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Haiti's way out of the seismic dilemma.

“Quel peuple!” Ils sont tellement habitués à chercher la vie dans des conditions difficiles qu'ils porteront l'espérance jusqu'en enfer.”

— Dany Laferrière, *Tout bouge autour de moi*.

“What a nation! They are so used to surviving in harsh conditions that they will carry hope all the way to hell.” - Dany Laferrière, *Tout bouge autour de moi* (Everything is moving around me)

This quote stood out to me upon reading *Tout bouge autour de moi* which translates from french into *Everything moves around me*. The Haitian people have suffered greatly and despite all the challenges they continually face, they have remained stronger and more hopeful than ever. Can this hope really help them move forward? So far it has proved to keep them alive and moving forward day to day, but, is it really enough? This book is a vibrant testimony of Dany Laferrière around the earthquake of January 12, 2010 that destroyed Haiti. Laferrière traces the key moments of this disaster: short texts, portraits, information, impressions, projections. This tragedy is rendered with strength and generosity. Laferrière's book discrete keys emotions, feelings and thoughts in a poignant chronicle. *Everything moves around me*, it's the look of Dany Laferrière, his country of origin, the fragility of things and beings. This book is a lesson in elegance, dignity and courage, a tribute to the Haitian people who found the energy to begin life after the earthquake.

I recall January 12th 2010, the date when a major earthquake hit Haiti. After two years away from home, a fun filled Christmas break ended in melancholy. I witnessed Port au Prince -- the place I grew up and called home -- tremble to wreckage. My family survived without injury, but our lives were shaken beyond repair. Our house, now an unstable structure, was unsafe, and we had been evicted by this catastrophic disaster. I slept on the street for three consecutive nights

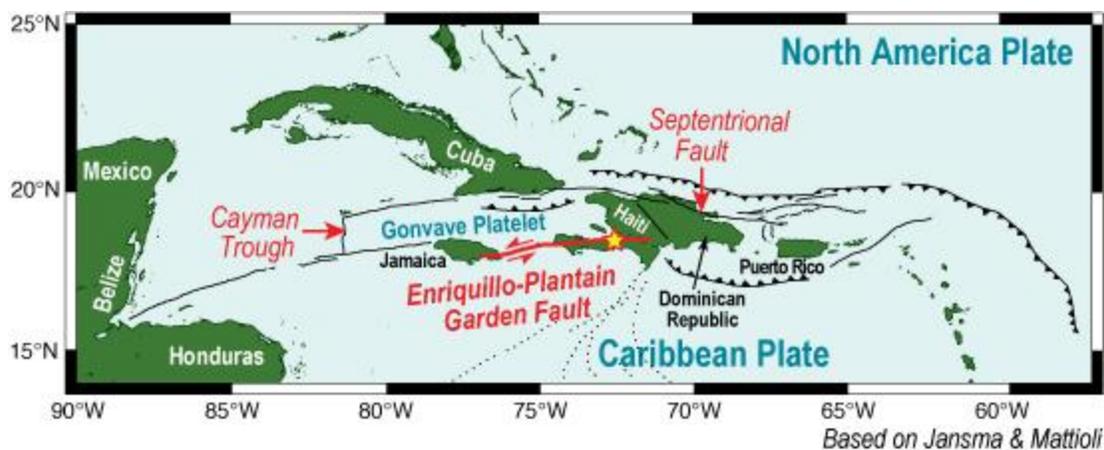
following the earthquake. This was, without doubt, the single most dramatic turning point in my life. I was torn into pieces all the while humbled to come to the understanding that life may be valuable one second and become as insignificant as the rubble that takes it the next. I have come to the realization that I am no better than anyone else and that sometimes it takes a natural disaster to bring a people closer to each other as a sovereign nation. Everyone showed love, affection and support to each other through the tough times in spite of all of our differences; education, religious beliefs and social class did not matter in the time of despair. Furthermore, I was even more appalled witnessing the recovery process where many self proclaimed leaders and humanitarians conducted a defective job at helping the country and its victims to get back on their feet for a hopeful future. I took notes believing that my beloved country deserves a better treatment and quality advocates to defend its cause. On that day, I started to dream of a future where things would be done in an effective way for the betterment of the living standards of my fellow Haitians.



It has been a long journey since this catastrophic earthquake, a tough battle. Every new day, I face situations that allow me to realize more and more who I am becoming and why. It is my dream to become an advocate for the causes of Haiti on the world stage. My dream fuels my

daily struggles in spite of the obstacles that try to obstruct my vision. I remain inspired, humbled and focused as I strive to earn a Bachelor degree and extend my academic credentials. I take the cause of my nation to heart and I want to live until the days when my fellow countrymen will see better days and establish adequate living standards for the generations that will follow. Though I have traveled the world and experienced the finer things in life, I can never stop being thankful for Haiti; the country that has groomed me into the person I have become today.

Haiti occupies the western third of the island of Hispaniola, along the northern boundary of the Caribbean plate. The island occurs on a separate microplate bounded on the north by the Great Puerto Rican/North Hispaniola subduction zone and transtensional strike-slip faults (Oriente-Septentrional fault) that define the boundary between the North American and Caribbean plates, and the Muertos trench subduction zone and strike-slip Enriquillo-Plantain Garden fault zone (EPGFZ) that define the plate interface between the microplate and Caribbean plate. The 7.0 Haiti earthquake occurred at 4:53 PM local time on January 12, 2010. The USGS reports that the earthquake's epicenter was located at 18.457N, 72.533W, approximately 25 km west of the city of Port-au-Prince. The earthquake was initially presumed to have occurred on the Enriquillo-Plantain Garden Fault Zone (EPGFZ), a left-lateral, strike-slip fault that slips approximately 7 mm/yr. Although the EPGFZ is a strike-slip fault, the focal mechanism for this earthquake was identified as left-lateral/oblique. Additionally, Surface Faulting and Coastal Uplift, the EPGFZ did not rupture at the surface and significant uplift occurred north of the EPGFZ, such that there is significant uncertainty regarding the causative fault for the earthquake. Large earthquakes have not occurred recently on the EPGFZ, but historical records indicate that Port-au-Prince was destroyed by earthquakes in both 1751 and 1770. These events are believed to have occurred on the EPGFZ.



