CHAPTER 1

AN ISLAND SHATTERED

An Earthquake Strikes

Another hot, humid, dusty day in the streets of a Caribbean capital. Flies crowd the markets and aged motorbikes and cars bounce through the potholes, coughing emissions and dodging pedestrians. Azure waves lap against the docks while street dogs and pigs scrounge for morsels in the trash heaps dotting the hill neighbourhoods. Just the typical sights, sounds, odours, and haze of life playing out as it has thousands of times before, with the shimmering heat starting to dissipate as the sun droops towards evening.

Today, though, is far from typical. It is 4.53 p.m. on Tuesday 12th January 2010 in Port-au-Prince, Haiti. Twenty-five kilometres west-south-west of the city, just thirteen kilometres below the surface, the earth jolts, fracturing rock, heaving soil, and radiating waves of motion with an intensity technically described as moment magnitude 7.0. This is high on the scale with which earthquakes are measured; just one or two earthquakes at this level or stronger occur in any month somewhere in the world,

although often much deeper below the surface than Haiti experiences on this day.

The earthquake's first set of waves, the primary waves, travel twenty times faster than most passenger jets, giving premonitions of the coming destruction. Port-au-Prince has the misfortune of being so close to the rupture's centre that most people have only seconds before the secondary set of waves, the shear waves travelling half as fast, arrive. The devastation begins.

The arrondissement (district) of Léogâne, almost on the earthquake's epicentre, witnesses over 80 per cent of its buildings badly damaged or destroyed. Many rural areas lose the little infrastructure they have, with dirt roads cut by landslips and schools entombing pupils and staff. Around the capital, thirty kilometres away, the shaking lasts for between thirty and sixty seconds. Thousands of buildings crumble, especially the shoddily built, ramshackle dwellings inhabited by people with no choice but to live there. Some buildings collapse in on themselves or tip over. Others slide down the hills into the ravines. The stories of the people who live in these homes are rarely told: people who scrape by day to day, ambling along the unpaved roads, living without running water, electricity, or sewage systems, and then dying in the ruins of their small, dilapidated shelter.

As one lives poor, one dies poor. The immediate aftermath could not bring ambulances and fire trucks wailing through the streets, with hard-hatted rescuers ready to haul out unconscious survivors, stabilize them right there, and then whisk them away to advanced life support in hospitals. Instead, roads are impassable to cars, vans, and trucks—as many were before the earthquake, with these vehicles stymied by the steep slopes, the inadequate infrastructure, and the difficulty of driving after dark. Rescue and

medical services do not exist to respond, and this too is a situation long predating the earthquake. As the sun sets, the survivors wonder what to do about water, food, toilets, and sleeping—questions many of them asked every day.

Except that today, the earthquake has happened. The first task is finding family and neighbours under the rubble. Throughout the dusty area, people scramble onto and into partially standing structures, despite the danger of aftershocks. They dig with shovels, makeshift tools, and their bare hands, carrying blood-covered casualties outside.

The destruction seems arbitrary. A pile of masonry which was once a house sits sandwiched between two others that still stand; a collapsed roof is surrounded by others that remain intact. Other blocks, which were crowded neighbourhoods earlier in the day, now resemble derelict construction sites. As the dead are recovered and the injured rescued, makeshift medical centres—never with enough personnel or gauze or room or antiseptic—shelter child and adult amputees. Soon, tent cities spring up proffering small rooms under flimsy sheets for extended families that have lost half their members.

The quagmire of poverty perseveres. Before 12th January, how could Haitians in the informal settlements begin to think of earthquakes? Even where their abodes were not constructed from masonry, sometimes making them safer during earthquakes, daily life meant struggling for food and water, navigating the open sewage and the violence, and being denied education and healthcare. Not much changes after 12th January, except that their rickety residences exist no more.

