

The First Eight Hours Following Environmental Hazards

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Abstract

The purpose of this study is to identify the role of emergency management plans in the first eight hours following a disaster. This study analyzes two wildfire cases in Northern California and Fort McMurray to evaluate the lessons learned. The two cases had different scenarios and outcomes, but they both highlighted the fact that the lack of effective communications channels and late evacuation notices had the most impacts on keeping affected residents safe. The main factors that contribute to the success of communications during wildfire disasters include selecting proper communication channels to inform residents in affected areas and having an evacuation emergency plan in place. This research then provides best practices that include using the emergency alert system and integrating different communications channels (social media, phone apps and radio) to update residents the progress of the fires and evacuation orders, providing the media with transparent information regarding the incidents and finding proper ways to communicate with vulnerable populations. The key activities that need to be completed during the first eight hours of the emergency based on the Protective Action Decision Model (PADM) are immediately issuing an alert warning, activating the emergency management team and making decisions regarding evacuation as soon as possible.

Keywords: wildfire, emergency management plan, risk communication program, the first eight hours, evacuation planning, the Protective Action Decision Model

Research Question or Hypothesis

Which main factors contribute to the success of the first eight hours following environmental hazards and disasters?

The effects of global warming on temperature and precipitation moisture, over the last few years, have caused drought and extreme heat patterns, making fires more frequent and intense. The Weather Network predicts that by 2030, “over half of Alberta's boreal forests could disappear in 80 years due to wildfires and climate change” (O’Malley, 2018). The increase in fire activities urges the Government of Alberta, in general, and the City of Calgary, in particular, to prepare and have a wildfire risk communication plan in place in order to monitor potential fire risks, ensure safety and reduce liability for residents in risk areas.

This risk communication critiques two wildfire cases: the Northern California wildfires in early October 2017 and the Fort McMurray wildfire in Alberta in 2016, using the works by Lindell and Perry (2012), Cova, Drews, Siebeneck and Musters (2009) and Cova, Dennison and Drews (2011). Through the lessons learned from these two wildfire cases, it is argued that effective communication and emergency evacuation plans are the keys to wildfire natural disaster responses, especially during the first eight hours following the disaster. This research will briefly review the literature before going over the two wildfire cases and then, analyze the lessons learned to provide some best practices as safeguards.

Literature Review

This literature review on risk communication focuses on the Protective Action Decision Model (PADM) and its applications to evacuation modelling. This review first introduces the model by Lindell and Perry (2012) and uses the works by Cova, Drews, Siebeneck and Musters (2008) and Cova, Dennison and Drews (2011) to critique the model.

According to Lindell and Perry (2012), the Protective Action Decision Model (PADM) attempts to characterize how people typically perceive the risks and adopt actions to protect against environmental hazards and disasters (p. 616). In urgent scenarios requiring households to take immediate actions, their preparation times including mental preparation and logistical preparation vary significantly depending on the incident characteristics (Lindell & Perry, 2012, p. 628).

Cova, Drews, Siebeneck and Musters (2009) identified the warning and evacuation as the main factors influencing the PADM. The warning and evacuation factors play an important role in “mov[ing] people safely and includ[ing] the population at risk, available law enforcement personnel, the estimated time to warn people, special needs population, and the level of community preparedness” (Cova, Drews, Siebeneck and Musters, 2008, pp. 155-156).

Cova, Dennison and Drews (2011) show that evacuation offers a relatively high level of life protection (p. 1663), but it could also place residents at risks if there was not sufficient time. Cova, Dennison and Drews (2011) also argue that although the PADM offers a great application to evacuating modelling, “the model should not be viewed as ready for operational use,” because all the parameters might not accurately be collected to make a good decision, especially given the dynamic and uncertain context of the emergency (p. 1680). Cova, Dennison and Drews (2011) listed four common reasons that may make the circumstances becoming urgent: 1) a fast-moving wildfire, 2) a delay in warning receipt or no warning, 3) a delayed decision regarding a warning or environmental cue and 4) prolonged preparation time in carrying out a selected action (p. 1674).

In this research, I identify common issues from two wildfire cases and then, provide

best practices and key activities that need to be completed within the first eight hours following an emergency or disaster based on the PADM.

Background

1. Northern California Wildfires in early October 2017

Northern California experienced the “deadliest” fires in the state history in early October 2017 (Blumberg & Ruiz-Grossman, 2017). A series of catastrophic fires broke out around 9:45 p.m. (local time) on Sunday, October 8, 2017 (Park, 2017). At 10:52 p.m, a mandatory evacuation was issued for all of Porter Creek Road and Petrified Forest Road, followed by another evacuation order between Calistoga and Santa Rosa at 11:58 p.m (Watkin et al., 2017). Then, at 1:12 a.m, firefighters warned that the fire would reach eastern Santa Rosa within an hour (Watkin et al., 2017). By 3 p.m, approximately 16 people died (Watkin et al., 2017). The Sonoma County did not activate Wireless Emergency Alert (WEA) system to notify residents because the alert system might reach “too many” people and create widespread panic for people who were not being affected (Yonemoto, 2018).

