was still largely limited as a result of the floods caused by Hanna.[11]

First Steps Towards Addressing Risks

Despite the turbulence of 2008, many argued that the Haitian government and the international community's efforts following Hurricane Jeanne played a significant role in reducing the fatal impact of that year's storm season. In 2004, 5,000 people died out of 300,000 affected, while in 2008, less than 800 died out of a total of 865,000.[12] The Haitian government's attempts to improve the capacity of its disaster management institutions were strongly supported by the European Union, the United Nations Development Programme (UNDP), and the World

[9] Renois, C. (2004). Haiti confronts new disaster with more than 700 killed in floods. Agence France-Presse (AFP). Retrieved from ReliefWeb http://www.reliefweb.int/rw/rwb.nsf/db900sid/SZIE-652SDU?OpenDocument&query=Haiti%20hurricane%20jeanne&cc=hti.

[10] Flooding trends in Savane Jong, Gonaives/Haiti: Pre- and Post-Hurricanes Gustav, Hanna and Ike (as of 23 Sep 2008). (2008). CATHALAC, SERVIR, National Aeronautics and Space Administration, US Agency for International Development. Retrieved from ReliefWeb http://reliefweb.int/map/haiti/flooding-trends-savane-jong-gonaiveshaiti-pre-and-post-hurricanes-gustav-hanna-and-ike-23.

[11] Haiti: Hurricane Season 2008 Revised Emergency Appeal No. MDRHT005. (2008). International Federation of Red Cross and Red Crescent Societies. Retrieved from ReliefWeb http://reliefweb.int/node/281807.

[12] Disaster Risk Management in Haiti, Summary Note. (2010). Global Facility For Disaster Reduction and Recovery. Retrieved from http://gfdrr.org/ctrydrmnotes/Summary_Haiti.pdf.

Bank. In 2004, after Jeanne, the government of Haiti established disaster management as the purview of the Directorate of Civil Protection with the vision of expanding its role beyond disaster assistance to include extensive mitigation work.[13] The World Bank specifically launched a three-year US$12 million Emergency Recovery and Disaster Management Project known by its French acronym PUGRD. Its primary objectives were to strengthen the Directorate of Civil Protection (DCP), and to improve coordination within the newly created National Disaster Risk Management System (NDRMS), a network of departments, municipalities, and committees of local government officials and civil society representatives responsible for enhancing national and local capacity in risk assessment, risk reduction, and preparedness.[14] It also began developing the legal framework to establish DRR as a national priority.

Besides developing the institutional framework for disaster risk management, in 2005 the Haitian government undertook a number of initiatives to better understand the risks facing the country and to prepare the population to act when disaster was imminent. The government commissioned the development of a methodology for the design of local flood hazard maps, from which two pilot maps were produced with the intention of expanding the initiative throughout the entire country. It also sought to create a database of damages caused by disasters using the Disaster Inventory System (DESINVENTAR).

Perhaps where Haiti's NDRMS was most successful following the 2004 hurricane was in its disaster preparedness and response efforts. Two pilot flood early warning systems were established in Haiti in support of the design of a National Early Warning System. Radio programs and posters were utilized throughout the 2005 hurricane season as part of a campaign

[13] http://eird.org/country-profiles/profiles/index.php/Haiti#HFA_National_Focal_Point.
[14] Amin, S., & Goldstein, M. (Eds.). (2008). Data against natural disasters: establishing effective systems for relief, recovery, and reconstruction (pp. 102-103). The World Bank. Retrieved from Prevention Web http://www.preventionweb.net/files/7943_97808213745281.pdf.

to increase the population's awareness of the risks associated with storms and flooding. The DPC, with the support of the United Nations and the U.S. Army Southern Command (Southcom), developed a National Plan of Action for that year's hurricane season that included two simulation exercises and the training of disaster risk management committees in the development of their own contingency plans.[15] The NDRMS specifically prioritized the strengthening of local capacity for response, a measure to decentralize and make the system more effective where it was most needed. It put together a network of Disaster Risk Management committees in all 10 departments and over 110 of the country's 165 municipalities, involving nearly 4,000 people throughout the country. The establishment of effective warning protocols and awareness campaigns has improved evacuation and mobilization efforts, with the number of people evacuated rising from 6,000 in 2006, 33,000 in 2007, to 122,000 in 2008. This was clearly evidence of a more effective dissemination of early warning messages and public responsiveness.[16]

In 2006, the Haitian government specifically addressed the relationship between its vulnerability to natural hazards and environmental factors such as ecological degradation and climate change by declaring the National Adaptation Programme of Action (NAPA). In the decade 1990 to 2000, Haiti lost nearly 44 percent of its forest cover.[17] Deforestation along with increasingly more violent storms has led to the crumbling of hillsides into rivers and lakes, causing massive mudslides and flooding throughout the country. NAPA focused on developing a national policy of watershed management. This included the Geographical Information System (GIS) Project at the Ministry of Planning that mapped land use, erosion, and housing density

[15] HFA National Report 2005. (2005). United Nations International Strategy for Disaster Reduction. Retrieved from http://eird.org/wikien/images/%28Haiti%29_National_Initiatives_Implementation_HF_2005.pdf.
[16] Disaster risk management programs for priority countries (pp. 138-141). (2009). The World Bank. Retrieved from http://www.gfdrr.org/docs/6thCG_DRM_Programs_for_Priority_Countries.pdf.
[17] Haiti—A Gathering Storm, 2009, p. 18.

throughout the country, the National Policy for Disaster Preparedness established by the Ministry of Interior, and the Coastal Zone Management Program administered by the Ministry of Environment. The objective of these initiatives was to address the various climate-related hazards that plagued Haiti, such as flash flooding, intense rainfall, and tropical storms.[18] The Haitian government's *Growth and Poverty Reduction Strategy Paper* published in 2007 went further by identifying disaster risk reduction as an important component of its development strategy.[19] The strategy called for efforts to address the causes of disaster rather than narrowly focusing on the management of disasters, identifying poverty as a key element in vulnerability to disaster, and thus poverty reduction as an important component in reducing risk. It placed decentralization of development and risk management at the forefront of reducing the prevalence of disaster throughout the country.