Fault rupture inversions have been developed for this event by various researchers, including the USGS. One fault rupture inversion, generated by Anthony Sladen of Caltech using broadband teleseismic data, indicates that the fault rupture was concentrated along a 20 km segment west of the epicenter, with a maximum slip of about 4 m. Interestingly, a significant vertical component of slip is shown starting at about 10 km west of the hypocenter. This vertical component of slip is consistent with the identified focal mechanism and was corroborated by observations of coastal uplift in this area. The derived Source Time Function (STF) for this event indicates that the majority of the seismic moment was released in a relatively short time, approximately 6 seconds. A similar rupture pattern was reported by other slip inversions.

The epicentral zone of the January 12 Haiti earthquake extends roughly from the Port-au-Prince alluvial valley in the south central part of the country, eastward to the vicinity of Petit Goave along the north coast of the Haitian southern peninsula. The earthquake occurred on the Enriquillo-Plantain Garden fault zone (EPGFZ), a major tectonic element with a long history of deformation and slip. The fault traces roughly west-east along the north portion of the southern Haiti peninsula, and has exerted a substantial topographic/geomorphic influence since the Tertiary. Quaternary displacement along the fault has formed a classic strike slip fault geomorphology including linear valleys and bounding uplifted mountains, shutter ridges, sag ponds, and elliptical basins at extensional stopovers and bends along the fault trace. Some stream reaches, such as within the deep valley of the Forse and Momance rivers that follows the EPGFZ trace, are apparently the result of both stream capture by recent displacements along the fault and preferred incision along sheared and locally weaker rocks along the fault zone. Surprisingly, no evidence of surface fault rupture has been found by the GEER team or other field teams. These investigations have included visits to Leogane, Carrefour and Port-au-Prince.

Nine multiple reaches of the fault in the epicentral zone that have clear Quaternary-active geomorphic expression, and roadways/tracks that cross perpendicularly or obliquely across the entire well expressed fault zone.

The earthquake-affected region is a physiographically diverse area that has undergone a complex geologic history of intrusion, tectonism, erosion, and sedimentation. The topography within the study area is relatively rugged, with steep mountain ranges and hill fronts, deeply incised streams and narrow intermountain stream valleys, and broad coastal delta fans and valleys. The central mountainous core of the southern peninsula to be locally underlain by metamorphosed Cretaceous basalt/mafic volcanic basement, and Cretaceous-Eocene limestone, conglomerate, and clastic sedimentary rocks. An east-west trending band of Miocene and Mio-Pliocene sedimentary rock (including flysch, siltstone, shale, sandstone) occurs along the coast and southern margin of the Port-au-Prince alluvial valley. Contacts between the Miocene and Mio-Pliocene units are commonly faulted, and small folds and possible thrust faults have deformed the Mio-Pliocene bedrock in response to a regional northeast-southwest compression, oblique to the trend of the strike-slip motion along the EPGFZ

Quaternary deposits in the earthquake epicentral zone include Holocene to late Pleistocene fluvial alluvium (channel, terrace, floodplain overbank deposits) deposited in the Port-au-Prince valley and interior incised river valleys, alluvial fan and colluvial wedge deposits along the margins of larger valleys, coastal delta fan complexes where larger streams (e.g., Momance and Forse Rivers) discharge into the sea along the coast, localized organic sediments within marshes and swamps, and beach sands along protected portions of the coast. The central area of Port-au-Prince which was devastated by the earthquake spans from the relatively level floor of a large alluvial valley, southward onto low hills underlain by Mio-Pliocene deposits. Portions of the city are presumably underlain by thick sequences of Holocene to Pleistocene alluvium in a broad downwarped basin, but zones of high damage extend onto the Mio-Pliocene bedrock. The cities of Leogane, which experienced a high percentage of structurally collapsed buildings and extensive shaking damage, and Carrefour are located on large delta fans, and underlain by a thick sequence of Holocene to Pleistocene alluvium. The distribution of most dense or severe building damage from the earthquake appears to be at least in part correlative with geologic conditions.

Amplified shaking likely occurred as a result of thick alluvial soils in the north-central

and

coastal region of Port-au-Prince, Carrefour, and Leogane. However, large zones of extensive and dense damage occurred in the southern portion of Port-au-Prince that extends onto the hills underlain by Mio-Pliocene, weakly-cemented deposits. Although these deposits are quite stiff and not generally perceived as representing a significant amplification hazard (e.g., Building code Vs30-based soil classification) other mechanisms of amplification may have been at work, such as topographic amplification, distributed slip/deformation along folds and blind faults, seismic wave focusing along geologic structures (folds and blind thrust faults), or basin margin 11 effects. These effects may have contributed to higher levels of shaking or adverse frequency content in these materials. Filled ground in port areas of Port-au-Prince and Carrefour experienced classic liquefaction, lateral spread, and settlement damage. Older Quaternary (Pleistocene) deposits include elevated sand and gravel fluvial terraces along major streams, older (inactive) portions of delta fans, and elevated coastal marine terraces. Some of the larger, older (late Pleistocene) alluvial fan complexes occur at the mouths of drainages along the south and north margins of the Port-au-Prince alluvial valley, and North Coast between l'Acul and Grand-Goave. Urban expansion south of Port-au-Prince and Carrefour extends onto the Mio-Pliocene bedrock hills and older alluvial fans. The sediment carried by the active river systems is dominated by sand and gravel within braided channel systems in intermountain valleys and the mouths of canyons, and a distally fining sequence of fine sand, silt, and clay at the distal ends of delta fans, coastal lowlands/marshes, and interior areas of larger alluvial valleys. Delta fans and alluvial valleys show evidence of relatively rapid sedimentation and considerable migration of active drainages through the Quaternary. As a result, distinct active and older sediment "lobes" or terraces can be differentiated based on elevation, degree of erosional modification, and soil development. Most of the large lateral spreads that occurred during the earthquake developed within artificial fill along the coast (e.g., Port-au-Prince and Carrefour ports), or at the distal noses of delta fans that are prograding into the sea between Leogane and Grand-Goave.

Many of the road failures observed along the coast west of Carrefour occur where the road crosses marshy ground and the distal ends of small alluvial valleys. Settlement and localized creep/slumping of sediments underlying the road bed appears to be responsible for many of the road failures, rather than lateral spread failure, as cracking typically was confined to the road beds and fill, and does not extend through natural soils shoreward of the roadways.

