Geo Factsheet

www.curriculum-press.co.uk Number 285

Haiti Earthquake 2010

Haiti is one of the poorest countries in the world and therefore very vulnerable to natural disasters. So when it was hit by a magnitude 7.0 earthquake on 12 January 2010, at 16:53 local time, people's resilience and ability to cope was almost non-existent. This Factsheet will examine the ways in which Haiti was impacted by the disaster and how much progress has been made in the past two years.

Physical Event

The earthquake occurred on the Enriquillo Fault, which marks the northern edge of the Caribbean tectonic plate (Figure 1), and which slips eastwards by 8 cm per year. The last major earthquake on this fault was in 1770, and so the 2010 event released most of the locked-up energy since then, causing movement of about 2.0 metres. However, unusually for an earthquake of this magnitude, there was no surface rupture – the movement was underground between depths of 2-8 km. The seismic waves which reached the surface (Rayleigh and Love waves), travelling across soft sedimentary coastal plains and creating massive damage. The epicenter was at Leogane, 15km south-west of the capital, Port-au-Prince, and two strong aftershocks of 5.9 and 5.5 magnitude occurred. A further aftershock of 6.1 followed a week later.

Immediate impact

The scale of impact is shown in Figure 2. The official death toll was 222,500 and thousands remained unaccounted for, buried beneath collapsed structures. Of the 2.5 million people living in Port-au-Prince and its hinterland, 15% either died or were injured, with 75,000 buried in mass graves immediately to prevent the spread of disease. Even so, many bodies were piled up in the streets and left for days. 1.5 million people were made homeless, forcing 800,000 people to live outdoors in 450 improvised camps in Port-au-Prince. Only 40% of these had improvised shelter material and only 3 camps had potable water. The capital's main port was destroyed and in terms of services, phone lines failed soon after the earthquake, adding to the chaos as communications were impossible.

Figure 2 Key facts

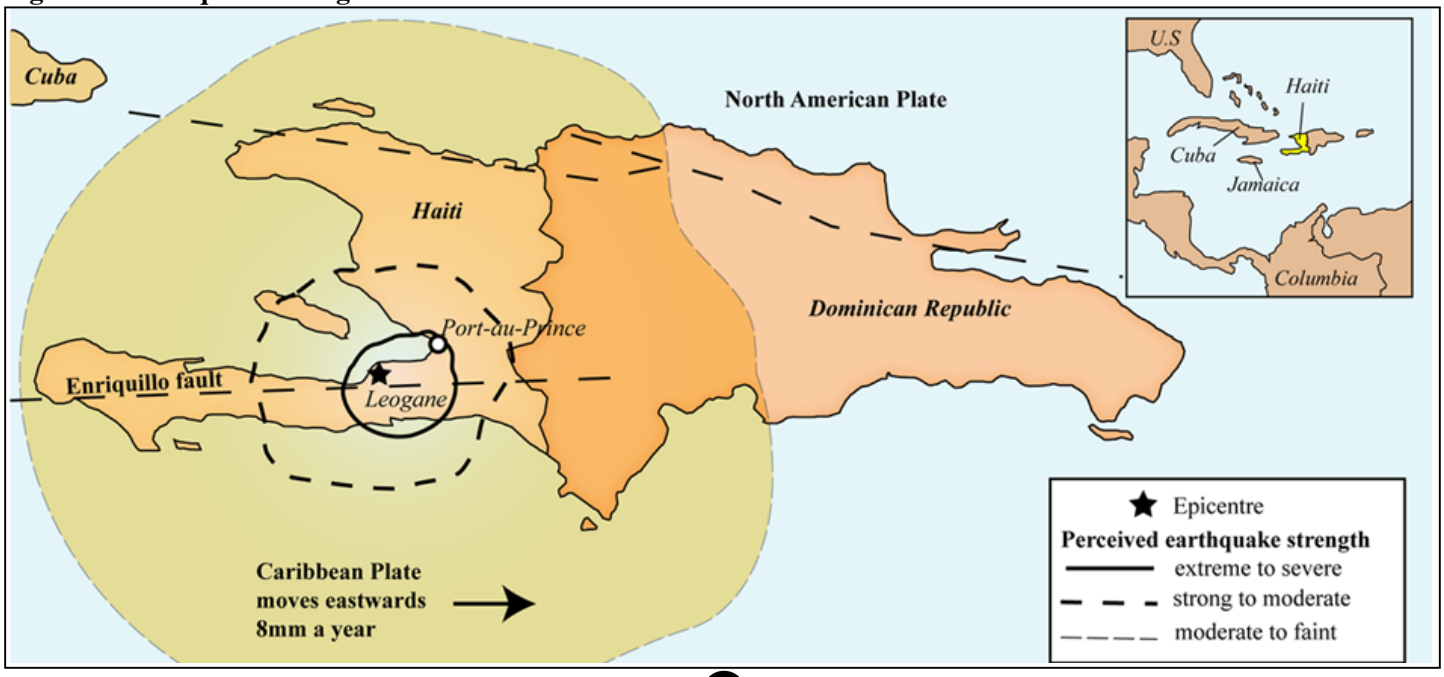
- Capital: Port-au-Prince
- Population (2009): 10,032,619
- Population under 15 (2009): 36%
- Population affected by the earthquake: 3.5 million
- Number of deaths: 222,570
- Number of injuries: 300,572
- Population displaced: 2.3 million
- Children separated from parents /guardians: >3500
- Houses damaged or destroyed: 293,383
- Total value of damage and losses: $7.8bn (120% of Haiti's GDP)
- Population living below $2 a day: 72%
- Life expectancy: 62 years
- Adult literacy rate: 62%
- Schools damaged or destroyed: 4,758