Gonaïves, particularly affected by Jeanne in 2004, received much of the international aid community's attention. USAID, whose funds were used in a number of projects around the city, was significant in improving capacity for disaster risk management at the local level. In 2005, CARE, one of the major humanitarian organizations receiving USAID funds in Haiti, assisted in the establishment of 16 disaster committees, and the development of a basic watershed information system to work in conjunction with the committees so as to strengthen their early warning capacities. Much work was done in the area of cleaning the municipal drainage system and repairing major breaches of the La Quinte River that led to significant flooding throughout Gonaïves in 2004.[20]

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[18] Plan d'action national d'adaptation (PANA). (2006). Republique D'Haiti, Ministére de L'Envioronnement. Retrieved from http://www.adaptationlearning.net/haiti-napa.
[19] Growth and poverty reduction strategy paper, 2008 – 2010 (p. 62). (2007). Republic of Haiti. Retrieved from http://siteresources.worldbank.org/INTHAITIINFRENCH/Resources/HaitiDSNCRPEnglish.pdf.
[20] Tropical storm recovery program: tropical storm Jeanne September 17-18, 2004. (2005). USAID. Retrieved from http://pdf.usaid.gov/pdf_docs/PDACF334.pdf.

When water engulfed the city once more in 2008, the international aid community increased its level of activity to reduce the amount of flooding in Gonaïves and to make the residents of the city more resilient. Cooperative Housing Foundation (CHF) International has built three major canals and 15,530 linear meters of drainage canals with USAID funds in Gonaïves.[21] Work was also focused on unclogging and connecting canals and drains throughout the city. Major emphasis was placed on dredging, enlarging, and reinforcing the riverbanks of the La Quinte River, which contributed to 60 percent of the flooding in 2004. The International Organization for Migration (IOM) built or rehabilitated 26 schools throughout the city, either relocating them to higher ground away from areas of significant flooding or adding additional floors so that they could also serve as hurricane shelters.[22] Besides IOM, USAID and Save the Children worked with children, parents, and teachers in 20 schools around Gonaïves to increase best practices in disaster preparedness, mitigation, and management. This involved forming school emergency response groups that developed and implemented disaster preparedness plans and conducted hazard and vulnerability assessments for their schools. USAID also collaborated with civil protection officials in the Artibonite Department, the department in which Gonaïves is situated, to implement the *Programme d'Urgence et de Gestion de Risques et Désastres* (PURGD), which focused on developing and updating local risk maps, conducting disaster drills, and supporting local and national government officials in risk mitigation projects.[23] It was this concerted effort that ensured that the level of death and destruction that occurred in 2004 would not again be witnessed throughout the region.

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[21] Working to protect their city—hurricane protection success in Gonaïves, Haiti. (2010). CHF International. Retrieved from http://chfinternational.org/node/34549.

[22] Charles, J. (2010). In Haiti flood zone, there's worry amid the work. The Miami Herald. Retrieved from http://www.miamiherald.com/2010/06/15/1680753/in-a-flood-zone-theres-worry-amid.html.

[23] Latin America and the Caribbean—disaster risk reduction fact sheet #1, fiscal year 2010. (2010). USAID. Retrieved from http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/prep_mit/mods/program_updates/lac_drr_fs01_09-30-2010.pdf.

DRR Hampered by Reality of Political Fragmentation

Some have argued that while Haiti had taken some positive steps forward in dealing with its disaster risks, the country's history of chronic political upheaval left its institutions far too weak to sustain any long-term initiatives. This has been particularly true in the case of disaster risk reduction. The tremendous destruction wrought upon Haiti in 2004 during hurricane Jeanne occurred only months after the elected president, Jean-Bertrand Aristide, was driven out of power by an armed insurgency, plunging the country in civil war. So in 2004 Haiti was dealing with significant political dislocation and the stalling of its newfound democratic tradition when it was faced with natural disaster. Many of the administrations that came to power simply did not have the time necessary to develop, coordinate, monitor, and evaluate DRR policy. This required a level of stability not evident in Haiti, perhaps ever. Political strife often left the government of Haiti in a position where it could only react to disasters when they occurred rather than be able to address the root causes of disaster in a comprehensive manner.[24]

The period following Hurricane Jeanne in 2004 had not been the first time that the government of Haiti, with the assistance of the international community, had established plans and policies to address Haiti's vulnerabilities to natural disaster. In 1999 it declared the National Environment Action Plan (NEAP) with the support of the Canadian International Development Agency (CIDA), USAID, the World Bank, and UNDP. This plan included the sustainable management of environmentally protected areas and watersheds. A year later, the country's National Risk and Disaster Plan was established to address the causes of risk, to reduce the impact of disasters, and to strengthen response capacities. Four years after this plan was

[24] Disaster risk management programs for priority countries (p. 136). (2009). The World Bank. Retrieved from http://www.gfdrr.org/docs/6thCG_DRM_Programs_for_Priority_Countries.pdf.

established, hurricane Jeanne devastated large segments of the country, highlighting the lack of progress on a number of these stated objectives.[25]

The DPC was characterized as rather weak prior to the 2004 disaster, evident from its inability to effectively coordinate the massive international relief effort that emerged. Disaster coordination was predominately done by the international aid community, leaving Haitian government institutions mostly marginalized.[26] It has been argued that excessive centralization of decision-making within the national government prevented the DPC from exercising the autonomy it needed to effectively work with policy makers in other government institutions, donor agencies, and the United Nations, and thus to adequately serve as the lead entity in disaster response and recovery.[27] Some view this as a result of the various rivalries that existed between government agencies. In Haiti, environmental policy is often dealt with across a multitude of government agencies, each handling a different aspect of an issue. Disaster policy, subsumed within environmental policy, thus becomes the purview of many different and competing government agencies. In a country like Haiti where clientelism dominates politics and policy making, DRR initiatives, multifaceted by nature, become hampered by a number of turf wars.[28]

Though the response of Haitian government institutions and the international community improved in 2008 when compared to failures in 2004, many problems persisted. Many were critical of what they felt was a lack of policy commitment by the Haitian administration in power at the time. The National Disaster Management Committee, part of the NDRMS, failed to meet

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[25] Eliscar, J. (2010). Environmental and Natural Disasters in Haiti: The Impacts of Failed Policies From 2004 to 2010 (pp 32 – 34). Graduate Masters Theses. Paper 32. http://scholarworks.umb.edu/masters_theses/32.