Localized liquefaction of loose, saturated sediments in these areas may have contributed to the road failures, but was not the major factor. Numerous landslides and rockfalls occurred within the Mio-Pliocene and older limestone bedrock in steep slopes and road cuts within the epicentral zone. In some cases these failures appear to have been restricted to colluvial soil and fractured/dilated rock within a weathered zone that extends about 1 to 3 m deep into the slopes. However, some deeper-seated slumps and debris avalanche/slide failures occurred in less-weathered, deeper bedrock in steep mountainous slopes. These failures appear in part to be influenced or controlled by bedrock joints or weak zones. Developments on steep slopes in places appear to have been impacted by slope raveling or foundation sliding/slumping, but appear to have been primarily damaged by possible topographically-induced amplified shaking or structural/design dictated by development on steep slopes (e.g., tall, slender columns on downhill sides of buildings constructed on steep slopes).

According to the Disasters Emergency Committee, before the earthquake, Haiti was 145th of 169 countries in the UN Human Development Index, which is the lowest in the Western Hemisphere. More than 70% of people in Haiti were living on less than \$US2 per day. 86% of people in Port au Prince were living in slum conditions - mostly tightly-packed, poorly-built, concrete buildings. 80% of education in Haiti was provided in often poor-quality private schools, the state system generally provided better education but provided far too few places. Half of people in Port-au-Prince had no access to latrines and only one-third has access to tap water. The 7.0 Magnitude Quake that struck near Port au Prince on January 12th 2010 has greatly impacted the country. 3,500,000 people were affected by the quake, 220,000 people estimated to have died and 300,000+ people were injured. Over 188,383 houses were badly damaged and 105,000 were destroyed by the earthquake (293,383 in total), 1.5m people became homeless. After the quake there were 19 million cubic metres of rubble and debris in Port au Prince – enough to fill a line of shipping containers stretching end to end from London to Beirut. 4,000 schools were damaged or destroyed, 25% of civil servants in Port au Prince died. 60% of Government and administrative buildings, 80% of schools in Port-au-Prince and 60% of schools in the South and West Departments were destroyed or damaged. Over 600,000 people left their home area in Port-au-Prince and mostly stayed with host families. At its peak, one and a half million people were living in camps including over 100,000 at critical risk from storms and flooding. Soon after, the outbreak of cholera has caused aid response challenges in October 2010. By July 2011 5,899 had

died as a result of the outbreak, and 216,000 were infected.

The aforementioned statistics demonstrate the ravaging impacts of the earthquake in Haiti. Recently, according to an analysis of new data. The devastating earthquake that rocked Haiti in January was unleashed by a previously undetected fault line – not the well-known one initially blamed. Its unclear how dangerous the new, unmapped fault might be or how it's discovery changes the overall earthquake hazard risk for Haiti, said Eric Calais, a professor of geophysics at Purdue University in Indiana. He said the analysis shows that most, if not all, of the geologic movement that caused January's magnitude-7.0 earthquake occurred along the newly uncovered fault, not the well-documented Enriquillo fault. Calais said that suggests Haiti's seismic zone is far more complex than scientists had anticipated. But the new fault's profile, including the possibility that it merges with the Enriquillo fault at some depth, won't be known until scientists intensively study the region. "If there are other faults capable of producing earthquakes besides the Enriquillo and this new one we need to know about them. We need to go after them". Haiti remains vulnerable to and unprepared for potential earthquakes that await in the future. What should the nation do? What measures should the government be taking?

Lately, the rise of sea-level has been a major topic of discussion. In 2007, Lake Azuéli only extended around 500m into Dominican territory. But it currently extends nearly 2km into this country, right up to the road that runs across the border. Haiti is the Dominican Republic's second-largest trade partner, after the US. The two countries share the island of Hispaniola. Communities in the southern Dominican provinces of Independencia and Bahoruco share Lake Azuéli with Haiti. They also have Lake Enriquillo, the largest lake and the lowest point in the Caribbean. The economic life of the area flows around these two lakes, which have been in grave danger for years. For this country of 10 million people, the rise in the water level in Lake Enriquillo represents an environmental challenge with serious socio-economic repercussions, especially since climate change. Around 15,000 hectares of farmland and pasture have been underwater since then. But people in the area fear the situation will become even more serious. Several studies indicate that the rising water level in both lakes could be an early sign of coming climate change and environmental modifications in the region over the next 20 or 30 years. By 2100, they forecast, the Dominican Republic could lose 14% of its territory as a result of rising sea levels

“But when you have bad governance, of course, these resources are destroyed: The forests are deforested, there is illegal logging, there is soil erosion. I got pulled deeper and deeper and saw how these issues become linked to governance, to corruption, to dictatorship.” - I Will Disappear Into the Forest: An Interview With Wangari Maathai.

Time seems to move slower than usual today. I think to myself, the second we are born, we become pilgrims journeying to a destination that remains unknown until nature reveals it to us. This moment of revelation is the moment of truth that changes the course of our lives forever. Thence, we know for sure that we have a purpose on this earth. At least, that’s how I feel about my dreams and aspirations in life. Today, I am alive and aware of my significance in this universe. I know where I have been, where I am and where I want to go. I will do everything that is required of me to get there and absolutely nothing will get in my way. This is what I call determination, the ultimate catalyst that sustains one’s journey towards success. I chuckle at myself writing this paragraph. Lord knows, I can express myself very well sometimes. It is even more humbling when I think back on the days when I spoke nor read no words of English. I was born in Port-au-Prince, the capital of Haiti where I grew up speaking Haitian Creole and French as my first languages. There are only a few things more wonderful than writing comfortably in the language of Shakespeare; for that I am truly grateful.

Though I lived in the Caribbean, which contributes a nearly negligible Carbon footprint relative to other countries, I am committed to a Greener World. I am passionate about educating others about the effects of climate change and simple ways in which families and communities can mitigate these effects. This was one of the main pillars of the Young Leaders initiative in 2009, of which I was an executive member, at the Washington Archibald High School. The project was entitled ‘The Green Revolution’ and we carried out widespread virtual Carbon traces

of hundreds of individuals and businesses and raised awareness about how their seemingly insignificant electricity-wasting and increased emissions lead to global warming. Additionally, we coupled these academic activities with more practical ones that the communities could get involved in by cleaning up major sites and beaches around the country. At the regional level, the success of the project and my work in this field was acknowledged by my admission to the Rotary Youth Leadership Awards themed Youth Taking Charge. Apart from issues of health, crime and human rights, we focused much on the environment and the advantages of renewable energy. Through the programme, we consecrated a day to reach out to many primary and secondary school students to show and encouraged them to plant trees and save energy for a greener world. Soon after, I was selected amongst a pool of selective applicants to take part in the Pan Global Adventure for Environmental Action with renowned South-African World Explorer, Mike Horn. Through this adventure, I came into contact with extreme weather conditions and environmental issues that proved me how important it is to be aware and play a part in the restoration of our deteriorating environment.

