Introduction (disaster management part)

The ability of governments and communities to manage natural disasters has improved with the rise of social networking. This is primarily due to the increased communication capabilities made possible through social networks (Huang, et al). A disaster in this context is defined as an event which disrupts the social fabric and makes it dysfunctional (Simon, et al). Specially, earthquakes, hurricanes, diseases, and other severe geological, meteorological, and biological phenomena which damage large sections of human infrastructure and cause loss of life are the natural disasters being managed in this research. The application of social networks to disaster management can be extended to man-made disasters, like war and terrorism, but the papers under review are focused on natural events. Social media provides collectivity, connectedness, completeness, clarity, and collaboration, which are necessary components of communication in an emergency situation (Chan). The kind of strategic information provided by publicly generated content in these scenarios leads to correct action in the field (Menoni). Compared to traditional means of community engagement, like television, radio, newspapers, and circulars, social networks move information much faster, reach a wider audience, and are not one-way (Kavanaugh, et al). With the tools of mass communication through social media, communities are better able to prepare for disasters, respond when a disaster strikes, and provide relief to those affected.

Related Works

Disaster management through social networks has been studied in several of the papers used as references. The papers by Kavanaugh, et al., Merchant, Simon, et al., and Chan focus on the general topic of using social media to improve management. Lindsay’s paper is similar to the other general reviews, but is more in-depth regarding relief efforts through online communities. The other scholarly papers reviewed cover how social media was used, or not used, for specific natural disasters. Several online news articles were also reviewed for specific details on the disasters discussed, and general adoption of social networks for disaster management.

Body

Natural disasters are an unavoidable part of human existence. Each year, they affect nearly one million and kill almost 400 people in the United States alone (Fox). Managing such events has three phases – preparation, response, and recovery. At all phases, social networks can be leveraged by disaster managers, victims, and the population at large to address the needs of the affected. Preparation refers to public and private planning for disasters along with building infrastructure to handle a disaster. By using social networks, planning and training can be organized, and collaborative networks can be established (Chan). When a disaster strikes, the immediate actions taken by those affected is the response, and is their efforts to minimize death and damage. At these times, many communication systems may be damaged, and for some, the Internet is the only option. Social networks connect victims to help, give responders situational awareness, and provide much-needed information to the general public (Simon). After the event has ended, recovery is the work done to return the social fabric to normal. Recovery is aided by social networking through its ability to raise awareness of victims’ circumstances and collect funds (Lindsay). The primary benefit of social networks in disaster management is information sharing on a large scale, but it is not a panacea. Internet access and power are required (Gosnell), and unfortunately most planning assumes communications will be intact (Skarda). Vulnerable groups, like the poor, homeless, and disabled, may not be reachable (Merchant, et al), but minorities are often more reachable with social networks than with government programs (Kavanaugh, et al). The requirements of message authentication, validation, accuracy, scalability, and security are not guaranteed through these networks as well (Huang, et al). Despite these challenges, using social media is a necessary part of disaster management. The next section will review four major, recent natural disasters – two that took place before large-scale social networking, and two that took place after – and discuss how they would have benefited from social networking, or how social networks were used to improve disaster management.

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| Disaster | Year | Deaths (estimate) | Cost (current dollars) | Communication methods |
| Hurricane Andrew | 1992 | 70 | $44.5 billion | TV, radio, telephone |
| Hanshin Earthquake | 1995 | 6,500 | $158 billion | Radio, TV, telephone |
| Hurricane Sandy | 2012 | 150 | $25 billion | Text messages, Twitter, Facebook |
| Tohoku Earthquake | 2011 | 20,000 | $224 billion | Text messages, Twitter, Facebook, Mixi |