Higher-profile structures of the well-to-do fare no better and the losses are just as calamitous, but they garner international

attention and international rescue resources. Parts of the Presidential Palace crumble, leaving it like a smashed and smeared wedding cake. One section of the country's United Nations (UN) headquarters pancakes, six storeys becoming one. UN employees die, 102 in all, the largest single-day loss of life in the organization's sixty-four-year history and a tragedy involving staff from every inhabited continent. The dead include the top UN official for Haiti, his deputy, and the acting police commissioner—all well deserving of the praise and memorials they received, as are the tens of thousands of ordinary Haitians who were provided with neither.

Many other UN employees and Haitians survive, only to reach home to discover that their spouses and children did not. A Danish man who had been working in the UN building is rescued five days later. He describes how he heard others trapped but alive, their noises ceasing thirty-six to forty-eight hours before he was pulled out. Dust clouds lift above the luxury seven-storey Hotel Montana, renowned among foreigners and once hosting dignitaries, celebrities, and country leaders. Over four dozen bodies are eventually recovered, including staff, tourists, and business travellers.

As the earthquake runs its course, at least 150,000 people and possibly up to double this number, the vast majority of them poor Haitians, are dead or dying. Disaster casualties are notoriously hard to tally, especially when the number of people living in an affected place is not known. The true death toll, and the true toll of suffering, in southern Haiti, can never be known.

The Haitian disaster mobilized the world. Aid soon poured in, along with journalists. Taking over from locals using their bare hands and basic tools to dig for survivors, international rescue teams crawled through collapsed structures time and again.

Many tearful reunions made it worthwhile, but the joy was marred by the growing piles of corpses. Locating all the bodies took weeks. When it was deemed that no one remained underneath a wrecked building or that they were not recoverable, a major logistics operation cleared and dumped the masses of rubble.

Governments and organizations pledged around US$13 billion of aid and delivered perhaps half. Remittances and individual donations are harder to track and they provided support to people who had lost everything except their own lives. The people's continuing desperation did not stop the political shenanigans. Days after the earthquake, the US military took over airport operations at Port-au-Prince, sparking a backlash from countries and agencies whose aircraft were unable to land. As the political fights brewed, Haitians were left needing the basics.

Flimsy tents were erected on mud-prone slopes only to be blown away by moderate winds. Privacy, security, dignity, and safety were not always significant considerations in setting up the temporary settlements, leading to continual rape and assault with little recourse for catching and punishing the perpetrators. Even allowing for the fact that attacks are under-reported because many fear that they will be stigmatized or abused for documenting what happened to them, by the end of a year after the earthquake, at least one-tenth of households in the temporary settlements had reported that a member had gone through some form of sexual assault.

As the post-earthquake months dragged on without promised housing being built, tens of thousands of Haitians were forcibly evicted from these temporary settlements. In many cases, they went from squalor to nothing. Once again, so many people were left without safety, without jobs, without healthcare, and without

schools for their children, despite the world's attention and the promises to 'build back better'.

The troubles did not stop there, as UN soldiers tasked with helping post-earthquake reconstruction made the situation even worse. On 21st October 2010, the Haitian government declared an outbreak of cholera, a disease not seen in the country for over a century, and over 10,000 people have died from it since. The UN soldiers had introduced cholera, which spread swiftly due to the extremely poor quality of water, sanitation, and hygiene across Haiti, not helped by the earthquake disaster.

The UN first tried to avoid responsibility for the outbreak, but then commissioned an independent report which concluded in May 2011 that the methods for handling and disposing of the UN soldiers' human waste were not sufficient to prevent cholera contamination. Claims for compensation from the UN by those affected by cholera were met with intransigence up to the level of Secretary-General. In February 2013, a formal UN statement effectively denied the need to provide compensation by not accepting legal responsibility for the cholera outbreak due to diplomatic immunity.[1]

It took until August 2016 for the UN to admit formally the role its troops played in bringing cholera to the country and it was December of that year when UN Secretary-General Ban Ki-moon, in his last month holding his position, finally issued an apology.[2] In between, in October 2016, the UN offered 'material assistance' (which some take as a code word for 'compensation') to those affected by cholera as part of a US$400 million initiative, which also involved eradicating the bacteria and improving Haiti's water and sanitation infrastructure. Without a specific funding or allocation

plan for this initiative, it was unsurprising that, over two years later, little had happened and cholera still plagues Haitians.