Bad governance has a major impact on environmental justice in Haiti. Furthermore, I want to highlight the lack of Education for Sustainable Development in the country. A step into enabling the population to develop a culture of prevention, safety and sustainability at core levels. The establishment of such culture would firstly teach the youth the importance of protecting their environment; as the youth is the future of the country. Secondly, it will also equip the population with the necessary tools to prevent injuries and the loss of many lives while enabling a swift recovery from these natural disasters while reducing their cultural and socioeconomic impacts on the country.

As a survivor of the major January 12th, 2010 earthquake in Haiti, I have not only witnessed the loss many lives but experienced firsthand the ravaging impacts of a natural disaster. Currently, less than 2% of Haiti's land is forested (Library of Congress: Country Profile Haiti, 10). The loss of all of its trees amplifies how dramatically earthquakes, hurricanes and other natural disasters impact my fellow Haitians. Without trees holding the soil in place, a heavy rain - let alone a hurricane or an earthquake can easily cause mudslides on the country's steep slopes. Many see peace as the opposite of conflict that may be political or civil. Peace, however, is also seen as concord, or harmony and tranquility. It is viewed as peace of mind or serenity and I strongly believe that living green and protecting our environment is equivalent to

living in peace. Haiti continues to claim the dubious honour of being ranked as the poorest country in the Western Hemisphere, with 80% of this Caribbean nation's population living under the poverty line and 54% in abject poverty. Haiti's sorrowful rank as the poorest nation in the Western Hemisphere and one of the poorest in the world has been directly attributed to the degradation of its natural environment (less than 1.5% of its original tree cover remains intact) as well as a lack of governance structures, underinvestment in social capital, obstacles to private investment, and a spiraling "poverty trap". While all these factors are related to one another (and unfortunately feed off of one another as well), environmental degradation is undeniably one of Haiti's most immediate threats.



The primary cause of Haiti's environmental degradation has been caused by Haitian's need for energy. With an electricity sector that only covered 10% of Haiti's population in 2006, chronic energy shortages have contributed to Haitian's search for alternative sources of energy. Unfortunately for Haiti's natural environment, wood became and continues to be the principal energy source in Haiti, accounting for 70 percent of energy consumption in 2006. Wood is burnt and turned into charcoal to be used as fuel. This results in the steady deforestation of Haiti, with an estimated 6,000 hectares of soil lost each year to erosion (International Crisis Group). With such appalling facts and figures, Haiti is in dire need for renewable energy alternatives. However, there is a meager interest from the government to enact such agenda. Does renewable energy have a future in Haiti that may save our future generations? That is yet to be found out.

The loss of Haiti's tree cover has continued to have devastating effects. In 2004, Hurricane Jeanne tore through the island nation leaving over 3000 dead in its wake (Landscape

Architecture for Humanity). Observers noted that many of the dead were killed in massive landslides caused by vast amounts of water falling, washing away soil cover and sweeping through communities leaving a trail of destruction behind. Haiti is and will remain extremely vulnerable to natural disasters such as extreme storms and earthquakes and resulting secondary catastrophes. While Haiti's forest cover is long gone, and its natural environment virtually denuded, it is the combination of failures that have led to this tragedy that we need to understand. The earthquake has led me to the realization that Haiti's deforestation needs more attention than ever. As Haiti is undergoing the phase of reconstruction, this long term issue needs to be carefully addressed. The loss of nearly all the country's forest cover promises to amplify how dramatically earthquakes, hurricanes, and other periodic natural occurrences impact Haitians.

“Natural disasters (droughts, earthquakes, epidemics, floods, wind storms) damage well-

being, both in their immediate and long-term aftermath, and because the insecurity of exposure to disasters is in itself harmful to risk-averse people.” - Jeff Dayton-Johnson, NATURAL DISASTERS AND ADAPTIVE CAPACITY.

It is a routine every Thursday to stroll on all of my social media feeds to look at old and hysterical pictures of my friends in family through the hashtag ThrowbackThursday commonly referred to as #TBT. In the social media sphere, on networks such as Twitter, Tumblr, Facebook and Instagram this weekly trend consists of postings, usually pictures, by users reminiscing of past events. The particular content may date from years or from just a few days prior. Coincidentally or better yet, ironically, last Thursday was World Environment Day 2014. For a split second, ThrowbackThursday started to make me think of Haiti’s rich environmental past in contrast to its now deplorable present environmental issues. This juxtaposition inspired me to write an open letter to the editor of the Caribbean Journal. I was confident that once the piece is published, it will serve as a call for action and commitment towards environmental justice by both the Haitian government and civil society with a major focus on youth. It would also inspire grassroots movements and other non governmental organizations to take or continue to take action for the rejuvenation of our environment.

The article began by defining natural disasters and how impactful they are on a developing country such as Haiti. It suggested that the population should be educated on the risks of natural disasters. A primary school student, for example, should not only know the importance of a tree to its environment but also know how to properly plant and care for one; that should be the goal of an education that advocates for sustainability. The population needs to be aware of how much hurt they’re causing to themselves by cutting five to ten trees to make charcoal. In contrast, they must also be cognizant of how much good it is to plant trees everyday. Awareness is key and it starts with the right education agenda.

Last week I took a tap-tap from Petionville to downtown Centreville. Tap-taps are shared taxis or vehicles for hire which are privately owned and ornately decorated. They follow fixed routes, won't leave until filled with passengers, and riders can disembark at any point in the journey. Many rides hopped on with plastic bottles of sodas or plastic bags of cookies. Many carelessly threw them away either in the street or the tap-tap after consumption. Observing this phenomenon disturbed me so much that I decided to confront one of the passengers.

Me: I have been sitting here and watched 5 people do the exact same thing you just did.

Passenger: So what?

Me: Imagine if a thousand individuals throw away their trash in the exact same way you did. Do you see a trend?

Passenger: Well the trend is already there.

Me: But it takes someone just like you to stop it. If you don't think your actions through and take responsibility for it you start setting a very bad example for our children. If you keep behaving in such manner, Port-au-Prince will never be clean. It doesn't depend solely on the government to clean the streets but you also have to be a concerned citizen and cooperate. I am positive that if you go abroad you would discontinue this behavior simply because you're in a foreign land. Why can't you exercise the same care for your homeland?

