

# 7 LONG-TERM TRENDS IN INTERNATIONAL DISASTER RESPONSE OVER THE PAST CENTURY

...AND WHERE THEY MIGHT GO





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**SEVEN LONG-TERM TRENDS  
IN INTERNATIONAL  
DISASTER RESPONSE OVER  
THE PAST CENTURY**

**...AND WHERE THEY MIGHT GO**

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## **METHODOLOGY**

Research for this report was conducted through a desk review of online resources. For the 1907 earthquake in Jamaica, the author relied heavily on cablegrams published by the Colonial Office of Great Britain, as well as the archives of the New York Times. Information on the 2010 earthquake in Haiti was collected from UNOCHA situation reports as well as the websites, articles, and reports of other UN agencies, news media, and NGOs.

Prediction on the future of disaster response was informed by current discussion on the topic and by analyzing the likely impact that new and expected technology will have on response operations.

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# INTRODUCTION

On 14 January 1907, an earthquake of significant magnitude struck near Kingston, Jamaica, at 3:30 p.m. It killed approximately 1,000 people and caused damage totalling US\$25 million — about \$640 million in today's dollars<sup>1</sup>. A first-hand account of the aftermath published in *The New York Times* described Kingston as a “mass of debris” and in a state of “desolation and ruin.”<sup>2</sup>

Just over 100 years later, a 7.0-magnitude earthquake struck near Port-au-Prince, Haiti, on 12 January 2010 at 4:53 p.m. The disaster made headlines around the world for its devastation, with casualties estimated between 160,000 and 316,000<sup>3</sup>. Damage from the earthquake was estimated at billions of dollars<sup>4</sup>, and *The New York Times*, echoing its language from a century before, described Haiti as a city in ruins.<sup>5</sup>

For reasons including infrastructure, population size and density, the 2010 Haiti earthquake was sizably more deadly and costly than its 1907 Jamaican counterpart. However, the two disasters share many similarities that invite comparison. Both earthquakes occurred on a mid-January afternoon in the capital city of Caribbean islands located less than 500 km apart. Both caused large-scale damage to an island's largest urban centre, which overwhelmed standard emergency response. Furthermore, both disasters received international attention and assistance representative of their era, and thus showcase the evolution in humanitarian aid in emergency situations since the beginning of the twentieth century.

This report compares the response to the 1907 Jamaica earthquake with the response to the 2010 Haiti earthquake in order to better understand the impact of advancements and examine how they have affected the humanitarian system as a whole. The report further looks to new and emerging technologies and processes to forecast how the humanitarian system will continue to change in the future, and cumulatively evaluates the long-term trends of disaster response.

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1 Wilson, J. F. (2008). *Earthquakes and Volcanoes: Hot Springs*, BiblioBazaar, 70.

2 Caine, R. H., (18 January 1907). “Saw Kingston's day of terror” *The New York Times*.

3 Kolbe, A. R.; Hutson, R. A.; Shannon, H.; Trzcinski, E.; Miles, B.; Levitz, N. Puccio, M.; James, L.; Roger N.J.; Muggah, R. (2010). “Mortality, crime and access to basic needs before and after the Haiti earthquake: a random survey of Port-au-Prince households” *Medicine, Conflict and Survival*. 26 (4): 281–297. “Haiti raises quake death toll on anniversary,” (12 January 2011) *CBC News*. Retrieved July 2018 from <https://www.cbc.ca/news/world/haiti-raises-quake-death-toll-on-anniversary-1.1011363>

4 Cavallo E. A.; Powell A.; Becerra O. (2010). “Estimating the direct economic damages of the Earthquake in Haiti” *Inter-American Development Bank*.

5 Romero S. (13 January 2010) “Haiti lies in ruins; grim search for untold dead” *The New York Times*.

# HISTORICAL NOTE AND REPORT SCOPE

In 1907, Jamaica was a colony of the British Empire, with a Government led by a British-born Governor, Sir James Alexander Swettenham. In his duties as Governor, Swettenham reported to the Secretary of State for the Colonies, who resided in London.

In 2005, the United Nations (UN) passed the Humanitarian Reform Agenda, which made changes to UN humanitarian response. The reform prominently involved the adoption of the cluster system, whereby UN and non-UN organizations were divided into groups referred to as 'clusters', which are based on the main sectors of humanitarian action (e.g. water, health, logistics). The cluster approach allows for coordination in a system that otherwise has a limited formal structure. It was used in response to the 2010 Haiti earthquake.

This report centres on the earthquakes that occurred in Jamaica in 1907 and Haiti in 2010. The examination of the future of disaster response and the evaluation of the long-term trends within the humanitarian sector are therefore directed towards sudden-onset natural disasters. Human-made disasters and protracted emergency situations will likely share many similarities in future growth with sudden-onset natural disasters, but they are not the explicit topic of this report. Discussions about the future of disaster response are based on emerging advancements and should be viewed as educated forecasts.

# ADVANCEMENTS IN CRISIS RESPONSE

The evolution of crisis response has come from advancements in numerous different areas. Some of these advancements were technology-driven, such as the invention of the airplane, which radically transformed the delivery of relief supplies and personnel. Such developments were largely developed outside of the humanitarian sector but used in crisis response once feasible. Other advancements were process-driven and involve the creation of institutions or structures that increased response capabilities, such as the Central Emergency Response Fund (CERF). Most advancements in crisis response can be partly attributed to both technology and processes. The first situation report on the Haiti earthquake, for instance, was able to be published within hours of the earthquake due to the presence of modern communication networks as well as the prior establishment of its author, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Therefore, determining the future of crisis response involves looking at how emerging technology and process innovations will interact with each other to affect the humanitarian sector as a whole.