Source: UNDP Haiti Institute of Statistics and Information and World Bank

These figures make the Haiti earthquake more than twice as lethal as any previous magnitude 7.0 event, and the reasons for this lie in the socio-economic conditions of the city. **Leogane**, at the epicentre, had 80-90% of its buildings destroyed and in Port-au-Prince, many civic offices were destroyed, such as schools (80%), hospitals, tax offices and parliament itself. The UN lost its HQ, along with 80-100 staff. Collapsed buildings were the main reason of death and injury.

It was soon discovered that constructors had used brittle steel, weak cement mixed with dirty or salty sand and often, steel reinforcement rods had been terminated at the joints between columns and floors of buildings, where earthquake stresses are highest.

Figure 1 Earthquake strength and Columbia



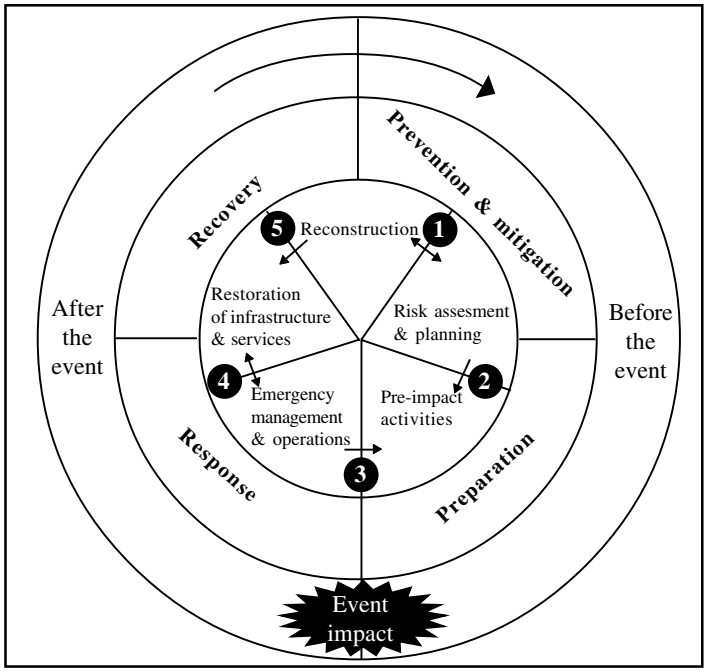
Immediate response – rescue phase (0-2 weeks)

The initial searching was done by manually lifting rubble, as no heavy lifting gear was available. Aid agency staff already in the area, understandably looked for their own families and so were not part of any coordinated response team. International search teams from around the world brought their equipment and expertise. 120 people were rescued from under rubble in the two weeks after the earthquake. Injured survivors made their way to hospitals in Dominican Republic but soon overwhelmed the services there. Within Port-au-Prince, doctors were performing many amputations with only basic medical equipment.