Passenger: Sir, you are very thorough but I can't do anything but agree with you. The country needs more people like you.

Me: Thank you but I am simply being a concerned citizen and so should you at the sight of anyone else entertaining behavior that is destructive to the sanity our environment.

Passenger: You are right. I will be an exemplary citizen from now on. Have a good afternoon!

I strongly believe that the implementation of an agenda of Education for Sustainable Development (ESD) would go a long way into disaster prevention and risk management in a country such as Haiti. What is Education for Sustainable Development? Education for Sustainable Development (ESD) emphasizes the need for stimulating a holistic, integrated and interdisciplinary approach to developing the knowledge and skills needed for a sustainable future

as well as changes in values, behaviour, and lifestyles. This requires us to reorient education systems, policies and practices in order to empower everyone, young and old, to make decisions and act in culturally appropriate and locally relevant ways to address the problems that threaten our common future.

According to The United Nations Educational, Scientific and Cultural Organization (UNESCO) whose aim is to build peace in the minds of men and women, Education for Sustainable Development is about learning to:

- Respect, value and preserve the achievements of the past;
- Appreciate the wonders and the peoples of the Earth;
- Live in a world where all people have sufficient food for a healthy and productive life;
- Assess, care for and restore the state of our Planet;
- Create and enjoy a better, safer, more just world;
- Be caring citizens who exercise their rights and responsibilities locally, nationally and globally.

This represents a new vision of education, a vision that helps people of all ages better understand the world in which they live, addressing the complexity and interconnectedness of problems such as poverty, wasteful consumption, environmental degradation, urban decay, population growth, health, conflict and the violation of human rights that threaten our future.

ESD aims at demonstrating the following features:

- Interdisciplinary and holistic: learning for sustainable development should be embedded in the whole curriculum, not as a separate subject;

- Values-driven: it is critical that the assumed norms - the shared values and principles underpinning sustainable development - are made explicit so that that can be examined, debated, tested and applied;
- Critical thinking and problem solving: leading to confidence in addressing the dilemmas and challenges of sustainable development;
- Multi-method: word, art, drama, debate, experience, different pedagogies which model the processes. Teaching that is geared simply to passing on knowledge should be recast into an approach in which teachers and learners work together to acquire knowledge and play a role in shaping the environment of their educational institutions;
- Participatory decision-making: learners participate in decisions on how they are to learn;
- Applicability: the learning experiences offered are integrated in day to day personal and professional life;
- Locally relevant: addressing local as well as global issues, and using the language(s) which learners most commonly use. Concepts of sustainable development must be carefully expressed in other languages - languages and cultures say things differently, and each language has creative ways of expressing new concepts.

The article goes on to assess Haiti's adaptive capacity. Adaptive capacity is defined as a country's ability to grapple with negative shocks from outside the economy, such as financial contagion, terms of trade shocks and natural disasters. In the case of natural disasters, adaptive capacity can be defined as the vulnerability of a society before disaster strikes and its resilience after the fact. (Natural Disasters and Adaptive Capacity, 6). Now one may become even more curious to know what is Haiti's adaptive capacity.

An excerpt from my article analyzes Haiti's adaptive capacity. "An assessment of Haiti's adaptive capacity leads us to two main components: vulnerability and resilience. Due to poor infrastructure, lack of effective zoning codes, and a fragile environment, Haiti has always been susceptible to major losses. Additionally, Haiti has very low resilience - the capacity to spring

back from a disaster. One of the reasons for Haiti's low resilience is the struggle of farmers in the countryside to find cultivable land plots due to deforestation and erosion that consequently affects agricultural outputs. Environmental degradation is a key factor of rural poverty, especially in households that rely on farming for household consumption and entrepreneurial activities." (Restoring Haiti's Environment, 1).

The article goes on to urge the Haitian government to make environmental policy an absolute priority which can only be possible through the implementation of sound and effective environmental policies that can reduce the human and economic costs of natural disasters. It can also increase resilience, and enable swift economic recovery from natural disasters. It must also be emphasized that sound environmental policies are not restricted to education, reforestation and the likes. Currently, Haiti relies heavily on fossil fuels to generate electricity. The government must push an agenda for renewable energy. Over 60% of electricity generation is based on imported diesel mostly from Venezuela. The implementation of renewable energy alternatives will address Haiti's high-energy costs, low electrification rates, and high dependency on fossil fuels. The government and collaboration with the private sector and incoming investors from abroad can work on low-cost clean energy alternatives, create recycling systems to help manage Haiti's waste, and develop new methods for cooking through effective cookstoves and recycled briquettes that can replace charcoal.

Undoubtedly, as a young leader, I believe greatly in the power of youth to be effective change makers in their communities. I tapped into this potential to suggest how youth can be a major vehicle in working towards environmental justice as the Haitian youth is intelligent and resourceful. With the right program, youth can lead the environmental justice movement that will drive sustainable development for Haiti. It is essential for the government to create a Youth Environmental Corps. The newly formed corps of young people can play a major role in creating environmental awareness, encouraging community service, and building a renewed commitment toward environmental issues. The implementation of the newly formed environmental corps would give rise to a new generation of critical thinkers and leaders who would contribute to sustainable and equitable development. Moreover, the youth would earn the opportunity to be included in governance, planning, and decision making in environmental affairs. Youth is the future of any society and their inclusion is valuable and essential in addressing public policies.

Presently, environmental degradation is one of Haiti's foremost ongoing threats. The article reminded Haiti and the rest of the world that is not too late to come together and launch an ambitious environmental agenda and make anew the commitments towards environmental justice. Now that the article has been written and published, what is the next step? How will I turn this call for action and policy suggestions into concrete actions? The published piece received a lot of online traction and attention from the targeted individuals, government officials. I am currently drafting a Youth Environmental Action plan that will be proposed to the Haitian government and serve as a model for other developing countries and non governmental organizations that are seeking to include youth into the sustainable development of their communities. The time to be conscious about environmental issues and climate change is now.

“If you want to bring a fundamental change in people's belief and behavior...you need to create a community around them, where those new beliefs can be practiced and expressed and nurtured.”