Also, when the emergency 911 phone lines were flooded with thousands of phone calls, the dispatchers “had no system to convert an avalanche of real-time reports of fires and aid requests from residents and first responders into an early and clear sense of what was unfolding” (Johnson, 2018).

The fires destroyed 8,900 structures including homes and buildings, scorched 245,000 hectares and claimed the lives of 44 people (Gabbert, 2018). An estimated 20,000 people were forced to evacuate during the first 24 hours by the California Department of Forestry and Fire Protection (Edelson, 2017).

2. Fort McMurray Wildfire in May 2016

On May 1, 2016, approximately at 4 p.m., an Alberta Agricultural and Forestry aircrew discovered a wildfire burning in a remote part of forest southwest of Fort McMurray (KPMG, 2016). Three hours later, at 7:08 p.m., an evacuation notice was issued for those people who lived in Fort McMurray's Gregoire neighbourhood by using the Alberta Emergency Alert system (KPMG, 2016, p. 24). Then, at 9:57 p.m. the Mayor of the Region declared a State of Local Emergency and activated the Region's Emergency Operations Centre (REOC) (KPMG, 2016, p. 24). As the wildfire grew, residents of the communities of Centennial Park south of Airport Road and Gregoire received a mandatory evacuation order. Everybody safely evacuated to the operating centre that night (KPMG, 2016, p. 24).

Unlike the northern California wildfire, the peak of the Fort McMurray wildfire occurred between May 3 and May 4, 2017, when almost 88,000 residents were evacuated from the Region. No fatalities, serious injuries or missing persons were reported regarding the fire; however, two young lives were lost in a motor vehicle accident fleeing the fire (KPMG, 2016, p. 14). The mass evacuation notification came late and the evacuation was not well organized.

KPMG (2016) reported a total of 1,935 residential structures and 23 industrial and commercial buildings were destroyed or irreparably damaged (p. 14). Evacuees started returning home on June 1, 2017 (KPMG, 2016, p. 31).

Analysis: Lessons learned from the Northern California wildfires

Firstly, communications channels were not effectively utilized to alert residents regarding evacuation. The Sonoma County's decision of not activating WEA was a mistake because the fires occurred at night when a majority of people were asleep. Kovner (2018) reported 43 per cent of 3,705 responses from residents of the three counties ravaged by the wildfires did not

receive any warning to evacuate. Only when they heard emergency vehicle sirens in their neighbourhoods and/or were told by friends, family and neighbours did they know they needed to evacuate.

Secondly, the Sonoma County could have started evacuating people earlier. The very first 911 phone calls regarding the fires were received at 7:25 p.m. on Oct. 8, 2017 (Johnson, Rahaim, Rossmann and Warren, 2017). Also, on the same day, in the morning, the National Weather Service issued a Red Flag Warning for some parts of northern California with gust from 40 to 55 miles per hour with low humidity and dry fuels (Rufenatch, Van Cor, Villalobos and Monroe, 2017). However, almost four hours after the first 911 calls, when all fires broke out, the county started evacuating people.

Lastly, Sonoma County was not prepared for this type of catastrophe in terms of human and engine resources. When the emergency 911 phone lines were flooded with thousands of phone calls, the dispatchers “had no system to convert an avalanche of real-time reports of fires and aid requests from residents and first responders into an early and clear sense of what was unfolding” (Johnson, 2018). During the first 12 hours, according to the state Office of Emergency Services, only 130 out of 300 engines were sent to assist in the firefight as requested by local firefighters (St John, 2017).

Analysis: Lessons learned from the Fort McMurray wildfire

Like the Northern California wildfires, the mass evacuation notification of 88,000 people on the third day of the disaster came late. According to Huncar (2016), a firefighter said, “I think it [the late evacuation notice] put all the lives of the first responders at risk as well as the lives of the people in the city. People should have been notified much earlier.” The fire did not cause any fatalities itself, except the death of two teens who were trying to escape from the fire. However,

“the death of the teens could be considered ‘a direct result’ of circumstances since they would not have left otherwise” (Huncar, 2016).

It was also reported that only 24 per cent of residents responding to an online survey agreed that the evacuation was well-organized (KPMG, 2016, p. 69). The evacuation messages should have been delivered at the same time on all communications channels to avoid the confusions among the public. The first evacuation notification on May 3 was delivered on the Region’s social media account at 1:55 p.m., before being pushed out through the Alberta Emergency Alerts system, television, radio and phone apps at 2:34 p.m., 40 minutes after. Many residents said that they learned from the evacuation from friends and family instead (KPMG, 2016, p. 68).

Additionally, the press conference on May 3 sent people mixed messaging regarding the evacuation. They were told to “get on with their lives, and take their kids to school” and advised that “[evacuation] is a long way off,” but the same time, they were urged to “be prepared to act on short notice” and to be aware that “fire conditions are extreme” (KPMG, 2016, p. 68). The post-incident assessment said, “These mixed messages may have undermined the urgency for preparedness, and potential danger that the wildfire presented to the community (KPGM, 2016, p. 68).