[26] Amin, S., & Goldstein, M. (Eds.). (2008). Data against natural disasters: establishing effective systems for relief, recovery, and reconstruction (p. 109). The World Bank. Retrieved from PreventionWeb http://www.preventionweb.net/files/7943_97808213745281.pdf.

[27] Amin, S., & Goldstein, M. (Eds.). (2008). Data against natural disasters: establishing effective systems for relief, recovery, and reconstruction (p. 105). The World Bank. Retrieved from PreventionWeb http://www.preventionweb.net/files/7943_97808213745281.pdf.

[28] Eliscar, J. (2010). Environmental and Natural Disasters in Haiti: The Impacts of Failed Policies From 2004 to 2010 (pp 32 – 34). Graduate Masters Theses. Paper 32. http://scholarworks.umb.edu/masters_theses/32.

formally all throughout 2005-2006, and most of the ministries attached to the committee did not actively work to institutionalize and develop the body.[29] The U.S. Southern Command (Southcom) responsible for security operations throughout Latin America and the Caribbean launched similar complaints when the slew of hurricanes hit the country in 2008. They blamed the Haitian government for failing to grant Southcom title to land for an Emergency Operations Center (EOC) and a Disaster Relief Warehouse (DRW) for which funding had been approved years prior to the four major storms in 2008.[30] While many more lives were saved in 2008, flooding and mudslides were significant, and a sizable segment of the population was left without much needed relief for days.

The Hurricane Season Following the 2010 Earthquake

Immediately following the 2010 January earthquake, the anticipation of the rainy season in May, and the hurricane season right on its heels, put the international aid community on the defensive. Now they were rushing to prevent another tragedy on top of the one they were already struggling to manage. While for the past decade or so droves of Haitians had been leaving the city of Gonaïves for what seemed to be the comparative safety of the capital city, the earthquake's devastation of Port-au-Prince dramatically reversed this trend. Anywhere between 50,000 to 100,000 Haitians from the capital were now dispersed throughout the Gonaïves area just months before the threat of flash floods and mudslides potentially became a reality.[31] Not only in Gonaïves, but also throughout the country, relief camps housing the displaced were

[29] Amin, S., & Goldstein, M. (Eds.). (2008). Data against natural disasters: establishing effective systems for relief, recovery, and reconstruction (p. 103). The World Bank. Retrieved from PreventionWeb http://www.preventionweb.net/files/7943_97808213745281.pdf.
[30] Kathie Klarreich. (2008). Haiti gets no mercy from Hanna, Ike. Time. Retrieved from http://www.time.com/time/world/article/0,8599,1839710,00.html.
[31] Many Haitians leave quake zone for flood zone. (2010). Associated Press. Retrieved from http://www.msnbc.msn.com/id/35048770/ns/world_news-haiti/.

particularly vulnerable. Just prior to the rainy season, there were nearly 1.2 million people in 460 spontaneously organized camps, with 250,000 living in 21 camps facing significant risks. The government conducted site assessments for risk of flooding and hurricane exposure, evacuating inhabitants of the most at-risk camps immediately. Over 7,000 of the most vulnerable were relocated, while mitigation work was started in at-risk sites.[32]

The Red Cross was particularly active in working with local communities to address the flood risks presented by the impending wet season. The organization conducted disaster preparedness activities in relief camps throughout the country, training volunteers in emergency first-aid, vulnerability and capacity assessment and community-based disaster management, while sponsoring community groups active in digging drainage ditches, laying sandbags on hillsides, and creating evacuation routes in vulnerable areas. Other organizations used cash-for-work programs to rehabilitate drainage canals and build flood barriers. The Red Cross was also instrumental in launching an awareness campaign prior to the hurricane season, sending approximately 4 million text messages, running weekly national radio programs, and using sound trucks to disseminate information on preparing for floods, storms, and landslides.[33] Two emergency hotlines were established, one in Creole and another for French and English speakers, connecting relief camp managers to Critical Incident Response Teams established by the IOM, MINUSTAH, and OCHA. If camps faced significant flooding, these teams would be responsible for outlining response options, and relocating affected populations if necessary. Emergency food

[32] Action plan for national recovery and development of Haiti: immediate key initiatives for the future (p. 32). (2010). Government of the Republic of Haiti. Retrieved from http://whc.unesco.org/uploads/events/documents/event-725-2.pdf.
[33] Haiti earthquake 2010: One-year progress report (p. 19-20). (2010). IFRC. Retrieved from http://www.ifrc.org/Global/Publications/disasters/208400-First%20anniversary%20Haiti%20EQ%20operation%20report_16b.pdf.

rations were pre-positioned in 31 locations across the country, with alternative transport routes established to avoid areas potentially vulnerable to mudslides.[34]

The United States government was also significant in the preparation for the 2010 hurricane season. Since the earthquake destroyed Haiti's Meteorological Center, leaving the country without the real-time weather information necessary for preparedness and early warning activities, USAID facilitated the shipment of two emergency weather information network systems to Haiti. USAID, working with the World Meteorological Organization (WMO), the U.S. National Weather Service, Meteo-France, and the Hydrologic Research Center (HRC), also began work to establish a flash flood guidance system that would monitor inundation patterns and issue warnings to at-risk populations.[35] Another primary focus of U.S. activity in Haiti was to build the capacity of the country's emergency response network. It has worked extensively with the Haitian Department of Civil Protection, funding the construction of five emergency operations centers and five disaster relief warehouses throughout the country.[36]

Despite the multiple measures to prepare the earthquake ravaged country for the impending hurricane season, a 30-minute storm that hit Port-au-Prince in September made it apparent that the relief camps were not ready for a full-blown tropical storm or hurricane. Nearly 15,000 tents in 262 camps were either damaged or completely destroyed in the short

[34] Responding to the humanitarian crisis in Haiti: achievements, challenges and lessons to be learned (p. 20). (2010). Inter-Agency Standing Committee. Retrieved from http://www.humanitarianinfo.org/iasc/pageloader.aspx?page=content-news-newsdetails&newsid=143.