— Malcolm Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference*

Malcolm Gladwell is a brilliant writer who has positively impacted my life and enlarged my perspectives on personal and societal growth. His best-selling book “*The Tipping Point: How Little Things Can Make a Big Difference*” focuses on the individual's capability to effect change in society. This book has inspired me to be an effective change maker and a global citizen. The aforementioned quote suggests that in order to introduce fundamental change in people's belief and behavior, the initiator must create a community around them. In our case, the fundamental change that we are striving to introduce is that of Environmental Justice and as the initiator we ought to facilitate the introduction of this change in the population's attitude towards the core environmental issues that the country now faces.

This is the driving ideology behind Jeunesse Verte Haitienne that can be translated from French into The Green Youth of Haiti (JVH). My close friend Olivier and I came together to brainstorm on how we can create a platform for young people both locally and within the Haitian diaspora where they can get involved in the fight for Environmental Justice in Haiti; that session gave birth to JVH. We are developing strategic programs that are primarily targeting primary and secondary schools. JVH will go into these schools to promote the preservation of our environment by creating awareness in the minds of the youth on the current environmental issues. JVH will also hold reforestation and cleaning activities; through the latter, plastic bottles will be collected and sold for recycling. The funds collected from sold plastic bottles will remain within the association to support future initiatives aiming at furthering our agenda of environmental justice.

The structure of JVH will be continually polished to maturity. After which, we will introduce the model to the Ministry of Environment and the Prime Minister's Environmental Advisor for consideration as the basis of the Youth Environmental Corps, which I had suggested in my editorial and mentioned several times. The Youth Environmental Corps will implant the seed of awareness into the minds of our youth on a national scale. With discipline and determination Haiti's upcoming legal citizens will grow up not littering and cutting our trees down but rather planting, cleaning and advocating for recycling and renewable energy alternatives. I believe it to be a concrete and crucial step for the country's environment to rejuvenate.

In Gladwell's other book, "Outliers: The Story of Success", deals with the cultural and societal forces that give rise to opportunistic individuals. There is a quote that says: "Who we are cannot be separated from where we're from." When I read that sentence in the book it resonated to me as "Who I am cannot be separated from Haiti." This is a strong statement and when duly processed it demonstrates how major our role is in reshaping the destiny of our country. Furthermore, this quote should encourage any world citizen to play a role in the progress of their home country. 'Who I am cannot be separated from Haiti' has become the new mantra that daily renews my commitment towards working for a better and more sustainable Haiti.

“How do we cultivate collaboration in the right way so that we achieve the great things that are not possible when we are divided?” - Morten Hansen

To the end of the introduction of the brilliant read of *Collaboration: How Leaders Avoid the Traps, Build Common Ground, and Reap Big Results*, Hansen raises a very compelling question that invokes deep reflection: “How do we cultivate collaboration in the right way so that we achieve the great things that are not possible when we are divided?” According to the Oxford Dictionary, collaboration is defined as united labour, co-operation; especially in literary, artistic or scientific work. I strongly believe that we can cultivate collaboration the right way by knowing strengths and weaknesses of team members and assigning their tasks accordingly. You may wonder whether this has anything to do with Haiti’s current state of environmental injustice. Well it does, bad governance has played a major role in the destruction of natural resources. Erosion, deforestation amongst other issues are inextricably linked to corruption. Such has been the case of Haiti for the past fifty years; government leaders have failed to collaborate, or better yet have badly collaborated. Parliamentarians are constantly opposing the government while failing to ever vote a legislation that caters to an environmental issue.

Hansen highlights that bad collaboration which is a collaboration characterized by high friction and a poor focus on results is worse than no collaboration at all. In contrast, a disciplined collaboration is based on the leadership practice of properly assessing when to and when not to collaborate and instilling in people both the willingness and the ability to collaborate when required. Many governments have gone by and none have made environmental policy the primary focus. Governments have continuously failed to realize how imminent of a threat the environment has become in Haiti, a country that was once referred to as the Pearl of the Antilles filled with natural resources. It gets even sadder flying over the Dominican Republic to Haiti and witnessing the huge gap of forest cover between the two countries; one which abruptly changes from green forest cover to white denuded mountains. One would have thought that the earthquake could have served as a fervent reminder of the current state of the environment to the country's leaders.

It is imperative that the government or any upcoming one makes the environment the number one priority on the list. It is also the population's job to hold these leaders accountable to such commitment. Currently, Haiti has a thriving tourism campaign that is proving to be very successful putting the country back on the world map as an uprising destination as it once were years ago. However, how could one truly focus on tourism when there is no presence of a viable agenda for a sustainable environment? This is a perfect example of bad collaboration. A country that is recovering from a major catastrophe and being rebuilt needs to harness its armor and direct its focus to the most obvious problem. I am not saying that the Ministry of Tourism should not be doing its job. However, It becomes a problem when every other minister of government or any other official is promoting the same tourism agenda while most of the population do not even know the face of the Minister of Environment.

This is the perfect time for necessary cross-collaboration. Tourism could potentially bring significant revenue. Therefore, the Ministry of Environment should join its forces towards developing green infrastructures around the key touristic sites of the country. We can also start witnessing the rise of eco-tourism. In promoting such a thriving tourism agenda, Haiti can also benefit from it.

The Haitian citizen must be transformed into a concerned and aware citizen. One roaming the streets of Port-au-Prince, for example, must know his or her responsibility towards the environment and how the failure of fulfilling such does not go unpunished. What do I mean

by responsibility? The citizen must know the repercussions of littering on the sanity of his environment. When a Haitian travels to the United States, for example, it automatically comes to them from observation that there are garbage bins around and that is where they should throw away all trash. Why is it that it has to take one to travel to do what should come as a natural responsibility of the citizen. In such a scenario, four parties are involved. Firstly, it becomes the job of the Ministry of Education to reinforce an agenda of Environmental Awareness ran by the Ministry of Environment and it is up to the Ministry of Public Works and the Police Force to make sure that these regulations are enforced. The same goes for individuals who are carelessly cutting trees down anywhere anytime without legal permissions.

Haiti sits on top of dangerous faults that may cause subsequent and catastrophic earthquakes. We cannot run away from that but we can build in a manner that would alleviate the damages possible in contrast to the previous January 12th earthquake. One seismologist said that because of failing masonry practices that are linked to corruption, buildings kill people and not earthquakes. It has become viable for the government bodies to take a stand on the issue before anyone else. Such move on their part will demonstrate and reassert the importance of protecting the environment to the general public. It will set the right precedence for generations to come.