The following sections of the report look at the past, present and likely future of the following areas within crisis response: alerts, mobilization, communication networks, delivery, finance, non-governmental organizations (NGOs) and international cooperation.

## 1. ALERTS

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Alerting people outside the crisis area to its impact

### 1907 Response

In 1907, the cablegram was the fastest method of communication from Kingston, Jamaica, to the outside world, with cables having been laid from Jamaica to Bermuda in 1897<sup>6</sup>. However, these cables were damaged in the earthquake and both Kingston telegram offices were destroyed in resulting fires<sup>7</sup>. Transmissions out of the country could therefore only be sent via Holland Bay, a neighbouring city. But as many landlines had also been damaged, communication proved challenging<sup>8</sup>. This meant that news of the earthquake did not reach London until the following evening<sup>9</sup> — over 24 hours after the earthquake — and owing to the disruptions, transmissions were often delivered out of order and with a

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6 Huurderman, A. A. (2003). *The Worldwide History of Telecommunications*. Wiley InterScience, 137.

7 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907*. (1907), Daring & Son Ltd., no. 9.

8 "Messages from Kingston; many come to New York - say only 30 were killed," (16 January 1907), *New York Times*.

9 "Quake and Fire Wreck Kingston," (16 January 1907), *The New York Times*.

substantial time delay<sup>10</sup>. The New York Times carried the story on its front page on 16 January and reported that only 30 people had been killed<sup>11</sup>, an estimate revised to 1,000 in the paper's next edition.<sup>12</sup>

## 2010 Response

The Haiti earthquake occurred at 4:53 p.m. on 12 January, and locals tweeted about the disaster within minutes of it occurring<sup>13</sup>. The OCHA office in Haiti alerted the United Nations Disaster Assessment and Coordination (UNDAC) team within 15 minutes, and an alert from the Global Disaster Alert Coordination System came shortly after<sup>14</sup>. CNN Breaking News tweeted about the earthquake within half an hour, using the United States Geological Service as its source.<sup>15</sup> OCHA published its first situation report within hours of the earthquake, describing “large numbers of casualties and widespread damage.”<sup>16</sup>

## Future Response

Alerts will increasingly rely on crowdsourced information from publicly available content on social and digital media. Artificial intelligence (AI) will be able to sort through the massive amounts of available data to detect events such as earthquakes within seconds and provide frequent updates as information is made available or confirmed. Companies such as Dataminr already offer such services, and capabilities will continue to develop as AI advances and more people contribute to digital conversations. As the data is publicly available and does not require significant investment, Governments, news media, NGOs and private sector companies will all utilize such services. This will decentralize information channels, providing a wide range of actors with credible alerts within seconds of a sudden-onset emergency.

In addition, the continued development of early warning systems will alert people to certain types of crises prior to them occurring, allowing time for evacuation and mitigating casualties.

## 2. MOBILIZATION

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Mobilizing response from outside the crisis area to support relief efforts

### 1907 Response

Once alerted to the earthquake in Jamaica, Great Britain and other countries began to mobilize available ships to provide assistance. Mobilization began on the morning of the 16th, approximately 36 hours

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10 “Scene in Kingston when quake came,” (18 January 1907), *The New York Times*.

11 “Messages from Kingston; many come to New York - say only 30 were killed,” (16 January 1907), *New York Times*.

12 “Jamaica’s dead may reach 1,000,” (17 January 1907), *The New York Times*.

13 See for example: @FredoDupous, “oh shiet heavy earthquake in right now ! in haiti,” 12 January 2010, 4:56 pm, <https://twitter.com/FredoDupoux/status/7684238396>

14 United Nations Disaster Assessment & Coordination, “Haiti Earthquake, January 2010” UNDAC Mission Report, 4.

15 @CNNbrk, “7.3 magnitude quake in Haiti, U.S. Geological Survey says. More to come on <http://www.cnn.com>,” 12 January 2010, 5:10pm, <https://twitter.com/cnnbrk/status/7684693500>

16 “Haiti: Earthquake Situation Report #1.” (12 January 2010) UN Office for the Coordination of Humanitarian Affairs. Retrieved July 2018 from: [https://reliefweb.int/sites/reliefweb.int/files/resources/7FFA2880038FE2AA492576AA00182827-Full\\_Report.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/7FFA2880038FE2AA492576AA00182827-Full_Report.pdf)

after the earthquake, with ships leaving for Jamaica that afternoon.<sup>17</sup> The US Navy Base at Guantanamo Bay was the closest equipped port to Jamaica. It sent a small torpedo boat with medical supplies that arrived the night of the 16th followed by two ships, which arrived the next morning.<sup>18</sup> No other ships arrived in Jamaica until the 21st, when the HMS Indefatigable arrived from Trinidad carrying provisions worth £1,500 (around US\$218,000 today).<sup>19</sup> On the 22nd — eight days after the earthquake — four more ships arrived stocked with supplies, including one from Haiti, one sent from the Chief Engineer of the Panama Canal, one from the French via Martinique and one from the British via Bermuda.<sup>20</sup> Within Jamaica, assistance was provided by the firemen of neighbouring Spanish Town, who helped relieve the Kingston brigade.<sup>21</sup>