From flimsy shelters to disease to sexual violence, how could so much go so disastrously wrong during the relief, recovery, and reconstruction? There is no lack of experience in humanitarian aid and no shortage of guidelines and manuals gracing the shelves. All the heartaches identified in post-earthquake Haiti had multiple precedents registered in reports from past disasters.

More to the point, why did the world have to wait for the earthquake to mobilize so much help for Haiti? As with humanitarian aid, there is plenty of experience side by side with guidelines, manuals, and texts on building to withstand earthquakes and other hazards—and developing a society which can deal with an earthquake and other hazards. Little of this accumulated insight had been applied to Haiti. The promised US$13 billion, or even half of that, would have gone a long way towards preventing the disaster in the first place.

Before and After the Earthquake

It is hard to predict exactly when earthquakes will hit, as there are few reliable warning signs beforehand. In the long term, statistical analysis can provide some indication of the time frame within which a geological fault will move. For now, so many assumptions are needed, and the ways in which a fault can shift are so varied, that confidence in the predictions is low. In the short term, hours or days before a tremor, a variety of proposed indicators has been examined, from radon gas to groundwater levels and from animal behaviour to electricity in the air. No single sign has proved itself

sufficiently to be accepted. This doesn't, of course, stop some individuals popping up after a major earthquake claiming they foresaw it, neglecting all the previous times they predicted an earthquake which did not happen, and so making scientists rightly leery about such claims.

Despite not knowing when an earthquake will occur, many major tremors can generally be forecast by location, in terms of mapping known faults, most notably along the boundaries of tectonic plates. This method is not 100 per cent reliable and earthquakes still occur far from major tectonic plate boundaries, as witnessed on 25th December 1989 when northern Québec, in the middle of a tectonic plate, experienced surface ruptures during the Ungava earthquake. Even at known tectonic plate boundaries, previously unknown faults can slip, which is what occurred in Northridge, California on 17th January 1994, with damage killing about fifty-eight people. We certainly know that Dushanbe, Istanbul, Jakarta, Kingston (Jamaica), Mexico City, Quito, San Francisco, Skopje, Tehran, Tokyo, Vienna, and Wellington among many others will be rattled at some point. Port-au-Prince was also on this list.

Knowledge of Haitian earthquakes extends back centuries. In 1842, a quake about ten times as powerful as that of 2010 rocked the country's north coast. Hesketh Prichard, a British explorer and then a First World War sniper, referred to it in a scientific article of 1900, describing his journey across Haiti.[3] Another research piece from 1912 mentions 1842 alongside the major damage around Port-au-Prince from shakings in 1751 and 1770.[4]

Yet despite this knowledge of seismicity, little was done. Why was the infrastructure in the capital city so poorly constructed? Why were so many people poor, leaving them with no choice but

to live in these buildings without hope of improving them? Why did even the affluent parties, from the country's president to the UN to the developers of Hotel Montana, not enact basic earthquake safety principles? These questions were being asked in 2010: a meeting on tackling disasters in Haiti, highlighting seismic safety, was concluding on 12th January when the earthquake rumbled through.

The overwhelming inequities, underdevelopment, and marginalization precluded a quick fix. Haiti, as a country, is not especially poor or under-resourced, but the scale of inequality is horrifying. Centuries in the making, all these problems could not be easily solved. It takes time to put up tens of thousands of buildings which lasted barely a minute on 12th January. It takes time to create a city rife with informal settlements, without basic services, and lacking planning regulations, building codes, and institutions to monitor and enforce such laws. It takes time to produce a culture of day-to-day bustle across exposed electric wires, through haphazard doorways, and around informal structures.