“Healthy citizens are the greatest asset any country can have.” — Winston Churchill

Haiti is constantly being challenged and this vulnerable country has suffered from failures in all facets. Human health is dependent on a healthy environment and Haiti is struggling to keep a sane one. Recently, while in Haiti, I became victim of a mosquito-borne virus that was detected for the first time in Haiti a few weeks ago. This virus has quickly spread throughout the country. Over 10 000 cases of the chikungunya virus have been confirmed by the ministry of health. The bulk of the cases, were found in the west department, where the capital of Port-au-Prince is located. And the remainder of the cases were confirmed in northwestern Haiti.

The new numbers seem to represent a startling jump over the past few weeks. Port-au-Prince has been abuzz with people complaining about a sudden and debilitating illness that's been referred to as "the fever." The symptoms of chikungunya include not just a sharp fever but also headache, full-body rash and joint pain. The illness is rarely fatal but recovery usually takes about a week. Some people experience joint pain for months to years. The illness, which is most commonly found in Asia and Africa, was first detected in the Caribbean in December on tiny St. Martin. There is no vaccine for chikungunya and it is spread by the pervasive *Aedes aegypti* mosquito, which also transmits dengue fever in the region.

An outbreak of cholera has been ongoing in Haiti since October 2010. Cases continue to be reported but in smaller numbers than earlier in the outbreak. Cases have been reported in all 10 departments of Haiti. Cholera is a bacterial disease that can cause diarrhea and dehydration. Cholera is most often spread through the ingestion of contaminated food or drinking water. Water may be contaminated by the feces of an infected person or by untreated sewage. Food is often contaminated by water containing cholera bacteria or by being handled by a person ill with cholera.

Although no cholera vaccine is available, people can prevent cholera by following these 5 basic steps:

- 1) Drink and use safe water
- 2) Wash your hands often with soap and safe water
- 3) Use latrines or bury your feces (poop); do not defecate in any body of water
- 4) Cook food well (especially seafood), keep it covered, eat it hot, and peel fruits and vegetables
- 5) Clean up safely—in the kitchen and in places where the family bathes and washes clothes

“The only person who is educated is the one who has learned how to learn and change.” - Carl Rogers

Carl Rogers was one of the most influential psychologists of the 20th-century. Rogers is widely considered to be one of the founding fathers of psychotherapy research and was honored for his pioneering research with the Award for Distinguished Scientific Contributions by the American Psychological Association (APA) in 1956. The person-centered approach, his own unique approach to understanding personality and human relationships, found wide application in various domains such as psychotherapy and counseling, education, organizations, and other group settings. Upon reflecting on the aforementioned quote, being concerned with the sustainable development of Haiti, I wondered what successful city Haiti could emulate in order to protect itself from subsequent seismic activities. Through thorough research, I have come up with two exemplary models that Haiti can learn from and change for the better.

Twenty-five years ago, the San Francisco Bay Area was hit by the Loma Prieta earthquake. Since then, the city has taken steps to increase the safety of inhabitants. They have launched a very innovative program: AlertSF, a new aspect of the Emergency Alert system which sends text message alerts to mobile devices. 15 years ago, a cellular phone was a luxury in Haiti. To have one and maintain it was a very costly endeavour. However, 8 years ago, Digicel Group stepped on the field and changed the game considerably. Since this new era, cellular phones have become affordable and accessible in the country.

In 2014, every household has a cellular phone in its possession. This has made it easier to reach out to the population and send warnings of diverse nature. An initiative that Digicel had already undertaken during hurricane season; that which to alert the population to remain safe, especially in dangerous areas. The rise of technology in Haiti now makes room for collaboration between the government and this private company for the safety of the Haitian population. AlertSF serves as a great example for Haiti to follow and why not name it AlertHT. In

comparison to other islands, Haiti is as badly and equally positioned for future earthquakes. Furthermore, to Haiti's disadvantage, more resources are being put available for the other countries during disaster as they are richer and have access to more advanced technology.

Furthermore, San Francisco's Disaster Council has reviewed the Earthquake Response Plan Enhancement. This Enhancement supplements the city's existing Emergency Operations Plan (EOP) with catastrophic-earthquake specific response planning, input from all city departments, and data gathered from past urban earthquakes around the world. To prepare this Enhancement, the San Francisco Office of Emergency Services and Homeland Security (OES&HS) reviewed extensive research of after-action reports and lessons learned from large urban earthquakes, including, Loma Prieta, the Northridge earthquake of 1994, and the Hanshin-Awaji (Kobe) earthquakes in Japan in 1995. They used this data to identify challenges to earthquake response and disaster management. Subsequently, they have also formed of a new management unit -- the Structural Safety and Emergency Management Division (SSEM) -- within the city's Department of Building Inspection. The SSEM Division implements new seismic safety programs, including the proposed automatic gas shut-off valve, the seismic risk reduction of soft/weak-story, open-front wood-frame buildings and the Pacific Earthquake Engineering Research (PEER) Center Tall Buildings Initiative.

On the other hand, Chile has a National Emergency Plan since 1977, which has been updated and improved to become in 2002 the National Civil Protection Plan, NCPP (Gobierno de Chile 2002). The NCPP is a strategic multi-sector master plan that defines methodologies and the organization structure to prevent, mitigate and address emergencies or disasters in Chile. The NCPP can be put into action by different public/private institutions, government agencies, volunteer groups and organized local communities under the coordination of the National Emergency Bureau of the Ministry of Interior of Chile, ONEMI. ONEMI serves as a logistic entity and gives continuous support to different institutions on both prevention and response at different geo-political levels in Chile, such as National, Regional, Provincial and Municipal. Prevention activities are coordinated by the Civil Protection Committee which is mainly comprised of professional organizations, private institutions, local industry groups, local government agencies and any other organized entity willing to participate, improve or develop mitigation/ preparation plans. The response, including also the rehabilitation process, is the

actual activity during and after the event coordinated by the Emergency Management Committee, EMC.