Due to the proximity to the US, there was a strong sense of responsibility to help Haiti. President Obama vowed "unwavering support" and the US army and marines sent 5,500 troops and six US military ships. Celebrities took part in a two-hour 'Hope for Haiti" telethon and raised £35 million. The UN launched an appeal for $562m (£346m), to help three million people for six months. The World Food Programme appealed to donors for 14 million ration packs that could be eaten without cooking – enough to feed 2 million people for a month.

Since the UN International Decade for Disaster Reduction began in the 1990s, much work has been done on disaster preparedness (see Figure 3), and emergency response.

Figure 3 Disaster management cycle



However, there is a difficult transitional period when there has to be a change from humanitarian aid to rebuilding. The following describes the progress reached by Haiti in its recovery. Compared with a plan for reconstruction - see Figure 4.

2 weeks later

The disaster management was chaotic, partly due to the low level of preparedness (a function of the country's poverty, conflicts and poor governance) and partly due to the destruction of transport, communications, civil offices and the loss of personnel – virtually all connectivity was lost. In the first fortnight, tents could only be provided for 25% of the homeless, about 400,000. These were located outside the capital as there was no space due to rubble. This enforced emigration took people away from familiar surroundings at a time when they were most vulnerable. 18 hospitals and emergency clinics began working in Port-au-Prince.

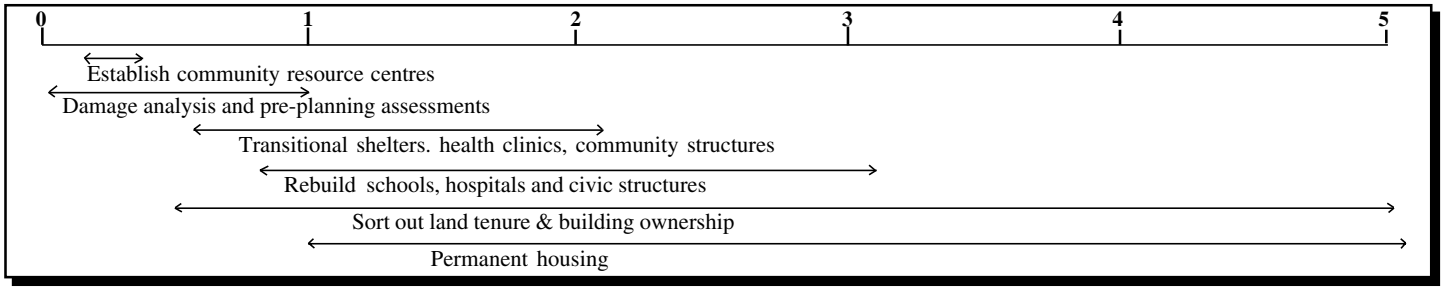
The US Coastguard partially re-opened the damaged dock area in the port and four airports – two in Haiti and two in Dominican Republic were used to bring in supplies and personnel. Relief was arriving at the city's airport but could not be distributed due to the damaged infrastructure. Many US flights were prevented from taking off in the USA as there was no space to land and no fuel for them to return.

Some street market traders were still operating but stocks dwindled rapidly, and became unaffordable as prices rose steeply. Those that re-opened faced the threat of looting and violence as people became hungry and sought to find scarce resources. The UN sent an extra 3500 troops and police to maintain law and order and 4000 more American personnel were sent. Further assistance was given by the World Bank, which announced that it was suspending all payments on Haiti's debt for the next five years and an intention to cancel it altogether.

It was critical to know the worst hit areas, and to keep regularly updated about the_distribution of aid. A rapid-response scheme funded by the World Bank, using GIS and Google Earth, was organised. 500 scientists from 100 organisations worldwide, representing academia, government agencies, non-profit organisations and private industry, worked to map the damage in Haiti. Each individual was given a 1x1 km image from a satellite image of the whole area and, working to a common classification – the European Macroseismic Scale – within a fortnight had identified more than 10,000 buildings as having been either totally destroyed or heavily damaged, together with where collapsed bridges prevented access.