[35] Latin America and the Caribbean—Disaster Risk Reduction, Fact Sheet #1, Fiscal Year (FY) 2010. (2010). USAID. Retrieved from http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/prep_mit/mods/program_updates/lac_drr_fs01_09-30-2010.pdf.

[36] Press briefing by Kenneth Merten, U.S. Ambassador to the Republic of Haiti, and Carleene Dei, USAID/Haiti Mission Director—Haiti's Hurricane Preparedness. (2010). USAID. Retrieved from http://reliefweb.int/node/368045.

maelstrom.[37] Immediately after the earthquake it was understood that the relief effort would have to consist of providing the type of relief shelters that could withstand the heavy rain and winds of the tropical storm season. Since this could not be accomplished before the hurricane season was upon the country, much of the international community's efforts were concentrated on preparedness and educating the population on how to respond if a hurricane should occur.[38] Reports following the storm found that camps that had worked closely with the international community in implementing some forms of mitigation such as digging drainage channels and ensuring tents and tarpaulins were secure, were less affected by the violent storm. The event led the international relief effort to intensify its work in these areas. Over 180 assessments of camps facing flood and landslide risks were carried out, with 109 of those determined to be of high risk marked for extensive mitigation work.[39]

When Hurricane Tomas passed through the country on Friday November 5th, things were not nearly as dire as they had been in 2004 and 2008 despite the heightened vulnerability of the population following the January earthquake. Only seven people were killed, while another 10,000 voluntarily evacuated their homes in search of safer locations.[40] Specifically impressive was the fact that there were no deaths in Gonaïves, the Haitian city most associated with the devastations of hurricanes past. Organizations like CHF International point to their work planting over 230,000 trees and building over 100,000 cubic meters of dry-stone wall to prevent soil erosion and mudslides, construction of over 15,500 linear meters of drainage canals, and expansion of a nearby artificial lake to hold larger quantities of water, as significant in

[37] Increased disaster planning key in Haiti following storm. (2010). UN Office for the Coordination of Humanitarian Affairs. Retrieved from http://reliefweb.int/node/369414.
[38] Ferris, E. (2010). Earthquakes and Floods—Comparing Haiti and Pakistan (p. 6). The Brookings Institution. Retrieved from http://www.brookings.edu/papers/2010/0826_earthquakes_floods_ferris.aspx.
[39] Increased disaster planning key in Haiti following storm. (2010). UN Office for the Coordination of Humanitarian Affairs. Retrieved from http://reliefweb.int/node/369414.
[40] Bigg, M. (2010). Haiti dodges storm disaster, but urgent needs remain. Reuters. Retrieved from http://www.reuters.com/article/2010/11/06/us-haiti-storm-idUSTRE6A27Z220101106

preventing devastation this time around.[41] USAID pointed to its dredging and reinforcement of the La Quinte river, which was the source of much of the flood water that inundated the city in previous years, while Haiti's DPC believed that lives were saved as a result of its early warning and evacuation notices.

Others were more skeptical of such claims. They argued that catastrophe was avoided because the Hurricane simply did not hit Haiti directly on. The level of rain and wind was not what it had been in previous large storms. These same voices were actually quite critical of the country's preparedness. They point to reports of shortages in shelter material and other essential emergency items, the reluctance of much of the population living in tent cities around the country to evacuate out of fear of having their belongings stolen or land expropriated by the more powerful, calls by the government to evacuate at-risk locations without telling the population where to go, and evacuations to what ended up being locations prone to flooding despite statements to the contrary by the Haitian government and international community.[42] The lack of places to relocate vulnerable populations should the threat of a hurricane emerge was something acknowledged earlier on by U.S. government organizations working in the country. Most of the country's hurricane shelters were left unusable by the January earthquake.[43] One of the objectives identified by the international relief effort moving forward was to reconstruct or modify schools and hospitals so that they would serve as safe zones in times of disaster.[44]

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[41] Hurricane Tomas: Before and After. (2010). CHF International. Retrieved from http://www.chfinternational.org/node/34677.
[42] Katz, J. (2010). Haiti 'got very lucky' as Tomas skirted island. Associated Press. Retrieved from http://abcnews.go.com/Business/wireStory?id=12074516.
[43] Haiti—preparing for the hurricane season. (2010). International Organization for Migration. Retrieved from http://reliefweb.int/node/361481.
[44] Haiti earthquake 2010: One-year progress report (p. 23). (2010). IFRC. Retrieved from http://www.ifrc.org/Global/Publications/disasters/208400-First%20anniversary%20Haiti%20EQ%20operation%20report_16b.pdf.

