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Reality Versus Fantasy: An Analysis of Emergency Management Practices Portrayed in Disaster Movies

Lisa Wier
Eastern Kentucky University, lisa_wier@mymail.eku.edu

Eastern Kentucky University

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Lisa Wier

Faculty Mentor

Dr. Ryan Baggett

School of Safety, Security, and Emergency Management

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Lisa Wier

Mentor: Dr. Ryan Baggett

Abstract description: In Hollywood, disaster films are often highly fictionalized for entertainment purposes. They often misrepresent disaster protection, mitigation, response, and overall preparedness. The films *Jurassic World* (2015), *San Andreas* (2015), and *Your Name* (2016) misrepresent mass island evacuation and response, earthquake preparedness and mitigation, and near-Earth impacts (NEOs) and protection respectfully. However, the disasters exaggerated are based upon real hazards that emergency management officials must plan for. The disasters portrayed are analyzed with the U.S. Department of Homeland Security's *National Preparedness Goal* and its core capabilities to demonstrate effective strategies for the incidents, and proper identification of the discrepancies between disaster management fact versus fiction.

Key words: Disaster movies, Films, National Preparedness Goal, *Jurassic World (film)*, *San Andreas (film)*, *Your Name (Kimi no Na wa)*

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Introduction

The purpose of this honors thesis is to demonstrate a lack of proper preparedness activities in modern disaster films. Movies, as a popular and common entertainment source, can typically provide an initial exposure on a topic to a large audience. They can also contribute to the population's perception about the nature of disasters (McEntire, 2007). However, many topics are fantasized for entertainment purposes, similar to the phrase, "I've seen this in a movie once". While oftentimes the circumstances are pure fantasy or overly exaggerated, there is some truth in the basic threat that can be solved logically using examining real life concepts and practices. By analyzing how and why the protagonists could have selected an alternative solution, the reader will understand the fundamentals of appropriate emergency management strategies as opposed to media sensationalism.

For this research, three disaster movies will be analyzed: *Jurassic World* (2015), the box office success to the revitalization to the 1990s film series, *San Andreas* (2015), portraying what could occur San Andreas Fault with Dwayne "the Rock" Johnson to the rescue, and *Your Name* (2016), Japan's highest grossing anime. The films are within the same time period to grasp an understanding of current disaster portrayal. A variety of the emergency management practices will be highlighted including mass evacuations for *Jurassic World* (2015), earthquake preparedness for *San Andreas* (2015), and near-earth impacts (NEOs) for *Your Name* (2016). Disasters will be analyzed with the *National Preparedness Goal* (Second Edition), a document created by the U.S. Department of Homeland Security (DHS) and Federal Emergency Management Administration (FEMA), which outlines five mission areas and several core capabilities to achieve a resilient nation through the whole community approach. Through

comprehensive analysis, an accurate strategy for the incidents will be identified resulting in the identification of the discrepancies between disaster management fact versus fiction.

The thesis methodology removes the fantasy elements of the films analyzed in order to focus on the disaster core elements under investigation. For example, instead of an island park showcasing dinosaurs, the thesis focuses on an amusement park located on an island. The same applies to the other films; instead of focusing on Dwayne "the Rock" Johnson beating the odds, the thesis will analyze preparedness in earthquake-prone southern California. While *Your Name's* story heavily involves body swapping, the thesis will instead study the ambiguous topic of preventing objects that could impact the earth. It is anticipated that the research will reveal the falsehoods in the protagonists' actions in response to the disaster, which will be countered with plausible fact-based alternatives.

Movie Summaries

Jurassic World (2015)

Jurassic World is the 2015 sequel to the original *Jurassic Park* trilogy and provides the audience with another "dinosaur-terrorizes-the-park" experience. The first genetic hybrid, the *Indominus rex*, escapes the paddock and wreaks havoc on the park. After the dinosaur's death at the end of the film, the park is unable to reopen due to bad reputation and closes down for good. After escaping, the park's senior management denies the motion to evacuate the island, and instead relies on the Asset Containment Unit (ACU) to contain the dinosaur. However, the *Indominus rex* easily obliterates the ACU. Claire Dearing, the operations manager of the park does not call for a mass evacuation but instead initiates "phase one" and orders all attractions north of the resort (which is located in the center of the island) to close. Only after the *Indominus rex* breaks into the park does the operations team initiate "phase two" and evacuates the island.