## 2010 Response

A century later, the US Navy Base at Guantanamo Bay was again the closest equipped port, this time to Haiti, and the US Coast Guard arrived in Port-au-Prince at 8 a.m. the day after the earthquake to assess damage to the port for incoming ships. That afternoon, the Coast Guard also moved critically injured US citizens to the hospital in Guantanamo Bay.<sup>22</sup> Total contributions from the US Navy to the Haiti earthquake would include 33 ships and 19 helicopters.<sup>23</sup> Iceland Search and Rescue was the first international search-and-rescue team on the ground, arriving via airplane just under 24 hours after the earthquake<sup>24</sup>, and there were 26 search-and-rescue teams in Haiti after three days.<sup>25</sup> A US Air Force Special Operations team took control of the Port-au-Prince airport the night of the 13th. The team was soon landing about 250 flights a day, though planes were often backlogged and stuck circling Haiti due to the airport's size.<sup>26</sup>

## Future Response

Significantly faster airplanes have been discussed by the likes of NASA and Boeing,<sup>27</sup> but it appears unlikely this will have a large effect on disaster response in the near future. For one, such projects are still in development and there are questions of cost and viability of use. More importantly, faster planes would only exacerbate the airport congestion that was seen during the Haiti earthquake. Improved

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17 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., enclosure in no. 117.*

18 *Ibid, no. 69.*

19 *Ibid, enclosure 1 in no. 10.*

20 *Ibid, no. 51.*

21 *Ibid, no. 9.*

22 "U.S. coast guard continues support in wake of Haiti earthquake," *The Maritime Executive*.

23 DiOrio, D. R. "Operation Unified Response - Haiti Earthquake 2010," (version 1, November 2010) Joint Forces Staff College.

24 "Haiti Earthquake, January 2010" United Nations Disaster Assessment and Coordination Mission Report, 25.

25 Bhattacharjee, A.; Lossio, R. (January 2011). "Evaluation of OCHA Response to the Haiti Earthquake," *Final Report, OCHA*, 10.

26 Elton, B. (2010). "Haiti: boots on the ground perspective," *Small Wars Journal*, 3.

27 Pasztor, A.; Wall, R.; Tangel, A. (18 July 2018). "New York to London in 3-½ hours? Supersonic travel may be back" *The Wall Street Journal*. Retrieved July 2018 from: <https://www.wsj.com/articles/new-york-london-in-3-hours-supersonic-travel-may-be-back-1531906323>

communication networks may help relieve such congestion, but overall, mobilization will likely not be a key development area in crisis response in the immediate future.

### 3. INFORMATION COMMUNICATION TECHNOLOGY

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Communicating information to and from people in the crisis area

#### 1907 Response

Landlines and cables were damaged in the earthquake, which limited communication out of and within Jamaica. The afternoon following the earthquake, landlines were repaired to within five miles of Jamaica and transmissions could then be sent from the outskirts of Kingston to Holland Bay and then abroad.<sup>28</sup> The printing press of the local paper, The Daily Gleaner, burned down in the earthquake, but it resumed publishing four days after the earthquake using the Government Printing Office.<sup>29</sup>

#### 2010 Response

Cell service in Haiti was severely disrupted, as many cell towers were located atop buildings that were damaged in the earthquake.<sup>30</sup> Service that was still operational was soon overloaded by use, severely affecting the ability to establish communication in the days and weeks following the earthquake.<sup>31</sup> Telecommunication specialists were deployed within days to Port-au-Prince and helped ensure working communication networks for Government officials and humanitarian agencies. They also set up calling centres via satellite phones to allow the civilian population to make contact with family.<sup>32</sup>

Despite the limitations in the Haiti network, the use of mobile communication technology enabled the emergence of a “collective intelligence” that was hailed for its ability to improve the disaster response.<sup>33</sup> Furthermore, the use of high-resolution satellite and aerial imagery allowed for accurate maps to be created, crowdsourced and disseminated via these communication networks. Maps were created by organizations, volunteers and companies engaging in philanthropic work, which enabled better assessments of the earthquake damage and coordination of aid delivery by responding organizations.

The earthquake severely disrupted Haitian media — television, print and radio. Le Nouvelliste, the largest newspaper in Haiti, did not return to print for months after the disaster, though it did upload videos

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28 “Messages from Kingston; many come to New York - say only 30 were killed,” (16 January 1907), *New York Times*.

29 “History of earthquakes in Jamaica,” *National Library of Jamaica*, 3. Retrieved July 2018 from: <http://www.nlj.gov.jm/history-notes/Earthquakes%20of%20Jamaica%20final%20edited.pdf>

30 Corley, A. (19 February 2010), “Why Haiti’s cellphone networks failed,” *IEEE Spectrum*. Retrieved July 2018 from: <https://spectrum.ieee.org/telecom/wireless/why-haitis-cellphone-networks-failed>

31 *Ibid.*

32 “Haiti earthquake,” *Télécoms Sans Frontières*. Retrieved July 2018 from: <https://www.tsfi.org/en/our-missions/fields-of-interventions/disaster-response/haiti-earthquake>

33 *Harvard Humanitarian Initiative (2011). “Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies” Washington, D.C. and Berkshire, UK: UN Foundation & Vodafone Foundation Technology Partnership, 11.*

to YouTube documenting the recovery in the immediate aftermath.<sup>34</sup> The slower return to print than in 1907 is likely reflective of the decreased importance of local print journalism in communicating information in the twenty-first century. International media coverage was prominent in the weeks following the earthquake, but it is not clear how accessible this was to the Haitian population.

## Future Response

Providing reliable communication networks to crisis responders and the affected population will be an increasing priority as the importance of access to information is recognized. Advancements in this area will come from investments and innovation by militaries and technology companies, which will both use disaster response as a method for testing new technologies. Loon Inc., a subsidiary of Alphabet, uses high-altitude balloons to provide a wireless network and is a current example of such innovation. The affected population's ability to access a reliable communication network will empower local decision-making and radically transform search-and-rescue capabilities. Platforms such as Ushahidi, which manages the bottom-up flow of information, will become critical tools in disaster response in order to structure the large amounts of data being provided by the affected population. Mapping technology and the media will both adapt to the increased presence of local voices available through communication networks, using them as sources of information and directing their products towards their use.