While disaster was averted in this case, greater dangers may be on the horizon, particularly in terms of landslides. A USAID team of seismologists and geologists found nearly 5,000 landslides produced by the January earthquake, and predict the possibility of many more during future rainy seasons.[45] These potential landslides may not only be devastating to the communities below them as trees, rocks, and boulders descend upon their homes, but also as this sediment and debris interrupts river flows and thus increases the magnitude of future flooding.[46] This is an example of the earthquake magnifying some of Haiti's more traditional risks. Because Haiti is one of the most deforested nations in the western hemisphere, in many areas water is not seeping into the soil where it is absorbed, but rather erodes unstable slopes producing landslides and massive floods.[47] In fact, the death toll and massive destruction caused by Jeanne in 2004 was not a result of wind-damage, but rather the mudslides and flooding due to its heavy rains.[48]

Both the Haitian government and various international organizations have identified the need to address Haiti's environmental degradation as one central component in reducing its risks to disaster. In the Post-Disaster Needs Assessment conducted following the earthquake, the Haitian government identified the protection of the country's ecosystem as critical to reducing disaster risks. It pointed to soil stabilization by reforestation as a first step forward,[49] along with sustainable watershed management and sustainable farming. Some agricultural practices have lead to a reduction in forest coverage, reducing soil quality and thus increasing erosion,

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[45] USAID/OFDA Haiti One-Year Geohazards Overview—January 12, 2011. (2011). USAID. Retrieved from http://reliefweb.int/sites/reliefweb.int/files/resources/A9E005677CFDDF424925781700056F39-Full_Report.pdf.
[46] Rapid Environmental Impact Assessment:Haiti Earthquake—January 12, 2010 (p. 23-23). (2010). USAID/CHF International. Retrieved from http://www.chfinternational.org/files/PNADS052.pdf.
[47] Joyce, C. (2011). Haiti's buildings weren't fit to withstand quakes. National Public Radio. Retrieved from http://www.npr.org/templates/story/story.php?storyId=122547242&ft=1&f=1004.
[48] Haiti: 1,000 dead, another 1,000 missing after storm. (2004). Deutsche Presse Angentur (DPA). Retrieved from http://www.reliefweb.int/rw/rwb.nsf/db900sid/SZIE-653Q8Q?OpenDocument&query=Haiti%20hurricane%20jeanne&cc=hti.
[49] Haiti earthquake PDNA: assessment of damage, losses, general and sectoral needs (p. 12). (2010). Government of the Republic of Haiti. Retrieved from http://www.refondation.ht/resources/PDNA_Working_Document.pdf.

increasing the rate and scale of flooding, destroying existing economic activities including agriculture.[50] Just a few months before the earthquake, the Inter-American Development Bank approved a $3.44 million grant to help Haiti implement sustainable land and forest management practices, and another $30 million for anti-flooding works in three major watersheds and the promotion of erosion control agricultural practices. The hope is to reduce flooding by 20 percent in these three watersheds and increase permanent plant covering by 20 percent.[51]

Addressing Vulnerability to Seismic Activity

While the January earthquake was the first of its kind experienced by the country in over two hundred years, Haiti's geographic location makes it highly vulnerable to seismic activity. Two of the country's primary urban centers are located on major fault lines, the Enriquillo-Plantain Garden fault responsible for the recent tragedy running near Port-au-Prince, and the Septentrional fault running off the northern coast near Cap-Haïtien, Haiti's second city.[52] Other significant provincial cities such as Les Cayes, Jacmel, Léogâne, Fort Liberté, and Ouanaminthe are also potentially threatened. Despite such exposure, Haitians simply never considered earthquakes an impending threat. The country had not faced one in over two centuries. Hurricanes were a much more frequent and thus familiar menace, and anxieties regarding underdevelopment, endemic poverty, and political instability were seemingly more pressing. These same belief structures shaped the relationship between Haiti and the international aid community. Thus little was invested in establishing a system to monitor seismic activity, even

[50] Action plan for national recovery and development of Haiti: immediate key initiatives for the future (p. 22). (2010). Government of the Republic of Haiti. Retrieved from http://whc.unesco.org/uploads/events/documents/event-725-2.pdf.
[51] Haiti to combat environmental decay with IDB funds. (2009). Inter-American Development Bank. Retrieved from http://reliefweb.int/node/325562; Haiti to receive $30 million IDB grant to limit flooding, erosion in watersheds. (2009). Inter-American Development Bank. Retrieved from http://reliefweb.int/node/324609.
[52] Harris, R. (2010). The anatomy of a Caribbean earthquake. Retrieved from http://www.npr.org/templates/story/story.php?storyId=122531261.

after Haitian seismologist Claude Prépetit's 2009 research found that Haiti was at risk of an earthquake of a magnitude similar to the one that occurred in January.[53] In March, following the quake, the United States Agency for International Development (USAID) sent seismologists and geologists from the U.S. Geological Survey (USGS) into Haiti to set up eight seismic stations, five of which will become part of a permanent National Haiti Seismic Network. With data gathered from the earthquake's aftershocks they were able to gain a better understanding of the fault that produced the massive tremor and develop a more detailed and accurate national seismic hazard map. These advances were complimented by workshops with scientists throughout the region to improve their understanding of seismic risks and thus enhance their national resiliency.[54]

Haiti's lack of awareness of the threat that earthquakes posed has also translated into an absence of modern building codes. The 2008 collapse of a hillside school on the outskirts of Port-au-Prince killing over 90 children, in hindsight, was a foreshadowing of the devastation to come only two years later. The school was built without any structural steel or cement.[55] According to the San Francisco-based nonprofit design group, Architecture for Humanity, Haiti's legacy of widespread deforestation has meant that construction is primarily done with poured concrete and cement blocks, but that because concrete is expensive, many contractors add greater quantities of sand to their mixtures, producing structurally weaker material that easily

[53] Haiti: stabilization and reconstruction after the quake (p. 3). (2010). International Crisis Group. Retrieved from http://www.crisisgroup.org/~/media/Files/latin-america/haiti/32_haiti___stabilisation_and_reconstruction_after_the_quake.ashx; Urban disasters—lessons from Haiti: study of members agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 27). (2011). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.
[54] USAID/OFDA Haiti one-year geohazards overview—January 12, 2011. (2011). USAID. Retrieved from http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/sectors/risk_reduction.html.
[55] Death toll rises to 92 in school collapse in Haiti. (2008). The New York Times. Retrieved from http://www.nytimes.com/2008/11/07/world/americas/07iht-08haiti-fw.17640170.html?_r=1&scp=1&sq=Haiti%20school%20collapse&st=cse.

crumbles under stress. The lack of steel reinforcement is also a result of costs. Even the concrete blocks used are of substandard quality, often made in people's private homes.[56]

Port-au-Prince itself invites disaster. It lies along steep hillside slopes and atop soil that is not meant to sustain much development.[57] In the past couple of decades, the capital has grown dramatically from about 250,000 in the 1950s to over 2 million recently, all without government management.[58] Grinding poverty and the absence of government oversight has meant that the majority of this new population built where, how, and with whatever they could, without considering the risks they were subjecting themselves to.[59] So the devastation wrought on January 12, 2010 was a byproduct of the intersection of endemic poverty, seismic risk, and anemic government capacity.