On August 24, 1992, Hurricane Andrew came ashore near Homestead, Florida. It was a category 5 storm, one of the most powerful ever to hit the state. Almost 70 deaths were attributed to Andrew, and did an estimated $26 billion ($44.5 billion in 2016 dollars) in damage to Florida alone (Lilly). Over one million residents lost power and 150,000 lost telephone services. Despite this, the most common means of information movement through affected areas was radio, television, and newspapers. Famously, reporter Brian Norcross stayed live on the air for 23 hours when the storm hit, giving viewers updates on what to do and how to stay safe (Beasley). The experience of Hurricane Andrew was a powerful lesson for the people of Florida and the United States – better communication is key in catastrophic storms, and the existing infrastructure is not sufficient. To address this weakness, many telecommunication providers developed mobile towers that can be deployed in emergencies, and towers that can stay powered by batteries for over a week (Beasley). Although social networks were not available at the time, such an option may have proven valuable when the telephone network was not functional, or even if devices were powered by backup generators. One main problem during Hurricane Andrew was the lack of preparation, as the danger was generally underestimated. When the storm hit, bad planning further limited the ability to respond to the event, as “no one was in charge [and] no one knew what to do (Lilly).” With the tools of social media, preparation and response to natural disasters are aided by improved communication.

The Hanshin Earthquake struck Kobe, Japan, on January 17th, 1995. It was the second largest earthquake to hit the country in the 20th century and was particularly devastating in areas with old wooden houses (Smith). The death toll was nearly 6,500 and the damage cost around $100 billion ($158 billion in 2016 dollars). Immediate response was slow, as communications failed and management officials did not fully understand the scope of the disaster. Additionally, rigid social structures limited cooperation between government agencies and prevented fluidity in responses (Menoni). Preparations were found to be extremely poor, which surprised even the media. Realizing the event was a wakeup call, the Japanese government moved to establish better planning and organizational structures to deal with disasters (Chatfield). Given that social media serves well in communication support, the use of such systems would have likely aided in the management of the Hanshin Earthquake.

Hurricane Sandy swept up the northeastern coast of the United States in late November of 2012, hitting an area generally unaccustomed to strong hurricanes. The damage was extensive – over $25 billion and at least 147 deaths (CNN Library). Telephones were overloaded and power was out in many areas, but social networking played a pivotal role in response and recovery, as Internet services were for the most part still available. Twitter was especially active with disaster management efforts, with over 20 million related tweets during the storm reported by FEMA (Maron). The website was used by some police and fire departments to keep their communities informed, and emergency requests were sent through the social media when other means were not possible (Hughes, et al). Disaster managers that were able to leverage social networking were much better prepared to deal with Hurricane Sandy, and their performance during the storm was well-received by victims, prompting many lagging organizations to increase their online presence as well (Webley). Compared to Hurricane Andrew, Sandy was met with a much more connected populace that was better able to handle the crisis, in part thanks to social networking.

On March 11, 2011, the Tohoku Earthquake struck off the northeastern coast of Japan. The earthquake and ensuing tsunami killed over twenty thousand people and caused an estimated $224 billion in damages to buildings and infrastructure (Kazama). Compared to the Hanshin Earthquake, this disaster’s response unfolded in a much different manner due to the popularity of social networking. Twitter, Mixi, and Facebook were the major social media hubs for the country, and most crisis response communication was peer-to-peer, user-generated, and not government-controlled. As such, news of the disaster spread quickly, with social networks breaking the story 20 minutes before the mainstream media (Cho, et al). Within hours of the event, multiple government agencies found that the best way to reach the public was through social media and created accounts on Twitter (Cho, et al). Furthermore, one of Japan’s most popular social networks, Line, was launched within four months as a solution to the country’s weakened communications infrastructure (McCracken). Although the Tohoku Earthquake was extremely devastating, management of the disaster was greatly improved with the use of social networks.

Disaster management has changed dramatically with the rise of social networking. In particular, Twitter and Facebook have been able to connect millions of people almost instantaneously when a disaster occurs, and keep them engaged in the response and recovery efforts. By examining the circumstances of four major, recent disasters, it is clear that social networks have become a crucial tool in handling crises. These systems facilitate communication between affected people and responders in the immediate aftermath of a disaster. Social media platforms also now work to bring communities together to plan and prepare for emergency situations (Skarda). They make fund raising efforts for relief reach a wider audience, as well as bringing awareness to the challenges faced by victims (Lindsay). With increased social media penetration and analytics, new options for disaster management open up. Open-sourced software enables crowdsourcing (Howe) to be leveraged in a crisis, and RSS and Twitter feeds can be connected to public address systems (Merchant), providing much-needed information on emergency services. As yet unseen future applications will further enhance the ability of social networks to aid in disaster preparation, response, and recovery.