For Haiti in 2010, this time period might have been precisely 206 years. Before 1804, France had been the ruling colonial power, exploiting slaves to plant and harvest coffee, sugar cane, and tobacco. In treating human beings as commoditized objects, France's costs were low and profits were high, a wealth built on the back of inhumanity. At the time, a colonizer would not care much about saving the lives of the colonized, especially since slaves could easily be imported from elsewhere.

In 1791, in the wake of the American War of Independence (1775–83) and the French Revolution of 1789, Haitian slaves rebelled. Twelve years later, as the Napoleonic Wars gripped Europe, the Haitians won. A year after that, on 1st January 1804,

Haiti declared independence, so that the first free Caribbean state was born, only to remain everywhere in chains.

Colonial powers refused to accept this freedom. France exacted a heavy toll through a demand for reparations, finally paid off by Haiti in 1947. The USA, with its own colonial experience apparently forgotten, joined in the exploitation. In 1868, American President Andrew Johnson suggested annexing the island, but it never happened. US warships were a common sight around Hispaniola until in 1914 US President Woodrow Wilson sent in the marines to move the foreign cash reserves of Haiti to New York. In 1915, the marines arrived again as an occupation force, staying until 1934.

This pattern of control persisted over the next decades through Haitian leaders. François ('Papa Doc') Duvalier retained an iron grip over the country from 1957 to 1971 after which his son Jean-Claude ('Baby Doc') Duvalier continued in the same vein. They subjugated, tormented, and pillaged Haiti as much as France and the USA had done before them. Although the former colonial powers were not wholly enamoured with the Duvalier regimes, they more often than not took advantage of the leaders' absolute power while the Haitian people suffered. Baby Doc fled to France during a popular uprising in 1986, paving the way for elections and coups in Haiti.

Jean-Bertrand Aristide became the on-again, off-again elected president of Haiti. A convoluted American foreign policy remained uncertain exactly where the White House and American troops stood with respect to Port-au-Prince. In 2004, the UN took over and was working at reconstructing the country with evidence of some progress.

After a steady increase between 2004 and 2008, Haiti's population growth rate dipped slightly in 2009. Infant, child, and

maternal death rates continued their steady decline, each dropping by more than 10 per cent from 2004 to 2009. Numbers and rates of undernourishment decreased during the same time period.

With over half the population under the age of 20, opportunities for education and jobs persisted as a major challenge. Riots over food prices in 2008 precipitated the firing of the prime minister. As Haitians had done for decades before, thousands fled in derelict boats, hoping to reach the USA, the Turks and Caicos Islands, or the Bahamas. If they did arrive and could find work, their remittances provided a lifeline for those staying at home. Commonly, the US Coast Guard intercepted and repatriated those in boats, leaving them to try again another day. Many more simply disappeared at sea, slipping below the waves or being devoured by sharks.

This roller-coaster progress characterized Haiti, as it had done since independence, when the earthquake battered over two centuries of social and infrastructural neglect. And earthquakes are not the only hazard facing Haiti. On 14th September 2004, tropical storm Jeanne formed in the ocean near several Caribbean islands. The system tracked west-north-west, becoming a hurricane on 16th September and skipping along the Dominican Republic's north shore as a tropical storm before unleashing its rainfall across northern Haiti.

The city of Gonaïves was worst affected, suffering more than 2,800 of Haiti's 3,000 Jeanne-related fatalities. The same vulnerabilities which led to the 2010 earthquake's devastation created the Jeanne disaster. Lack of opportunities, gross inequities, oppressive dictatorships, and centuries of exploitation by the outside world made people vulnerable.