Another use of Google Earth and GPS technology was by aid workers themselves in the camps, using hand-held devices to enter and upload information about the current level of supplies and health of survivors. This was the first time such a sophisticated tool had been used in disaster management. Online maps then showed the current conditions of the camps and potential dangers such as landslides and floods. In the chaos and movement of people in the first few days, this approach allowed managers to keep track of the logistics of delivering aid.

Figure 4 Time line for post-earthquake reconstruction in Haiti



Given that there had been such a large international response at the time of the event, questions were raised as to why so much time was being taken to get basic aid into Port-au-Prince.

1. Aid workers have to obey certain rules for their own safety, and Port-au-Prince was designated a similar level as Baghdad and Kabul, based on sporadic shooting and isolated looting. This meant that aid workers had to remain within the UN compound.
2. The American response to send troops and military equipment meant that this created a bottleneck at the airport, blocking supplies sent by other nations, in particular the efforts of the World Food Programme and Medécins Sans Frontiéres. This blockage caused a loss of patience by Haitians, which made the US military response a self-fulfilling prophecy.
3. Haiti is the only country in the western hemisphere defined by the UN as being a "Least Developed Country". It suffers from corrupt governance and past colonial interference, so was unready to deal with such an emergency.
4. The port was damaged more badly than first realised. The main pier and terminal at the northern end was destroyed, and the southern pier was closed after just a few days. Imports of materials and equipment for reconstruction were needed, but the roads from the port to the city centre were just two-lane low-grade surfaces, unable to support the volume and actual weight of vehicles.

6 months later

In June 2010, a World Summit for the Future of Haiti: Solidarity Beyond the Crisis was organised in Dominican Republic. 54 countries and 35 international organisations were represented, committing $11 billion to reconstruction projects. Venezuela added $127 million of financial support through fuel imports, as well as debt-forgiveness of hundreds of millions of dollars to state-run Petrocaribe, a total of $2.65 billion.

The priorities identified at summit were:

- Strengthening of democratic institutions, to deal with chronic political instability.
- Development of stricter building codes.
- The need to find homes for displaced people – 1 million were still living in tented accommodation.
- The hurricane season was approaching and shelters needed constructing. Very few buildings remained that could withstand hurricane-strength winds. (Hurricane Tomas hit Haiti in Nov 2010 causing 35 deaths and severe flooding in the south-west of the country, but the tented camps in Port-au-Prince were unaffected).

1 year later

Progress was understandably slow, given the scale of the disaster and the depth of poverty that existed before the event. Some societal activities were re-established, such as schools and random commercial activity. Only an estimated 5% of rubble was cleared and landmark buildings, important for community morale, remained in disrepair. Unemployment was rife and camps appeared permanent, giving shelter to 800,000 people, with no hope of imminent re-settlement due to logistical bottlenecks and enduring problems associated with land rights.

Unlike in western societies, only 5% of the land has legal documentation as to who actually owns it. Land had been forcibly taken with each frequent change of government. Land rights delay the process of re-homing people because if a needy family do not actually own the land, they will be thrown out by usurpers and remain homeless and in poverty. About 40 percent of the world's population is subject to forcible eviction from their homes because of a lack of documentation proving ownership, but in Haiti, that number is closer to 70 percent.

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Examples of reconstruction in Port-au-Prince:

(1) Delmas 32

A densely populated suburb in Port-au-Prince, 5 times that of New York City, with 120,000 people living in 1 km^2. 1500 of the 5000 buildings collapsed, and 2000 were structurally damaged. Even before the disaster, there was no plumbing or electricity. The World Bank donated $30 million for redevelopment, but land ownership is problematic.

(2) North Pole

Prior to the earthquake, 10-12000 squatters lived on 16000 acres of land to the north of the city. When the government announced, post-disaster, that the area was to be redeveloped, the numbers grew to 50000, people hoping to receive a claim to the land. This has become a slum in the making.