The *Indominus rex*, an obvious threat, has already killed two people, and is later revealed to have the ability to camouflage, avoid thermal detection, and to persuade other carnivores to attack humans. The dinosaur is also shown to be a voracious and intelligent predator, easily adapting to challenges and overpowering the *Tyrannosaurus rex*. With this knowledge, the operations team should have taken the *Indominus rex* as a more serious threat (Marshall, Crowley, & Trevorrow, 2015).

For *Jurassic World*, the thesis will analyze the evacuation of Isla Nublar after the escape of the dangerous *Tyrannosaurus rex* and *Velociraptor* hybrid *Indominus rex*. In the park, the pivotable means of travelling from the main park (located in the center of the island) to the ferry terminal are the monorails. Maps of the island are visible in the command center. One of the key elements of the map includes monorail routes, and the map shows there is only one route to the ferry terminal. There could be multiple monorails available, but numerous guests are shown waiting for the terminal in the main park. The absence of sufficient escape routes trapped the visitors on the island and escalated the severity of the catastrophe, and this is important because, as stated by Claire in the beginning of the film, the park hosts approximately 21,216 visitors on the day of the disaster. While the placement of the main park in the center of the island may be effective for tsunamis or storm surge threats, having inadequate transportation to the port inhibited a proper mass evacuation (Marshall, Crowley, & Trevorrow, 2015). As of April 2019, the film grossed over $1.6 billion worldwide, and is the fifth highest grossing film domestically and the sixth highest grossing film worldwide (Box Office Mojo, 2019a). This demonstrates the amount of people who saw the film, and the film’s overall impact.

San Andreas (2015)

San Andreas is a 2015 American disaster film produced by Warner Brothers Pictures. The film stars Dwayne "the Rock" Johnson as Ray Gaines, a Los Angeles Fire and Rescue helicopter pilot who rescues his family during several catastrophic earthquakes caused by the rapidly shifting San Andreas Fault. The disaster originated with small tremors near the Hoover Dam, causing two seismologists to investigate. A 7.1 magnitude earthquake destroys the dam, damaging cities over 200 miles away. One of the surviving seismologists, Dr. Lawrence, concludes that the San Andreas Fault, which was expected to erupt soon, was shifting. The shifting triggered a 9.1 magnitude earthquake near Los Angeles, violently rippling the city and damaging skyscrapers. After the quake, Dr. Lawrence realized the northern section of the fault had yet to shift and sends an evacuation warning to the people of San Francisco. A 9.6 magnitude earthquake ravages the city, toppling the already heavily damaged skyscrapers. Not long after, a tsunami devastates the city, destroying the Golden Gate Bridge, and killing thousands. As a result of the disasters, much of California forms into an island (Flynn & Peyton, 2015).

With *San Andreas*, the thesis will analyze earthquake preparedness during the dramatic shifting of the San Andreas Fault and its effects on Californian cities. In the film, the intensity and sudden eruption of the fault line caught many residents by surprise. Over the course of the film, the only two characters (with the exception of first responders in the background) who knew what to do during an earthquake were Dr. Lawrence and Ray Gaines. During the first earthquake on the Hoover Dam, Dr. Lawrence ushers the pedestrians off the dam to safety before it collapsed. During the other two major earthquakes, Dr. Lawrence orders everyone underneath tables and to "drop, cover, and hold on" (Flynn & Peyton, 2015). In San Francisco, Ray Gaines

instructs people to seek shelter near sturdy buildings during earthquakes and is one of the first to notice the signs of a tsunami (Flynn & Peyton, 2015). The film grossed over $473 million dollars worldwide (Box Office Mojo, 2019b). While it did not reach the impact *Jurassic World* had, the film still made a profit and is a classic example of a modern disaster film.

Your Name (*Kimi no Na wa)* (2016)

Your Name, also known as *Kimi no Na wa,* is a 2016 Japanese animated feature from the studio Toho. The film revolves around two main characters: Cheerful, optimistic and playful Mitsuha who lives in a small town surrounding the perimeter of a lake called Itomori and yearns for a meaningful life in Tokyo, and quiet, reserved, yet sometimes aloof, Taki who lives in Tokyo with aspirations to be an architect. The two high schoolers live oblivious of one another until one day they wake up in each other's bodies. The two must manage to abide by the other's way of life and solve the cause of their swapping. At the same time, a comet threatens to destroy Itomori, and the two must work together to save the town's residents (Kawaguchi, Kawamura, & Shinkai, 2016).