## 4. DELIVERY

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Delivering relief services within the crisis area

### 1907 Response

Little was recorded about the specifics of aid delivery following the 1907 earthquake in Jamaica.

Distributions of food and shelter provisions were likely handled by the local Relief Committee in consultation with the Governor, and they were likely based out of the Palace Gardens racecourse, which was used as a temporary camp for people displaced by the earthquake.<sup>35</sup>

### 2010 Response

Aid delivery in Haiti following the earthquake encountered numerous logistical challenges due to the damaged and limited infrastructure. Damage to roads was significant, and between that and the large number of people trying to move around Port-au-Prince, traffic congestion was extensive.<sup>36</sup> Organizations also reported difficulties in securing vehicles and fuel, further hampering delivery efforts.<sup>37</sup> The delivery of different services and supplies was to be organized through the cluster approach, but most

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34 Sharma, B.; Al-Kassim, M. (12 March 2010), "Le Nouvelliste returns," *Columbia Journalism Review*. Retrieved July 2010 from: [https://archives.cjr.org/behind\\_the\\_news/le\\_nouvelliste\\_returns.php](https://archives.cjr.org/behind_the_news/le_nouvelliste_returns.php)

35 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907*. (1907), Daring & Son Ltd., enclosure in no. 9.

36 "What is delaying Aid in Haiti?" (21 January 2010) *BBC News*. Retrieved July 2018 from <http://news.bbc.co.uk/2/hi/americas/8472670.stm>

37 *Ibid.*

clusters were not operational in the first few weeks, resulting in a lack of coordination.<sup>38</sup> Clean water was delivered at designated focal points (52 sites within 5 days,<sup>39</sup> 300 sites within 3 weeks<sup>40</sup>), and the World Food Programme coordinated food distribution from 16 focal points.<sup>41</sup>

## Future Response

Drones are likely the most discussed emerging technology in relation to crisis response,<sup>42</sup> and they have significant potential to improve capabilities. Aside from uses in mapping and assessments, drones will be used to deliver relief supplies,<sup>43</sup> mitigating the issue of damaged infrastructure and enabling decentralized delivery. Such decentralized delivery will increase equity within a disaster response, as harder-to-reach communities will become easily accessible and decrease reliance on large aid focal points. Advancements in drones will foster engagement with local community leadership, who will largely oversee the monitoring and distribution of delivered supplies. The continued trend of decentralization will further complicate coordination, though this may be offset by improvements in institutional response and communication technology.

## 5. FINANCE

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Raising and dispersing funds to assist the crisis response

### 1907 Response

Several countries provided financial support to the Jamaica relief efforts. This money was sent either to London or Kingston through wire transfer or delivered in the form of supplies and provisions. Four days after the earthquake, Mansion House in London opened a fund to coordinate these transactions and took charge of the necessary administrative and accounting duties.<sup>44</sup> In total, Jamaica received just shy of £60,000 (around US\$9 million today) from foreign Governments and the Mansion House Fund, in addition to a £150,000 grant (around US\$22 million today) from the British Government.<sup>45</sup> Financial relief

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38 Bhattacharjee, A.; Lossio, R. (January 2011). "Evaluation of OCHA Response to the Haiti Earthquake," Final Report, OCHA, 23.

39 "Haiti: Earthquake Situation Report #5." (16 January 2010) UN Office for the Coordination of Humanitarian Affairs. Retrieved July 2018 from: [https://reliefweb.int/sites/reliefweb.int/files/resources/57C9BBCDC417E-4B2492576AE000199FD-Full\\_Report.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/57C9BBCDC417E-4B2492576AE000199FD-Full_Report.pdf)

40 "Haiti: Earthquake Situation Report #18." (5 February 2010) UN Office for the Coordination of Humanitarian Affairs. Retrieved July 2018 from: [https://reliefweb.int/sites/reliefweb.int/files/resources/D071E8A40383A4BD492576C-2001D2EB8-Full\\_Report.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/D071E8A40383A4BD492576C-2001D2EB8-Full_Report.pdf)

41 Ibid.

42 See for example: Meier, P. "Humanitarians in the sky: drones for disaster response." *Virgin*. Retrieved July 2018 from <https://www.virgin.com/virgin-unite/business-innovation/humanitarian-sky-drones-disaster-response>

43 Chowdhury, S.; Emelogu, A.; Marufuzzaman, M.; Nurre, S.G.; Bian, L. (2017) "Drones for disaster response and relief operations: A continuous approximation model" *International Journal of Production Economics* Volume 188, 167-184.

44 Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., no. 22.