The earthquake was not the only natural disaster suffered by Haiti in 2010. It also experienced a tornado in September, which killed 5, injured 50 and destroyed 6000 emergency tents. It was followed in November by both Hurricane Tomas, causing 35 deaths and an outbreak of cholera in the camps, affecting 200,000 people and killing 4,000, thought to be due to excrement in a river used for drinking water. Although 15,000 latrines had been set up, this was only 60% of the estimated need. Plans to build a permanent water supply system for $90 million were given extra urgency, as it is far more cost-effective then delivering emergency water supplies, which cost $40 million for just one year.

The transition from camps to temporary housing and starting to rebuild permanent homes was difficult because without rubble clearance, there was little available space. The scale of the problem can be illustrated by comparing it to elsewhere – it is the equivalent of 10 World Trade Centre sites, and would take 200 trucks a total of 11 years to clear. NGOs had competing priorities, some wanting to make headline progress with new buildings, others wanting to clear rubble. Ironically, the worst hit area, Leogane, cleared 80% of its rubble within the year but it had the advantage of flatter topography than Port-au-Prince, with space nearby to dump the rubble..

In the first year, only 1,179 new permanent houses were built nationwide, mostly outside Port-au-Prince. Different aid groups worked independently, so various designs of housing were used, rather than a single plan for the whole city. Because progress was so slow, some locals started to rebuild homes themselves in the old ways, on soft ground or steep hillsides, using poor materials.

All agencies accepted the urgent need to train Haitians in skills necessary for long term development. US engineers organized seminars to teach simple techniques to resist shaking. The government published voluntary guidelines for better building practices. The few codes and little enforcement may explain some of the poor quality buildings, but more important was thought to be corruption and poverty, because both led to poor construction standards. It was feared that the large amount of aid would lead to further corruption in the rebuilding of Haiti. In any disaster, the elderly and very young are the most vulnerable. The poverty in Haiti has always meant that children have been given away by families too poor to raise them.

Since the earthquake, the numbers of these "restavek" children has increased significantly, to over 300,000. Although there are no figures, child trafficking is also thought to have increased as displacement of whole communities made this easier. Orphan numbers have also increased post-disaster and the birthrate has tripled.

Despite elections in November, a political crisis involving fraudulent elections plus violence and intimidation meant that Haiti could not announce its next president. This was the main reason why only 38% of $1.4 billion donated aid had been spent. Leadership was lacking, there were no realistic plans and governmental experience was lost in the disaster – 13 out of 15 ministry buildings destroyed and 30% staff were lost.

2 years later

Since the earthquake, $5.5 billion was pledged by other countries and international agencies, but just 53% has been released to projects. This slow release of funds is repeated in all organisations – the Haiti Reconstruction Fund has only spent 10% of its funding actually on the ground and although the Interim Haiti Recovery Commission has approved over $3 billion in projects, most have not yet started. USAID gave only 2.4% of its projects to local Haitian companies and more than 90% to Washington-based contractors.

Locals working together with UN partners have removed 40% of the rubble. 7000 Haitians have been trained in practical construction skills and transitional housing is slowly becoming available for people still living in camps. Although numbers have reduced by 66% since July 2010, more than 500,000 are still living in camps with the majority in emergency shelters only designed to last for up to 12 months.

Much has been made of Haiti's "culture of immobilism", meaning that the country's leadership cannot effect change as people's attitudes to poverty and corruption are too entrenched. Workers are frustrated by the absence of a national plan. Michel Martelly, who became President in May 2011 after the initial elections in Nov 2010, offered a new approach but inherent problems meant that it took several months to form a government, meaning delays on new agricultural projects and refugee relocation programmes.

The future

The continuing and deep-rooted socio-economic problems of Haiti, with possible solutions, are set out in Table 1.

