

Reading Summary: Comparing the Haiti and Christchurch Earthquakes

Overview of the Earthquakes:

Haiti, 2010: In January 2010, a catastrophic magnitude 7.0 earthquake struck near the capital of Haiti, Port-au-Prince. With a shallow focus of only 13 kilometers and occurring near heavily populated areas, the Haiti earthquake caused widespread devastation, affecting an already vulnerable nation.

Christchurch 2011: In February 2011, a magnitude 6.3 earthquake struck near Christchurch, New Zealand. This was not the first earthquake in the region, as a larger magnitude 7.1 earthquake had struck in September 2010, causing significant damage but no fatalities. The February 2011 quake, however, occurred closer to the city center, with a shallow depth of 5 kilometers, compounding vulnerabilities caused by the earlier event.

Geophysical Processes Behind the Earthquakes

Feature	Haiti Earthquake (2010)	Christchurch Earthquake (2011)
Tectonic setting	Haiti lies along the Enriquillo-Plantain Garden fault system, part of the boundary between the Caribbean and North American plates. This strike-slip fault caused lateral movement, releasing stress that had built up over centuries.	Christchurch is near the Pacific-Australian plate boundary. The February 2011 earthquake occurred on a previously unknown fault within the Canterbury Plains, triggered by stress redistribution from the September 2010 quake.
Type of fault	Strike-slip fault causing horizontal displacement.	Reverse fault with vertical movement, causing significant ground shaking and shallow focus.
Secondary hazards	Triggered landslides, widespread building collapses, and outbreaks of cholera due to poor sanitation.	Liquefaction was a major issue, with water-saturated soils behaving like liquid, leading to ground instability. Landslides occurred in hilly areas.

The sequence of events in Christchurch highlights the concept of aftershock sequences. Stress redistribution following the September 2010 earthquake increased the likelihood of subsequent earthquakes, making the February event part of a cascading hazard chain.

Impacts on Human Wellbeing

Haiti Earthquake (2010)

- **Death toll:** Estimated 230,000 people.
- **Injuries:** Over 300,000.
- **Homelessness:** Over 1.5 million people displaced.
- **Infrastructure:** Massive destruction, including 60% of government buildings and 80% of schools.
- **Economic impact:** Losses estimated at \$8 billion (~120% of GDP).
- **Health:** Cholera outbreak caused by poor post-quake sanitation, killing nearly 10,000 people.
- **Psychosocial impacts:** High levels of trauma, compounded by inadequate mental health support.

Christchurch Earthquake (2011)

- **Death toll:** 185 people.
- **Injuries:** ~2,000.
- **Homelessness:** Thousands displaced, though many returned quickly due to available resources.
- **Infrastructure:** Central city severely damaged, with significant loss of historic buildings.
- **Economic impact:** Losses estimated at \$40 billion (~20% of GDP).
- **Health:** Anxiety and depression increased, particularly in communities affected by repeated quakes.
- **Psychosocial impacts:** Strong community response but significant disruption to daily life.

Explaining Vulnerability Using the Pressure and Release (PAR) Model

Haiti Earthquake:

1. **Root Causes:** Long-term poverty, weak governance, and lack of investment in infrastructure.
2. **Dynamic Pressures:** Rapid urbanization, poorly enforced building codes, and low levels of education.
3. **Unsafe Conditions:** Overcrowded informal housing, poor sanitation, and lack of emergency services.

Haiti's vulnerability was amplified by these pressures, making it highly susceptible to geophysical hazards. The impact was catastrophic, as weak social and physical systems failed to absorb or respond effectively.

Christchurch Earthquake:

1. **Root Causes:** Relatively high levels of development but some underlying vulnerabilities in urban planning and older buildings.
2. **Dynamic Pressures:** Liquefaction-prone soils and reduced resilience due to the September 2010 quake.
3. **Unsafe Conditions:** Older, unreinforced masonry buildings in the city center and areas highly prone to liquefaction.

Although Christchurch had strong governance and resources, the cumulative stress of multiple events exposed specific vulnerabilities, especially in the central business district.

Recovery Models: Comparing Haiti and Christchurch Through Park's Model

Park's disaster response curve illustrates how communities recover from hazards, moving through stages of relief, rehabilitation, and reconstruction.

Haiti:

1. **Relief:** The immediate response was slow and chaotic. International aid struggled to reach affected areas due to damaged infrastructure. Survivors lacked shelter, clean water, and medical care.
2. **Rehabilitation:** The process was hindered by governance issues, corruption, and dependency on international aid. Recovery was prolonged, with many living in temporary shelters for years.
3. **Reconstruction:** Reconstruction was slow, with limited improvement in building codes and infrastructure. Long-term recovery remains incomplete, and vulnerability to future hazards persists.

Key takeaway: Haiti's curve demonstrates a prolonged and incomplete recovery, with major dips in human well-being due to secondary hazards and governance challenges.

Christchurch:

1. **Relief:** The immediate response was well-coordinated. Emergency services and international aid arrived promptly, providing medical care, shelter, and food.
2. **Rehabilitation:** Efforts focused on repairing infrastructure and providing mental health support to affected communities. Many residents returned to their homes or temporary accommodations quickly.
3. **Reconstruction:** Reconstruction prioritized resilient infrastructure, with improved building codes and urban planning. Economic recovery was robust due to insurance coverage and government investment.

Key takeaway: Christchurch's curve reflects a faster and more effective recovery, with a return to pre-disaster conditions within a few years and improved resilience for future hazards.

Lessons Learned

1. **Haiti:** Highlights the need for global investment in disaster risk reduction, particularly in developing nations. Strengthening governance and infrastructure, improving sanitation, and enforcing building codes are critical.
2. **Christchurch:** Demonstrates the value of preparedness, strong governance, and community resilience. Effective planning and quick responses reduce long-term impacts.

Questions for Discussion

1. How did the sequence of earthquakes in Christchurch influence vulnerability and recovery compared to Haiti?

2. Using the PAR model, identify specific steps Haiti could take to reduce its vulnerability to future earthquakes.
3. How does Park's Model help us understand the differences in recovery trajectories between Haiti and Christchurch?

This revised reading now emphasizes geophysical processes, connects the events to the PAR model and Park's recovery curve, and provides a comprehensive comparison for students to analyze.