While the document *Urban Disasters—Lessons from Haiti* calls for long-term DRR to be a vital component of the post-disaster relief and recovery effort so as to avoid building back with the same mistakes as before, it also acknowledges that government incapacity makes this objective rather daunting. "There [simply] is no policy environment to even start working on these concerns. In the absence of clear government guidelines, building codes, byelaws and zoning regulations there is no common agreed denominator for initiating a widespread safe construction campaign."[60] An indicator of Haiti's inability to address its seismic risk is the fact

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[56] Fountain, H. (2010). Flawed building likely a big element. The New York Times. Retrieved from http://www.nytimes.com/2010/01/14/world/americas/14construction.html?ref=world.
[57] Urban disasters—lessons from Haiti: study of member agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 27). (2010). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.
[58] Haiti was 'catastrophe waiting to happen.' (2010). CNN World. Retrieved from http://articles.cnn.com/2010-01-12/world/haiti.earthquake.infrastructure_1_building-poverty-line-catastrophe/2?_s=PM:WORLD.
[59] Haiti: stabilization and reconstruction after the quake (p. 3). (2010). International Crisis Group. Retrieved from http://www.crisisgroup.org/~/media/Files/latin-america/haiti/32_haiti___stabilisation_and_reconstruction_after_the_quake.ashx.
[60] Urban disasters—lessons from Haiti: study of member agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 26). (2010). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.

that the country only has one earthquake engineer.[61] Even more problematic is the possibility that a safe building campaign may be preempted by people's urgent desire to put things back together as they were before the earthquake, even if that means reestablishing old risks. It has been noted that families that were capable of rebuilding started immediately after the disaster in order to secure their property rights, considering the various issues regarding the lack of reliable government records of land titles. Much of this reconstruction is being done as it had always been done. While some international entities operating in Haiti, such as the British Red Cross (BRC), have begun training people on how to build seismic resistant homes, the scale at which this needs to be done does not yet exist. An effective campaign would require more time, resources, and greater government involvement, luxuries that may not exist at the moment.[62]

The issues surrounding reconstruction do not just involve how to rebuild, but also where to rebuild. This debate has led to two distinct positions. The first perspective focuses on minimizing the level of social dislocation as much as possible by keeping people as near to their places of origin as possible and helping them reinforce homes that are salvageable. Those who embrace this point-of-view have been highly critical of the Haitian government and much of the international relief effort's shelter provision strategy. Following the earthquake, nearly 1,200 spontaneous camps sprouted in and around Port-au-Prince. Many were overcrowded, had poor sanitation facilities, and were in areas subject to flooding and mudslides during the rainy season.[63] This prompted the government and international agencies to begin relocating many families to planned camps outside of high-risk areas, which meant relocation far from Port-au-

[61] Joyce, C. (2011). Haiti's buildings weren't fit to withstand quakes. National Public Radio. Retrieved from http://www.npr.org/templates/story/story.php?storyId=122547242&ft=1&f=1004.
[62] Urban disasters—lessons from Haiti: study of member agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 24-26). (2010). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.
[63] Ferris, E. (2010). Haiti six months on (p. 3). Brookings Institute. Retrieved from http://www.brookings.edu/papers/2010/0712_haiti_six_months_ferris.aspx.

Prince where the services and jobs exist. Critics fear that these planned camps are creating a situation of perpetual dependency, and are potential sites of future slums.[64] Despite these reservations, plans are to build 125,000 temporary shelters in these camps by the summer of 2011. Part of the reason why efforts have been concentrated in these areas rather than in Port-au-Prince is due to issues concerning unclear land rights and the massive quantities of rubble, nearly 20 million cubic meters, that litter the capital.[65] Unfortunately these difficult problems may take many years, if not decades, to resolve.

In the Global Facility for Disaster Reduction and Recovery's (GFDRR) document *Haiti Earthquake Reconstruction*, emphasis is placed on the need for recovery efforts to consider the factors that lead people to live in vulnerable locations. The document advocates for shelters being built as close to peoples' previous homes as possible so as to help them preserve community ties, secure their land rights, and maintain proximity to previous livelihoods. It is believed that this will increase the likelihood of a seamless transition between temporary shelter and permanent housing.[66] It is also argued that adopting such a strategy stimulates self-help, reducing the costs of reconstruction, and speeding up the return to some semblance of normalcy.[67] UN-Habitat, which focuses exclusively on urban issues, is aligned with this perspective, and thus promotes a strategy of 'Safe return,' whereby people are assisted in returning to their places of origin, these sites are assessed for risks, and made safer through

[64] Urban disasters—lessons from Haiti: study of member agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 3). (2010). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.
[65] Ferris, E. (p. 3). (2010). Haiti six months on. Brookings Institute. Retrieved from http://www.brookings.edu/papers/2010/0712_haiti_six_months_ferris.aspx.
[66] Haiti earthquake reconstruction: knowledge notes from DRM global expert eeam for the Government of Haiti (pp. 14 -15). (2010). The World Bank; GFDRR. Retrieved from http://www.unisdr.org/english/networks/gfdrr/documents/v.php?id=15512.
[67] World Bank Group response to the Haiti earthquake: evaluative lessons (p. 4-5) (2010). The World Bank. Retrieved from http://web.worldbank.org/external/default/main?noSURL=Y&theSitePK=1324361&piPK=64252979&pagePK=64253958&contentMDK=22451659.