45 Further correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., enclosure 1 in no. 1, 12.

assistance to Jamaica can thus be estimated at approximately \$32 million in today's dollars. The American Red Cross raised money independently and organized the sending of supplies via its own ship.<sup>46</sup> Ten days after the earthquake, the Governor of Jamaica reported that nearly half of the money received so far in Kingston had come from local donations as opposed to international contributions.<sup>47</sup>

## 2010 Response

The UN released \$10 million from CERF the day following the earthquake in Haiti, and it released an additional \$15 million a few days later.<sup>48</sup> Countries and NGOs gave money immediately and over time to the response. The American Red Cross raised \$32 million from one campaign that allowed individuals to give \$10 donations by texting "Haiti" to a designated number.<sup>49</sup> Total donations were estimated at \$13.5 billion.<sup>50</sup> Individuals abroad wishing to send money to family or friends in Haiti could use a wire transfer, though they were likely to encounter problems. The banks in Port-au-Prince closed following the earthquake, and so although wire transfers could be received, there was a lack of physical cash to give to the recipients, especially with the influx of remittances from abroad.<sup>51</sup>

## Future Response

Increased capabilities and use of technology will make cash-transfer programmes feasible on a massive scale. Large funds, such as CERF, will continue to exist, but they will be increasingly distributed as small payments to individuals and community organizations. The move towards cashless payments — started by services such as M-PESA — and the presence of a reliable Internet connection, even during crises, will solve previous liquidity problems. Currency will be tradeable by mobile phone and other devices, and it will move easily and transparently through international financial infrastructure due to developments in blockchain technology.<sup>52</sup>

The continued advancement of forecast-based financing<sup>53</sup> along with the development of early warning systems will see funds released prior to crises occurring to mitigate initial impact and subsequently deliver faster relief. Insurance-based models will gain further traction in situations ranging from droughts to earthquakes, further enabling faster financial response. Organizations and UN agencies will still

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46 *Ibid*, no. 60.

47 *Ibid*, enclosure in no. 51.

48 "CERF contributes \$25 million to Haiti relief efforts," (18 January 2010) UN Office for the Coordination of Humanitarian Affairs. Retrieved July 2018 from: <https://reliefweb.int/report/haiti/cerf-contributes-25-million-haiti-relief-efforts>

49 Woyke, E. (26 August 2010). "What the Red Cross learned from its Haiti mobile campaign," *Forbes*. Retrieved July 2018 from: <https://www.forbes.com/sites/elizabethwoyke/2010/08/26/what-the-red-cross-learned-from-its-haiti-mobile-campaign/#62ec84b43462>

50 "S. 1104 (113th): Assessing Progress in Haiti Act of 2014," (10 July 2014) United States Senate.

51 Whoriskey, P. (24 January 2010). "Sending money home to Haiti from U.S. proves difficult," *The Washington Post*. Retrieved July 2018 from: <http://www.washingtonpost.com/wp-dyn/content/article/2010/01/22/AR2010012203401.html>

52 For future use of blockchain in the humanitarian sector see: Ko, V.; Verity, A. (2016) "Blockchain for the humanitarian sector: Future opportunities" OCHA, Digital Humanitarian Network.

53 "Forecast-based financing," IFRC. Retrieved July 2018 from <https://www.forecast-based-financing.org/>

provide services to affected populations in the immediate aftermath of a crisis, but the evolution of finance will shift subsequent reconstruction efforts away from services and towards financial empowerment.

## 6. NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

The presence of NGOs in crisis response and their contribution

### 1907 Response

A Relief Committee was formed in New York within three days of the earthquake in Jamaica. It sent a cable to the Governor of Jamaica asking for a list of needed supplies but did not receive a response for several days.<sup>54</sup> The American Red Cross sent supplies to Jamaica on a ship arriving nine days after the earthquake.<sup>55</sup> In Jamaica, the Kingston Relief Committee was chaired by the Archbishop of the West Indies and helped to organize the initial relief efforts as well as subsequent restoration.<sup>56</sup>

### 2010 Response

There were an estimated 10,000 NGOs operating in Haiti at the time of the earthquake.<sup>57</sup> Owing to the large number of NGOs, it is difficult to determine their total contribution to the disaster response. As examples, Oxfam International had a team of over 100 staff in-country and delivered aid to over 300,000 people in the first three months,<sup>58</sup> and Médecins Sans Frontières had approximately 269 health professionals in Haiti and treated 360,000 people in the first 10 months.<sup>59</sup> The earthquake response also saw virtual contributions from digital volunteers and the philanthropic arms of technology companies, who helped compile situation reports, sort through satellite imagery and social media posts, and develop maps based on available information.<sup>60</sup> Many NGOs, most prominently the American Red Cross, have been criticized for poor management of funds and a lack of significant outcomes in terms of subsequent reconstruction efforts.<sup>61</sup>

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54 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., enclosure in no. 41.*

55 *Ibid, no. 60.*

56 *Ibid, enclosure 5 in No. 137.*

57 Edmonds, K. (5 April 2010). "NGOs and the business of poverty in Haiti," *The North American Congress on Latin America*. Retrieved July 2018 from: <https://nacla.org/news/ngos-and-business-poverty-haiti>

58 "Haiti earthquake - our response," *Oxfam International*. Retrieved July 2018 from: <https://www.oxfam.org/en/haiti-earthquake-our-response>

59 Fawthrop, T. (16 February 2010). "Cuba's aid ignored by the media," *Al Jazeera*. Retrieved July 2018 from: <https://www.aljazeera.com/focus/2010/01/201013195514870782.html>

60 "Before and after the Haiti earthquake," (12 January 2015) *Médecins Sans Frontières*. Retrieved July 2018 from: <http://www.doctorswithoutborders.ca/article/and-after-haiti-earthquake-interview-msf-physician-dr-wendy-lai>

61 See for example: Elliot, J.; Sullivan, L. (3 June 2015) "How the Red Cross raised half a billion dollars for Haiti and built 6 homes." Retrieved July 2018 from: <https://www.propublica.org/article/how-the-red-cross-raised-half-a-billion-dollars-for-haiti-and-built-6-homes>

## Future Response

Aided by advancements in technology, international NGOs will shift away from service delivery and towards coordination, connecting local populations with money and innovative technology. This will change the structure of international NGOs, as they will increasingly act as umbrella organizations with integrated ties to a range of different actors, including local NGOs, community and regional governance, specialized services and philanthropic arms of large companies. A sudden-onset disaster will see large NGOs connecting almost instantly with partners in the area and providing relief resources based on the direction of these stakeholders. Digital volunteers will continue to offer helpful services during emergency situations, though AI technology will replace them in many of their current functions, including monitoring of social media channels and reviewing satellite imagery. Bridging the gap between immediate disaster relief and subsequent reconstruction and development work will take on increased priority, as NGOs continue to be held responsible by the media and the public.