Discussion: Best practices

Through lessons learned from two wildfire cases, four main issues identified were: 1) there was a lack of preparedness for such mega-fires 2) the evacuation notice came late, 3) mass evacuations were not well-organized and 4) communications including communication channels selections and messaging were not effective. The best practices below will focus on three main themes: preparedness, communications and evacuation planning.

First of all, natural disasters can strike unexpectedly on different scales, leaving people little time to prepare and respond. No matter what the disaster is, there is always a high potential that it will create chaos and confusion among the public and key stakeholders. Hence, preparedness activities before a disaster are necessary and important because they allow those that may be impacted to predict possible consequences and thus, to equip them with the tools to minimize their losses and increase their chances of survival (Mamuji and Rozdilsky, 2018, p. 13). Had the Sonoma County been more prepared for such disasters, for example, providing emergency management exercises and training programs for staff, the 911 dispatchers could have managed thousands of phone calls better. The staff could have calmed affected residents down and pointed them to resources during the first six hours.

Secondly, in terms of communications channels, lessons learned from two wildfire cases highlighted the important role of the Emergency Alert System in issuing emergency warnings. The Alberta Emergency Alert System was successfully used to update the progress of the wildfire, evacuation notices for specific communities and information on recommended destinations for evacuees (KPMG, 2016, p. 42). In addition, the AEMA proved its success of taking advantage of social media, phone apps and radios to communicate with residents. Almost 90,000 people received an evacuation notice through different forms and evacuated safely within a day.

Besides, the media has an important role in presenting facts and delivering news to communities during the continuing hazard phase. Once a hazard has been determined, the risk becomes news and the media's function is to "report" not to "educate" about the risks (Adams, 1992-1993, p. 30). The 9/11 incident showed that 56.8 per cent of the coverages during the first three hours following the emergency was primarily framed with the descriptive frame disaster.

Steelman and McCaffrey (2012) asserted that “providing people with clear and specific information that takes into account local conditions can help minimize the inherent uncertainty of a natural hazard and in so doing help minimize potential dissatisfaction” (p. 702).

In addition, local authorities should pay more attention to communicate with vulnerable groups of people. Sugerman et al. (2012) showed that lower recall and compliance were observed with technical messages and among vulnerable, less educated, minorities and low-income populations. To make the messages easy to understand, facts should be provided and videos, personal testimony, pictures and graphics should be included. Sugerman et al. (2012) suggested keeping messages “simple, short and tailored to vulnerable groups.”

Lastly, “evacuation is the most common form of protective action in a wildfire” (Cova, Drews, Siebeneck and Musters, 2009, p. 160). Late notices regarding evacuation from the Northern California and Fort McMurray put people’s lives in danger and even caused some deaths in the northern California wildfires. Cova, Dennison and Drews (2011) reaffirm that evacuation offers a relatively high level of life protection and if there is enough time to clear the affected area, it is highly recommended in terms of improving community resiliency to wildfire (p. 1663). Therefore, an evacuation management plan should be included in the comprehensive wildfire emergency management plan.

According to the Mass Evacuation in Natural Disaster Guide sponsored by the United Nations High Commission for Refugees, evacuation planning is very important to 1) effectively mobilize and coordinate capacity and resources, 2) manage to evacuate all persons at risk safely, 3) meet emergency needs for shelter and assistance and 4) help evacuees and other affected people be able to recover from the disruption and risks created by their displacement (KPMG, 2016, p. 70).

In the post-incident assessment of the Fort McMurray fire, KPMG (2016) showed essential components of mass evacuation planning should include the pre-event stage, early warning, evacuation decisions, evacuation directives and full evacuation, including emergency shelter and relief (p. 69). Or at a minimum, “a specific evacuation plan needs to have a destination, a route of travel and alternative route, and a means of transportation” (Lindell & Perry, 2012, p. 622).

Conclusion

Through the analysis of lessons learned from the Northern California wildfires and the Fort McMurray wildfire, it is shown that preparedness, effective communications and evacuation planning are three main factors in response to wildfire disasters to “minimize the losses and increase the chances of survival” (Mamuji and Rozdilsky, 2018, p. 13). During the first eight hours following the emergency, things often progress very quickly and out of the control with, people panicking finding out information and which actions they need to take. Therefore, it is important for local authorities to keep track of red warning issues, pay attention to the progress of the issues and immediately activate the emergency management plan that should be prepared beforehand to mitigate and prevent the disasters. Once it is determined that an emergency response is required, authorities need to activate the emergency management team promptly, determine the appropriate time to issue evacuation notices and select communication channels appropriate to the situation, including social media, phone apps, radio or websites. “Evacuation is the most common form of protective action in a wildfire” (Cova, Drews, Siebeneck and Musters, 2009, p. 160) because of its high level of life protection when enough time to clear the affected areas is given (Cova, Dennison and Drews, 2011).

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