appropriate repairs and urban planning.[68] USAID has played an important role in appraising buildings in affected areas, supporting the assessment of over 380,000 of 400,000 targeted structures. About 54 percent of these buildings have been marked green and thus safe to inhabit, 26 marked yellow, needing minor repair, and 20 percent marked red, requiring major repairs or demolition.[69] Jeff Kerzner of the Pan American Development Foundation (PADF) believes that efforts should be concentrated on helping people move back into homes that can be repaired rather than building unsustainable temporary shelters far from the capital. He contends that repairs can be made to the majority of these properties for around $1,300 each, which is comparable to the price of a temporary shelter. Therefore, he believes investing in the provision of temporary shelters is a waste of time and money, and potentially presents long-term problems.[70]

For those who advocate for this perspective, UNDP's work developing a map of seismically vulnerable areas of Port-au-Prince is critical in the process of building back better. This seismic zoning map addresses the intensity of shaking a tremor may produce as well as the soil types around the city and their reactions under various levels of stress. This information will be crucial in the work of the architects and engineers designing safer buildings and infrastructure throughout the city. The seismic zoning map will be further enhanced in a more detailed version to be completed by mid-2012."[71]

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[68] Urban disasters—lessons from Haiti: study of member agencies' responses to the earthquake in Port-au-Prince, Haiti, January 2010 (p. 3). (2010). Disasters Emergency Committee. Retrieved from http://www.dec.org.uk/download/856/DEC-Haiti-urban-study.pdf.

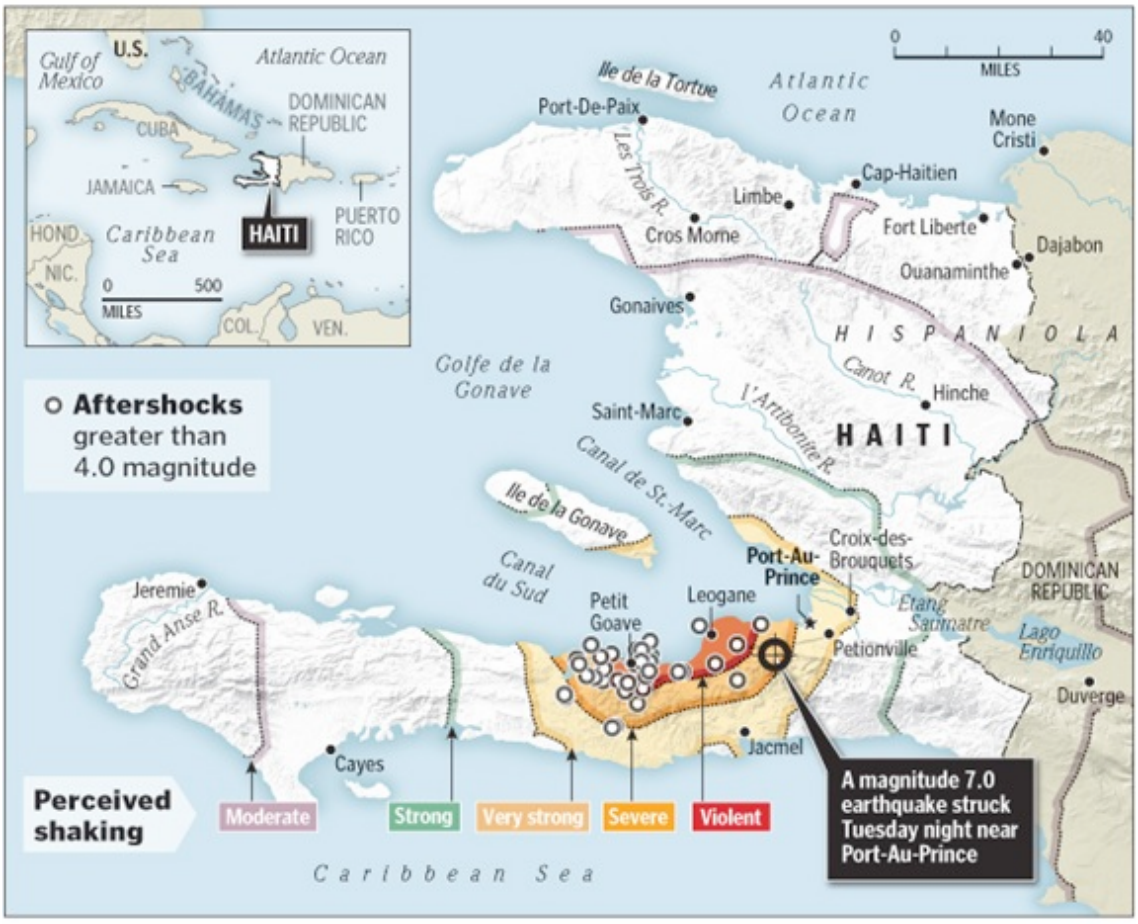
[69] USAID/OFDA Haiti one-year shelter and settlements overview. (2011). USAID. Retrieved from http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/sectors/files/fy2011/011211_haiti_sheltersettlements.pdf.

[70] A year later, Haiti's recovery gridlocked. (2011). The Miami Herald. Retrieved from http://www.miamiherald.com/2011/01/08/2007280_p4/a-year-later-haitis-recovery-gridlocked.html.

[71] Haiti: UNDP maps earth's shifts to rebuild city on safer grounds. (2011). United Nations Development Programme (UNDP). Retrieved from http://www.reliefweb.int/rw/rwb.nsf/db900sid/MUMA-8F46YP?OpenDocument&rc=2&emid=EQ-2010-000009-HTI.