Part of this equation was environmental degradation, including decades of deforestation. Denuded of trees, the hills sent the rainfall sluicing into low-lying areas. Mud, floods, and landslides marked Jeanne's passage, killing people and blocking roads delivering post-disaster aid. The same was true outside of hurricane season. Four months before Jeanne, along the Haiti–Dominican Republic border, flash flooding from intense rainfall killed more than 1,000 people in Haiti and over 400 in the Dominican Republic.

It would be easy to blame the rainfall for leading to deadly floods and landslides. It would be straightforward to pontificate that Haitians made the decision to cut down the trees. Doing so ignores our understanding of the nature of these unnatural disasters. The real disaster is revealed by the questions which we must raise and answer. Why did people feel they had no choice but to cut down trees? Why was infrastructure so poor that it could not withstand rainfall? Fundamentally, why did people not have the resources, knowledge, options, abilities, and opportunities to prepare for and deal with a storm? The answers to these questions are the same as for the 2010 earthquake.

Then, on 29th September 2016, a tropical storm formed just west of Barbados. As hurricane Matthew, it briefly reached Category 5, the most powerful, on 1st October before shifting between Categories 3 and 4 during its march northwards. Jamaica, Cuba, Haiti, and other countries in the area issued warnings. Many people evacuated locations in Jamaica as Cuba's well-tested civil defence went on standby. But Haiti took the brunt of the storm when it tracked east, cutting across the country from 4th to 5th October. Jamaica escaped a direct hit, with no reported deaths. Cuba and the Dominican Republic each listed four fatalities. Haiti's toll was at least 500 killed.

And there was the continuing cholera epidemic too. Following Jeanne and the May 2004 flooding, at least there had been no need to worry about the spectre of cholera. Society had taken action to deal with cholera long before 2004. It was the same during the 2008 hurricane season. Four storms in a row—Fay, Gustav, Hanna, and Ike, representing two tropical storms and two hurricanes—ripped through different parts of Haiti killing hundreds. No matter how much or where the rain fell, cholera had never been a concern.

By the time hurricane Matthew appeared on the map, Haiti had already reported 29,000 cholera cases for 2016. The disease's death toll around the country since it was introduced after the earthquake in 2010 already matched, if not exceeded, the total number of storm-related deaths within the same time period. As Matthew moved on and the floodwaters subsided, Haiti's cholera cases grew. The humanitarian response was duty-bound to involve cholera prevention, treatment, and vaccination. Human decisions following the 2010 earthquake had created the hazard of cholera for Haiti, which existing vulnerabilities turned into a continuing disaster. This disaster was illuminated by another hazard, a hurricane.

No shaking of the earth, no downpour from the clouds, and no wind from a storm created cholera in Haiti or vulnerability to the disease. The disaster is not natural. The bacterium was introduced by people, and it continues to grip the country because of human failures.

Two months after Matthew, an international group of doctors and researchers advising the Minister of Health and Population of Haiti estimated that cholera transmission in Haiti could be stopped within five years for around US$66 million.[5] Considering

cholera's cost of thousands of deaths and hundreds of thousands falling ill, as well as what might transpire should the disease cross the border into the Dominican Republic, this is a bargain. Thus far, no one has given the resources needed to achieve this goal, even though we know that every year, Haiti has the potential for a hurricane, earthquake, or tsunami which would entail the emergency import of cholera treatment and vaccination equipment.

Such decisions are not one-offs. They are systematic and continual, ensuring that the cholera burden on the Haitian population endures. They exemplify a long-term attitude of, in effect, allowing the perpetuation of a long-term problem inside Haiti which was introduced from outside.

And so the disasters continue. They parallel exactly the perpetuation of the long-term problem inside Haiti of entrenched disaster vulnerabilities which were introduced mainly from outside the country. The systematic and continual decisions to oppress most of the Haitian people, to snatch resources from the country, and to sustain the abject poverty all conspire to create the vulnerabilities which in turn create the disasters. The 2010 earthquake exposed the centuries of neglect, brutality, and vulnerabilities foisted on the Haitians who could least afford to challenge their locked-in position.[6] The 2016 hurricane exposed the years of neglect, brutality, and vulnerabilities foisted on the Haitians who are least able to avoid cholera by their own means.