## 7. INTERNATIONAL COOPERATION

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The presence of Governments in crisis response and their contribution

### 1907 Response

The Jamaica earthquake relief efforts received support from countries around the world in the forms of money and provisions. Support largely came from countries within the British Empire, but France, Haiti and the US sent ships with supplies.<sup>62</sup> No international body existed to coordinate emergency response, and the assistance to Kingston was coordinated primarily by the Foreign and Colonial Offices in London, and by the Governor of Jamaica, Sir James Alexander Swettenham. This ad hoc system ran into issues early when Swettenham, fearing foreign intrusion, refused much of the assistance offered by the US Navy, who were the first to respond. This act caused animosity abroad, with the New York Times running a front-page headline that read “Help Resented, Our Ships Leave,” and the British Government in London quickly apologized for the slight.<sup>63</sup> From cables sent between London and Kingston, it appears that there were soon adequate supplies to help with immediate shelter and food, with money and supplies for reconstruction efforts being the larger challenge.<sup>64</sup> Little information is available about the engagement of local populations.

### 2010 Response

The international response to the Haiti earthquake was sizeable, with dozens of countries contributing financial aid and providing significant military assets, including field hospitals, troops, hospital ships and port handling equipment.<sup>65</sup> Relief efforts and initiatives were decentralized, with OCHA coordi-

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62 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., nos. 51 & 69.*

63 “Help resented, our ships leave,” (21 January 1907), *The New York Times*.

64 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., no. 42.*

65 Cecchine, G.; Morgan, F.E.; Wermuth, M.A.; Jackson, T.; Schaefer A.G.; Stafford M. (2013) “The U.S. military response to the 2010 Haiti earthquake,” *The Rand Corporation prepared for the United States Army*, xvi.

nating the response as outlined in its mandate from the General Assembly. A subsequent evaluation of relief efforts praised the speed of financial mobilization and initial search-and-rescue efforts, and identified areas that required improvement in future disaster response.<sup>66</sup> These areas included a lack of communication between clusters (e.g. nutrition, health, shelter) and a lack of engagement with the Haitian Government and population. The evaluation found that local communities were not actively included in the design and implementation of the response, and that many responding bodies excluded the relevant Government ministries from deliberations.

## **Future Response**

Finding effective ways to coordinate between numerous different actors in a decentralized system will remain a challenge when addressing global emergencies, and the international response system will not face any large-scale change in the near future. The UN will continue to take a lead role in these coordination efforts, but as with NGOs, UN agencies will shift away from service delivery. Engagement with local government will become expected, but it will be constrained by numerous factors including capacity, the intentions of government officials, and the affected population's trust in their institutions. Climate change will bring more frequent natural disasters, but these crises will continue to see a more robust international response than the responses for protracted emergencies. Longer-term emergencies will also be instigated by climate change as well as politically driven conflict, and they will continue to suffer from underfunding.

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<sup>66</sup> Bhattacharjee, A.; Lossio, R. (January 2011). "Evaluation of OCHA Response to the Haiti Earthquake," Final Report, OCHA.

# ANALYSIS: EVALUATING THE LONG-TERM TRENDS

The most obvious trend when evaluating international disasters between 1907 and 2010 is the rapid increase in the speed of the response. It took over a day for the British Government to be notified of the earthquake in Jamaica, but less than half an hour for multiple official alerts to be issued about the earthquake in Haiti. Only three ships arrived in Jamaica within the first week, but 26 international search-and-rescue teams arrived in Haiti within three days. And it took days for a response fund to be established in London for Jamaica relief, yet CERF released \$10 million for Haiti relief within 24 hours.