Civil engineering infrastructure in Chile after the 8.8-magnitude El Maule earthquake in 2010 has a relatively good performance considering the high level of shaking and the close distance of a large population to the rupture area. Most structural damage was observed in low-rise informal construction buildings (e.g. 1 or 2-storey unreinforced masonry buildings). However, this earthquake also revealed many flaws and deficiencies in the design and construction of other different types of buildings in Chile. A couple of months after the earthquake, the government of Chile introduced two temporary laws, DS 60 (2011) and DS 61 (2011), to quickly address the reconstruction process in Chile based on the recent experience and more updated seismic design standards. Currently, researchers and structural engineers are working together to modify the seismic design and construction standards, the NCh433 (2009) and the NCh430 (2008), of new buildings in Chile addressing the flaws and issues observed after the earthquake in 2010. After the January 12th earthquake in Haiti, many experts emphasized how the earthquake did not kill the people but rather the poorly constructed buildings. Construction is not regulated in Haiti, therefore buildings are built anarchically failing to take into account any standard safety measures. People build anywhere and anyhow. The Haitian government should follow Chile's example and implement stringent construction laws to prevent history from repeating itself in the awful manner that it had previously done.

In terms of the emergency management process during the most recent event, local communities and reports identified a number of issues, such as uncoordinated efforts between the central government, the ONEMI and local authorities, lack of communication tools, poor interaction with international agencies, deficiencies on emergency plan implementation amongst many others. Most casualties were tsunami related in coastal cities/towns within the rupture area and currently being investigated with respect to their relationship with the flaws and issues identified during the emergency coordination process. To avoid the same issues identified during the earthquake in 2010, ONEMI has reorganized its structure and is currently developing an Integral Emergency Information System, SIIE (Instituto Geografico Militar 2011) and an Early Warning System. Some preliminary information regarding the implementation of these systems was gathered from the meetings in Arica, Iquique and Antofagasta.

Last month, I attended a forum held by the World Bank in Haiti under the theme of “Understanding Risk”. “To act on the risks, we must first understand them,” said Michel Matera, Risk and Disaster Specialist for the World Bank. Haiti is the second country in the world to host the forum of Understanding Risk in accordance to the World Bank, this forum provided a platform for discovery and exchange. Haitian and international experts in risk assessment presented technological innovations and best practices in the field. This forum also provided an opportunity to engage policymakers to establish a favorable environment and take into account risk management in the country's development, develop partnerships, and encourage new initiatives to prevent risks in Haiti. Several activities took place around the forum to promote new approaches and innovative technological tools to better understand risks and to reduce extreme disaster vulnerability in Haiti. Training sessions on risk analysis, photography contests, and writing workshops, were some of the activities that took place. A wide variety of workshops focused on understanding risks, their integration in developing countries, with a focus on land use, the frame and the resilience of vulnerable communities, and the establishment of an institutional environment conducive to taking risks into account.

The forum brought together a variety of stakeholders in the public sector, civil society, private sector, international cooperation, media, and research and training institutions. This initiative of the Haitian government and the World Bank contributed to the achievement of the following objectives: to provide the most efficient and less costly tools and methodologies for risk assessment, and to help policymakers and communities to better understand and manage the risks they face. At the end, the experts produced a booklet that contains the 10 initiatives that the government has put in place to prevent risks and lay the foundation for sustainable development in Haiti. I strongly believe that eyes are being opened on the obvious disaster potentials in Haiti and action is being taken accordingly. This forum proved to be very insightful, collaborative and successful. I hope that the conclusions that came about will be strategically implemented. It should not only rest upon the World Bank’s shoulders to organize similar forums. The government of Haiti must make it a duty to gather periodically to discuss the disaster management of such a vulnerable and yet unprepared country.

Can Haiti survive another major earthquake? Will a future quake nullify any preparative efforts made by the concerned bodies? Should the population be relocated from vulnerable areas to safer locations? These are questions that remain unanswered. They also constitute the

impending doom of Haiti. With adequate citizen involvement and responsibility, I believe there is hope for Haiti to stand tall after natural disasters; specifically an earthquake. Today, Haiti is at a critical cornerstone. I implore the World Bank to push an agenda that will transform the current circumstances and use Haiti as an exemplary model for ideal earthquake preparedness in order to help susceptible countries in the future.

### **Bibliography**

Center for Disease Control and Prevention, *Cholera in Haiti*, We August 2014

Comte D. and Pardo M. (2001). Reappraisal of great historical earthquakes in Northern Chile and Southern Peru seismic gaps, *Natural Hazards* 4, 23-44.

Dany Laferrière, *Tout Bouge Autour de Moi*, Memoir D'ancier, Avril 2010

Disasters Emergency Committee, *Haiti Earthquake Report*, July 2010

DS 60, Supreme Decree 60 Design and calculation for reinforced concrete, Ministerio de Vivienda y Urbanismo de Chile, Santiago, Chile, 2011

DS 61, Supreme Decree 61 Seismic Design of Buildings, Ministerio de Vivienda y Urbanismo de Chile, Santiago, Chile, 2011

Gina M. Scott, *San Francisco Takes Steps to Improve Emergency Management and Ensure Safety*, GovTech, Web 2006

Government of Chile, National Plan of Civil Protection, Ministry of Interior, 2002

*Haiti's Poverty is Directly Linked to Deforestation and Habitat Loss*. Web. Amiel Blajchman. 10 May 2009

*I Will Disappear Into the Forest: An Interview With Wangari Maathai*. Web. Dave Gilson. 05 January 2005.

Incorporated Research Institutions for Seismology, *GEOTECHNICAL ENGINEERING RECONNAISSANCE OF THE 2010 HAITI EARTHQUAKE*. Web 2010

Jeff Dayton-Johnson, *NATURAL DISASTERS AND ADAPTIVE CAPACITY*, OECD Development Center, August 2004.

*Library of Congress - Federal Research Division. Country Profile Haiti*. Web. 2006

Malcolm Gladwell, *Outliers: The Story of Success*, November 18 2008, Little, Brown and Company

Malcolm Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference*, January 7th 2002, Back Bay Books

Morten Hansen, *Collaboration: How Leaders Avoid the Traps, Build Common Ground, and Reap Big Results*, April 14th, 2009, Harvard Business Review Press

NCh433, Earthquake resistant design of buildings, Instituto Nacional de Normalizacion, Chile, 2009

NCh430, Reinforced concrete – design and calculation requirements, Instituto Nacional de Normalización, Chile, 2008

Patricia Grogg, *Rapidly rising lakes levels threaten trade on Dominican-Haiti border*, The Guardian, Web 2012

Stephane Vincent, *Op-Ed: Restoring Haiti's Environment*, Caribbean Journal, Web June 2014

The Editor, *Haiti earthquake caused by new fault line*, The Telegraph, Web Aug 2010

Time Magazine, *Haiti's Earthquake Destruction*, Web March 2010

UNESCO RESOURCES, *What is ESD?*, UNESCO.org, Web 2014