This is the disaster. The disaster is these long-term processes, over years and centuries, not the short-term events, over seconds (earthquakes), minutes/hours (tsunamis), and days (hurricanes). The process of unrolling disaster is based on the long-term choices of people who have the power, resources, knowledge, and abilities to make essential and intrinsic changes—but apparently not the

wisdom, will, or principles to do so. A disaster is not an event and is not the fault of nature. A disaster is a process manufactured and implemented by people and their choices.

How could an oppressed, marginalized, overexploited country forced to remain underdeveloped with the people in poverty ever deal with nature's extremes? Hurricane Matthew provided at least three days of preparation for Haiti. The entire Caribbean knows that any date between June and November (and sometimes outside these months) could bring a storm roaring through. The 2010 earthquake provided barely seconds of preparation time, but Haiti nevertheless knew that it could shake at any time.

Disasters such as those hitting Haiti hit the headlines and capture our attention. They are nothing new, having always happened throughout human history. Did disasters exist before human history? This question is not easy to answer because a disaster is described through effects on humans and society. Neither the earthquake of 2010 nor the rainfall of 2004, 2008, and 2016 would have mattered if they had not killed and injured people, disrupted routines, and damaged infrastructure. It is hard to have a disaster without humanity. Yet nature still produced the earthquake and storms.

Disasters not involving nature—such as chemical explosions, riots, and terrorism—are clearly not natural. When an environmental component—such as earthquakes and hurricanes—is involved, then disasters seem to be caused by the environment and are blamed on nature. Then what exactly is wrong with the phrase 'natural disaster'?

The definition of the term 'disaster' relates to its impacts on humans. At the basic level, trawling through hundreds of pages of academic writing on the definition, dozens of professional

manuals, and several dictionaries, a reasonable definition is 'a situation requiring outside support for coping'. Something happens, we cannot deal with it, and we ask for help. This concept works at the individual level and at the international level, matching UN glossaries, researchers' viewpoints, emergency services' interests, and dictionaries.

These seven words display vagueness—how should 'situation', 'support', and 'coping' be interpreted?—but vagueness can rarely be avoided. The principal power of these words is that they are understandable, somewhat intuitive, and work across many (although certainly not all) languages and cultures. The key is that disasters are defined by their societal impacts, not by the degree or scope of any influence from nature.

We also need to consider why those affected by nature cannot cope with it. The reason lies beyond the natural environment: vulnerability of people, places, infrastructure, and communities. Vulnerability means that people do not have the resources, knowledge, or choices available to stop nature from harming them.

Haiti's earthquake and storms were natural, but its disasters were not. They arose from individuals and society. But this is all for Haiti. Does the same pattern hold elsewhere?

CHAPTER 2

NATURE'S HAZARDS

Change is Natural

Our natural environment changes, as it has done for billions of years. Species evolve, continents drift, and sea levels fluctuate over time periods of hundreds, thousands, and millions of years. Some volcanoes wait millennia or longer between eruptions, as magma from deep underground slowly wends its way to the earth's surface. In the meantime, people build. The last known eruption of Germany's Laacher See volcano near Bonn was nearly 13,000 years ago, when comparatively few people were in the area. Scientists calculate that a similar eruption today would affect over two million people and the damage to housing alone would cost between 18 billion and 27 billion euros.[1]

As the ages wax and wane, the shape of the earth's orbit around the sun varies. So does the direction in which the earth's axis tilts compared to the sun. These variations affect seasonal extremes and lead to ice ages advancing and retreating.

Over human lifetimes, across decades, the climate witnesses further changes. The North Atlantic Ocean, the Pacific Ocean,