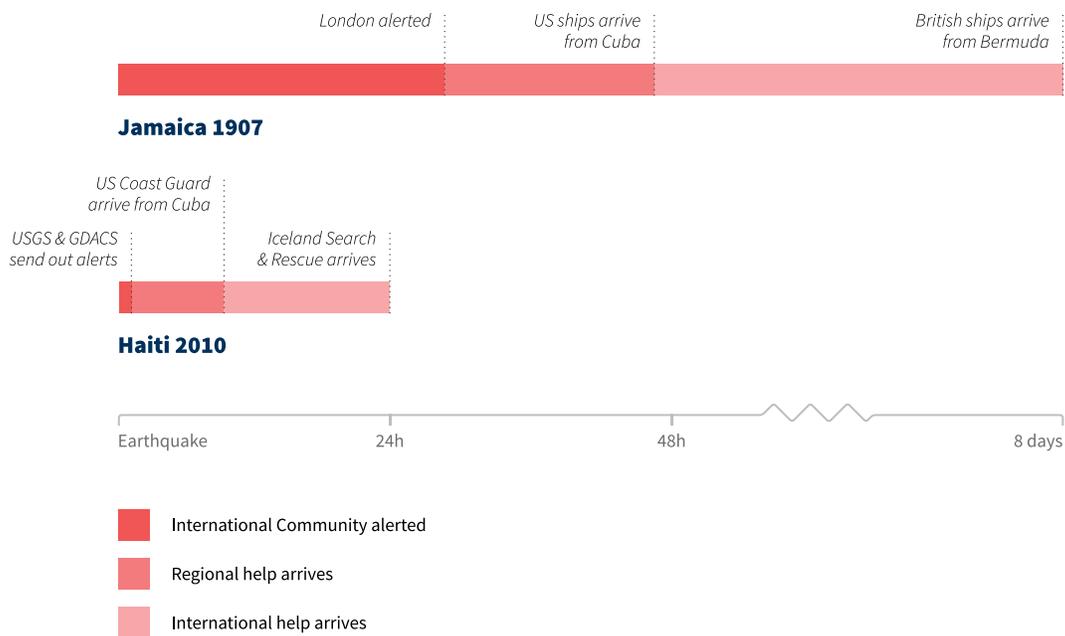


Figure 1: Response Speed

The increased speed of international response can be attributed to advancements in technology and processes. The invention of the Internet and cellular networks improved our ability to share information on crises. This was a sizeable advancement over the cablegram system that existed in 1907, which itself was a revolutionary technology that permitted messages to move faster than humans for the first time in history. Likewise, the development of airplanes in the twentieth century completely changed the speed at which countries all over the world could respond to a natural disaster in the Caribbean. Search-and-rescue responders from Iceland – over 6,000 km from Haiti — landed in Port-au-Prince within 24 hours.

Process-wise, the twentieth century saw the creation and development of international organizations that shifted crisis response from an ad hoc conglomeration of relevant parties to an established system with denoted roles and responsibilities. Initial alerts of the Haiti earthquake came from the OCHA office

in Haiti, the Global Disaster Alert Coordination System and the United States Geological Survey, all of which have a mandate to alert responders to crises as fast as possible. The release of \$10 million for relief efforts within 24 hours was due primarily to the creation of CERF by the UN General Assembly, and not because of advancements in financial technology since the Jamaica earthquake. Organized and established processes significantly reduced the time needed to mobilize relief efforts to Haiti.

When examining emerging technologies and process developments that could aid international disaster response in the future, it appears likely that the speed of crisis response will continue to increase, though at a slower rate than seen throughout the twentieth century. Advancements in information communication technology and finance in particular have the potential to expedite aid delivery, and institutional memory and growth should increase the speed at which organizations can respond. There will, however, be diminishing returns on some technological advancements. Alerts, which are already down to minutes, can only be reduced to seconds, and faster airplanes will still need to contend with the logistics of crowded airports and supply chain management in a disaster-affected area.

In a similar vein, the capacity of international response has increased by large orders of magnitudes and will likely not see such continued growth, even with continued technological and process advancements. In the first eight days of the Jamaica response, eight ships arrived to provide relief support; more ships followed intermittently in the following weeks. In contrast, the US Air Force Special Operations team reported landing 250 airplanes a day in the days following the Haiti earthquake, and the US Navy alone sent 33 ships. Over 10,000 NGOs were operating in Haiti at the time of the earthquake, and relief efforts provided a wide range of assistance that included search and rescue, telecommunications support, medical care and food provision. It will likely be possible for actors to provide even more aid in future crises, but it is less clear the extent to which this additional aid will be helpful. The relief effort to Haiti in 2010 saw the mobilization of unprecedented amounts of resources, yet subsequent evaluations reported problems with mismanagement and long-term development. More does not necessarily equal better.

Instead, smarter aid is needed, and this will likely be provided by emerging technology. Advancements in information communication technology in particular appear poised to make a sizeable impact on the quality of crisis response. The use of such technology following the Haiti earthquake was considered a breakthrough and the beginning of the realization of its potential to improve relief outcomes.<sup>67</sup> The technological capacity in Haiti was, in fact, dramatically higher than even 10 years prior,<sup>68</sup> and it is likely that the coming decades will continue to see increases that are akin to that of air travel in the mid-twentieth century. Reliable communication networks and platforms to manage crowdsourced information and transform data into maps and other valuable information products will lead to better needs assessments, better allocation of resources, better situational awareness before, during and after an emergency, and perhaps most importantly better local engagement.

It is a growing tenet of humanitarianism that improving the quality of aid will require empowering local communities to act however they see fit, instead of providing services that are designed with limited,

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67 Harvard Humanitarian Initiative (2011). "Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies" Washington, D.C. and Berkshire, UK: UN Foundation & Vodafone Foundation Technology Partnership.

68 Ibid, 12.

if any, community input and ownership. The historic marginalization of affected populations can be seen in the 1907 cablegrams of the Governor of Jamaica, who refers to people affected by the disaster as “wonderfully patient, but listless”,<sup>69</sup> and reports of the British Major and Lieutenant, who wrote that immediately following the earthquake, “it was impossible to get the civilian coloured population to do anything for themselves or for anybody else.”<sup>70</sup> One hundred years later, OCHA’s evaluation of its Haiti response found engagement with local NGOs and communities to be poor, with one OCHA staff member commenting: “We do not interact with local NGOs or Government, forget about interacting with communities.”<sup>71</sup>

If 1907 to 2010 is an indication of long-term trends, there is little reason to forecast change in responder-community relations. However, there are reasons to doubt this projection. As previous technologies enabled improvements in speed and capacity, emerging technologies will enable community engagement and increased decision-making by affected populations. Reliable communication networks will provide information. Technologies that provide reliable communication networks to responders as well as to the entire affected population allow the fast and transparent distribution of money to individuals and deliver supplies without relying on centralized focal points. They could also drastically alter the current structure of crisis response. The shifting of power towards local populations is made even more likely if the technology coincides with increased calls for engagement and community empowerment, as seen in part in the evaluations of the Haiti earthquake response.