Table 1 Long term recovery plan for Haiti

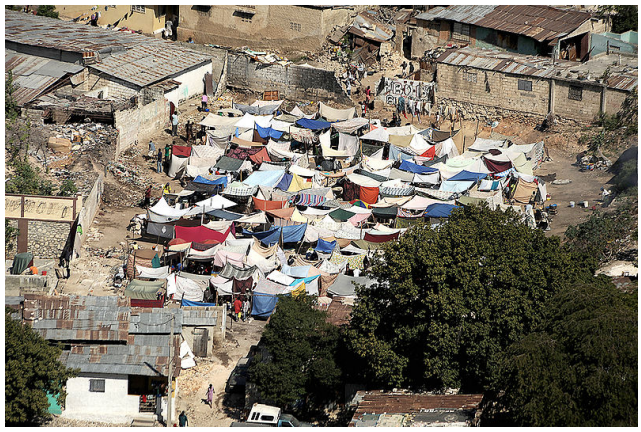
Current problems	Possible solutions
Business climate • Haiti is ranked 151 out of 183 countries in terms of ease of doing business. • It takes 195 days and 13 separate procedures to register a business, get construction permits, credit or engage in foreign trade. • Industry accounts for only 16% of the nation's economy despite Haiti's low-cost labour. • It is 35% more expensive to bring a container of goods into Port-au-Prince than into any of the developed countries of the Organization for Economic Cooperation and Development and takes 22 days longer.	• An efficient, one-stop shop must be established for businesses, such as Community Resource Centres
Judicial system • Haiti lacks well-trained lawyers, judges and legal aid for the poor. • 75% of those in Haiti's overflowing prisons spend long periods on remand. • The police and justice systems barely link at all.	• New procedures to identify those best released on bail. • Accelerate land ownership and property disputes, so reconstruction can continue.
Civil service • Haiti has no central financial control of its ministries. • 30% absenteeism among employees. • Phantom employees who collect government paychecks while working other jobs. • Poor record-keeping and noncompetitive bidding practices invite corruption. • Auditing is nearly nonexistent. • Most government decisions rest in the hands of a few.	• A census of all government employees, to determine their locations and roles. • For current and future employees, job descriptions should be established, with performance incentives
Education • The quake destroyed 5,000 schools. • Even before that, children attended classes sporadically under a system of largely unregulated schools and undertrained teachers.	• Education reform, with state aid to increase resources. • Teacher retraining on a grand scale. • School-based food programs to encourage attendance.
Public healthcare • The earthquake destroyed 73 of Haiti's 373 hospitals, clinics and medical training institutes. • 200 public health staff members died or were injured. • As a consequence of the earthquake, all resources are focused on preventing disease in the tent camps, coping with post-traumatic stress and providing prosthetics and rehab therapy.	• NGOs to provide all current healthcare, whilst Haitian government plans reform for the future health system.

(Adapted from the Rand Report: "Building a More Resilient Haitian State:www.rand.org

It is accepted by all players involved that Port-au-Prince can only be rebuilt in the long term. Giving decision-making to local communities is key to progress. In a recent survey, when asked for their top priorities, a lunch programme and access to the internet (currently, only 11%) were the top two requirements perceived by locals still in temporary shelters. Financial assistance is continuing, with the Inter-American Development Bank pledging $200 million annually until 2020 and the U.S. will provide an additional $5.97 billion during the same time frame.

A sense of permanence is vital if people are to break out of current attitudes of dependency, so strong leadership of national and local plans is very important. The President promised to rebuild all ministries in 2012, which if it happens, will improve coordination of the national rebuilding.

"With a new government in place and billions of aid dollars pledged, Haitians are left asking why there has not been more progress in rebuilding the country. The second anniversary of the devastating earthquake must be a call to action. Despite the apparent slowness of reconstruction, this remains an opportunity for Haiti´s political and economic elite to address the chronic poverty and inequality that has plagued the country since independence." Cecilia Millan, Oxfam's Director in Haiti.



Further reading

Haiti earthquake: day by day:
http://news.bbc.co.uk/1/hi/world/americas/8465266.stm
Where has the aid gone?
http://www.guardian.co.uk/global-development/datablog/2012/jan/12/haiti-earthquake-aid-money-data
Facts, engineering, images and maps:
http://mceer.buffalo.edu/infoservice/disasters/Haiti-Earthquake-2010.asp
New internationalist Jan/Feb 2012 Haiti Two years on

Questions to consider

1. Identify the main factors as to why reconstruction has been so slow in Haiti.
2. What are the highest priorities in rebuilding Haiti?
3. To what extent is international aid necessary in Haiti's reconstruction?

Acknowledgements;
This Geo Factsheet was researched and written by Dr. Debbie Milton who works at Southhampton University
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