A second perspective goes beyond simply advocating for the establishment of temporary shelters away from the hazards of Port-au-Prince, but that Port-au-Prince should not be rebuilt in its current location at all. They argue that, not only is the current location of the capital near a major seismic fault, but that the majority of its buildings are on unstable hillsides, and that it lies atop soft soils in a flood basin subject to storm surges. They propose the capital be moved to the city of Hinche in the Haut Artibonite Valley 128 km to the North of Port-au-Prince. It is seismically stable, has good water resources, and adequate area for building. They point to successful cases of relocation in other countries, such as the relocations of Guatemala's capital from Antigua to Guatemala City and Costa Rica's from Cartago to San Jose after earthquakes destroyed both in 1773 and 1841 respectively.[72]

[72] Haiti earthquake reconstruction: knowledge notes from DRM global expert team for the Government of Haiti (p. 23). The World Bank; GFDRR. Retrieved from http://www.unisdr.org/english/networks/gfdrr/documents/v.php?id=15512.



SOURCE: USGS | GENE THORP AND BONNIE BERKOWITZ / THE WASHINGTON POST[73]

There are others who don't call for complete relocation, but do view the tragedy of the earthquake as an opportunity to correct what they view as an unsustainable concentration of political and economic activity in Port-au-Prince.[74] Over 65% of economic activity and 85% of fiscal revenue is located in the city. They believe that this concentration of government and private sector resources, services, and job opportunities leaves the country highly vulnerable.

[73] Major earthquake strikes Haiti. (2010). The Washington Post. Retrieved from http://www.washingtonpost.com/wp-dyn/content/graphic/2010/01/14/GR2010011402758.html; For information concerning population movements out of Port-au-Prince, look at http://www.reliefweb.int/rw/rwb.nsf/db900SID/AMMF-82SVUA?OpenDocument.

[74] Margesson, R. & Maureen Taft-Morales. (2010). Haiti Earthquake—Crisis and Response (p. 23). Congressional Research Service. Retrieved from http://www.fas.org/sgp/crs/row/R41023.pdf.

Devolution of power to the provinces and municipalities is a forcefully stated priority in the Haitian government's *Action Plan for the Reconstruction and National Development of Haiti*.[75] It calls for investing in other economic and population centers such as Cap Haïtien, Les Gonaïves, St-Marc, Hinche, and Les Cayes for both historical and comparative advantage reasons.[76] The fleeing of over 500,000 people away from Port-au-Prince to these secondary cities and towns is viewed as an opportunity. The government plans on using grants to provide an incentive for this displaced population to remain around what they hope to turn into new growth hubs. They are also outlining plans for the development of regional infrastructures and services outside of Port-au-Prince, with the objective of spurring economic expansion in these areas and strengthening local capacity.[77]

Underdevelopment, Political Instability, and Risk

More recently, efforts in Haiti have sought to address disaster risks in a comprehensive manner, particularly as it becomes clear that there are significant links between economic underdevelopment, environmental degradation, and hydrometeorological and seismic risk. Any effort to reduce risk in Haiti must begin with the fact that 77% of the population lives on less than US$2 a day. It is the desperation that results from this fact that leads many Haitians to live with multiple risks. If we look at the degree of environmental degradation, particularly deforestation, that characterizes the island, poverty is a central factor. According to USAID, seventy-one percent of the fuel used for cooking in Haiti comes from the few trees left in the country, either burned directly or after being turned into charcoal, amounting to the equivalent of

[75] Ferris, E. (2010) Haiti Six Months On (p. 4-5). The Brookings Institution. P Retrieved from http://www.brookings.edu/papers/2010/0712_haiti_six_months_ferris.aspx.
[76] Action plan for national recovery and development of Haiti: immediate key initiatives for the future (p. 17). (2010). Government of the Republic of Haiti. Retrieved from http://whc.unesco.org/uploads/events/documents/event-725-2.pdf.
[77] Haiti earthquake PDNA: assessment of damage, losses, general and sectoral needs (p. 11). (2010). Government of the Republic of Haiti. Retrieved from http://www.refondation.ht/resources/PDNA_Working_Document.pdf.

30 million trees a year.[78] For many of the country's unemployed, selling charcoal is one means to eke out some kind of living, while for others too poor to afford electricity or imported fuels, charcoal becomes the only option for cooking. So actions taken out of economic necessity, become factors in increasing the population's vulnerability to disaster, thus making their economic circumstances even more despairing. The lack of trees has also dramatically affected farmers. As trees were cut down for fuel, the topsoil once held by their roots was inevitably washed away by heavy rains. This, along with drier weather as a result of the tree loss, made growing crops impossible. Unable to make a living in agriculture, many Haitians migrated to Port-au-Prince to pursue new economic opportunities. Recently Haiti's rate of urban population growth was at 3.63 percent a year compared to 0.92 percent in the countryside, with nearly a quarter of the country's entire population living in the Port-au-Prince metropolitan area.[79] Much of this population either lived in shantytowns in flood plains, or on unstable hillsides vulnerable to landslide, in homes constructed with cheap materials that cannot withstand the force of earthquakes or hurricanes. Compound this situation of a highly vulnerable population and a multitude of hazard risks with political instability and social dislocation, and you have a country that is always on the precipice of major catastrophe. Only by strengthening government institutions, empowering Haiti's civil society, and bridging the gap between the two, will the country be able to even begin to address these factors contributing to its vulnerability to disaster.

[78] Velasquez-Manoff, M. (2010). After the earthquake: Haiti's deforestation needs attention. The Christian Science Monitor. Retrieved from http://www.csmonitor.com/Environment/Bright-Green/2010/0120/After-the-earthquake-Haiti-s-deforestation-needs-attention.

[79] Environmental vulnerability in Haiti: findings and recommendations (p. iii). (2007). The United States Agency for International Development. Retrieved from http://pdf.usaid.gov/pdf_docs/PNADN816.pdf.

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Haiti to receive $30 million IDB grant to limit flooding, erosion in watersheds. (2009). Inter-American Development Bank. Retrieved from http://reliefweb.int/node/324609.

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