Civilian engagement and leadership would be a new development, but it fits into a larger trend of expanding and evolving international actors. The response to the 1907 Jamaica earthquake was dominated by States, with only marginal contributions from NGOs and private actors. The British Empire controlled the resources, and other countries that came to Jamaica’s aid did so with the approval of the British. Sovereignty forbid others from encroaching on territory controlled by the British, and the Governor of Jamaica heavily limited US assistance to the people of Kingston for fear of the US establishing any measure of control. The Relief Committee in New York, meanwhile, was ignored by the Governor, who appeared to have limited time for non-State actors.

The concept of sovereignty is still very much present today, and all international assistance to the Haiti earthquake had to be approved by the Haitian Government. However, the sheer size of the response, with its plethora of international organizations, NGOs and responding Governments, made such approval a symbolic exercise more than a practical reality of ownership. In addition, technology had advanced in such a manner that actors in 2010 could provide assistance to people in Haiti without being there physically. Organizations and digital volunteers reviewed satellite imagery, monitored social media, wrote situation reports, drew maps and generally provided support, where possible, from outside of Haiti, not in conflict with Haitian sovereignty but rather circumventing it entirely. From 1907 to 2010,

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69 *Correspondence Relating to the Earthquake at Kingston Jamaica at 14th January, 1907. (1907), Daring & Son Ltd., no. 9.*

70 *Ibid, enclosure in no. 165.*

71 *Bhattacharjee, A.; Lossio, R. (January 2011). “Evaluation of OCHA Response to the Haiti Earthquake,” Final Report, OCHA, 30.*

non-State actors gained a much more prominent role in crisis response, to a certain extent diminishing the importance of States themselves.

The long-term trend in this area is far from clear. On one hand, there is the continued respect towards national sovereignty that underpins our current international order. On the other hand, there are emerging technologies that will enable actors to circumvent States and provide resources directly to local organizations and affected individuals. The end result, likely a norms-based mix of decentralized actors and respect for nation State autonomy, will be part of a broader discussion of sovereignty happening within the areas of political science, international law and global affairs. The responses to future disasters may only deal peripherally with the issue of sovereignty, but it will likely be one of critical importance in cases where the Government has purposefully induced disaster conditions, or where the disaster site has multiple different actors functioning in a State-like capacity without a clear division of power.

# CONCLUSION

Between 1907 and 2010, advancements in technology and the establishment of organizations and processes led to drastic improvements in international crisis response. Technology and organizations will continue to evolve over the next 100 years in new and exciting ways, and the outcomes of crisis response will not remain static under these changing conditions. While the twentieth century saw crisis response improve mainly by advances affecting speed and capacity, it appears likely that emerging technology and organizational reform will instead advance the response in terms of overall quality. Progress will be made in the effective and efficient mobilization of resources and delivery of key services, stemming largely from technology that connects and enables various actors, as well as a shift in international organizations from providers to coordinators. Future crisis response will likely need to contend with more complex situations brought about by factors such as climate change, growing urbanization, and the evolving nature of war and conflict. These will present new problems, but overall the objective will remain the same: helping people affected by large-scale emergencies.

# APPENDIX I:

## Summary of Disaster Response Advancements

	1907 - Jamaica	2010 - Haiti	Future Response
<b>Alerts</b>	London alerted more than 24 hours after earthquake	GDACS and USGS send out alerts within half an hour of earthquake	Use of AI for faster response Alerts are decentralized and available to any actor
<b>Mobilization</b>	Ships leave for Haiti two days after earthquake Eight ships arrive on island within eight days	Iceland Search & Rescue within 24h 26 search & rescue teams within 3 days Two days after earthquake, Port-au-Prince airport begins receiving 250 airplanes a day	Rapid deployment, as seen in Haiti Congestion at transport points and supply chain logistics will continue to be largest bottleneck
<b>Communication Networks</b>	Landlines are heavily damaged Local paper publishes first paper four days after earthquake	Cell. networks are damaged & strained Responders work to provide networks for responders, Government and population Int. media reports on crisis; local media is largely disrupted due to damage	Emerging technologies provide reliable access to communication and networks in disaster area Communication networks are easily available to responders and affected population
<b>Delivery</b>	Coordinated by local relief committee, camp for displaced at Palace Gardens racecourse	Aid delivered at focal points around city Damaged roads and heavy traffic made delivery an ongoing challenge	Use of drone technology to deliver aid across a whole disaster site Increased reliance on local community groups to distribute relief supplies
<b>Finance</b>	Mansion House in London manages fund for relief effort starting four days after earthquake American Red Cross raises money for response Money sent to Kingston Relief Committee or sent in form of provisions	CERF provides funds the morning after earthquake Funding is raised and provided by numerous organizations Wire transfers are difficult due to lack of liquidity in Haiti	Blockchain and other technologies make transfer of money to individuals easy and transparent Move towards cashless systems solves liquidity problems that occurred during Haiti
<b>NGOs</b>	Assistance from Relief Committee in New York and American Red Cross Kingston Relief Committee organized in Jamaica	Over 10,000 NGOs operating in Haiti NGOs contribute wide range of services and resources Reports of mismanagement and poor planning	International NGOs restructure as coordinators of funds and technology to local community organizations
<b>International Cooperations</b>	Organized by Governor of Jamaica and the Foreign and Colonial Offices in London US assistance is declined due to fears of increased influence Little management by local population	Response decentralized but coordinated through OCHA Resources provided by dozens of countries Little management by local government and population	Continued development of international systems Move towards increased engagement with local populations and government