In the original timeline of the film, Itomori was destroyed on October 4th, 2013 when the Tiamat Comet broke apart at its perigee and impacted the town. The impact killed over 500 people, a third of the town's population, and injured hundreds more. The comet fragment landed nearby where many of the town's residents were celebrating the autumn festival, which contributed to high casualties. The impact left a .62-mile (1 km) crater next to the lake and caused a 4.8 earthquake. The disaster was dubbed the "Itomori disaster" and the town was subsequently abandoned (Kawaguchi, Kawamura, & Shinkai, 2016).

With *Your Name*, the thesis will analyze the alternatives to potentially prevent the destruction of Itomori from a near-earth object impacting the town and killing over five-hundred

people. In the movie, the comet's perigee, when it was closest to Earth, occurred at approximately 7:40 pm Japan Standard Time (JST). Not long after, the comet's nucleus collapsed, and a fragment impacted Itomori at approximately 8:42 pm JST. Nuclear munitions could have been a viable option if there was quick response. However, the collapse surprised everyone, including the international space agencies. Even so, experts were certain the fragments would burn up in Earth's atmosphere. Fortunately, in the alternative timeline of the film, Mitsuha and her friends managed to evacuate the portion of the town where the comet fragment would impact prior to the disaster. The impact still obliterated part of the town, but with few injuries and no deaths (Kawaguchi, Kawamura, & Shinkai, 2016). The film grossed over $357 million dollars, with a vast majority of the profit from international audiences (Box Office Mojo, 2019c). Particularly with near-Earth objects, this demonstrates the need for discussion for potential international hazards.

The *National Preparedness Goal*

The *National Preparedness Goal* is a document created by the U.S. Department of Homeland Security (DHS) to identify a nationwide ideal of preparedness through the whole community approach. In the second edition, the document defines the National Preparedness Goal for the entire nation as "a secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk" (DHS, 2015, p. 1). It is the responsibility of the whole community, ranging from local, state, and federal governments, non-governmental organizations, private businesses, and individuals, to become involved in nationwide preparedness. In order to achieve the goal, the document outlines five mission areas: prevention, protection, mitigation, response, and recovery, all of which assist with national preparedness

(DHS, 2015). The five mission areas include the phases of emergency management which serve to organize national preparedness activities (James & Long, 2012).

Figure 1 – Mission Areas and Core Capabilities

<table>
<tr><th>Prevention</th><th>Protection</th><th>Mitigation</th><th>Response</th><th>Recovery</th></tr>
<tr><td colspan="5">Planning</td></tr>
<tr><td colspan="5">Public Information and Warning</td></tr>
<tr><td colspan="5">Operational Coordination</td></tr>
<tr><td colspan="2">Intelligence and Information Sharing</td><td rowspan="4">Community Resilience

Long-term Vulnerability Reduction

Risk and Disaster Resilience Assessment

Threats and Hazards Identification</td><td colspan="2">Infrastructure Systems</td></tr>
<tr><td colspan="2">Interdiction and Disruption</td><td rowspan="3">Critical Transportation

Environmental Response/Health and Safety

Fatality Management

Fire Management and Suppression

Logistics and Supply Chain Management

Mass Care Services

Mass Search and Rescue Operations

On-scene Security, Protection, and Law Enforcement

Operational Communications

Public Health, Healthcare, and Emergency Medical Services

Situational Assessment</td><td rowspan="3">Economic Recovery

Health and Social Services

Housing

Natural and Culture Resources</td></tr>
<tr><td colspan="2">Screening, Search and Detection</td></tr>
<tr><td>Forensics and Attribution</td><td>Access Control and Identity Verification

Cybersecurity

Physical Protective Measures

Risk Management for Protection Programs and Activities

Supply Chain Integrity and Security</td></tr>
</table>

Within each mission area are several core capabilities that "serve as both preparedness tools and a means of structured implementation" and require the use of existing programs, technology, and tools (see *Figure 1*) (DHS, 2015, p. 1). The core capabilities provide the necessary knowledge to communities and individuals to enable them to contribute to national preparedness and are designed to be fluid for future challenges and different risks (James & Long, 2012). They serve as goals for the entire whole community to maintain during a disaster and cannot be obtained without national cooperation (James & Long, 2012).

While the whole community approach is most often referred to preparedness within the United States, it can be applied to any setting. Within *Jurassic World*, the whole community approach would include all levels of the operations team, ranging from the senior officials to the animal caretakers, and the visitors. Because the film takes place on an island, the whole community approach encompasses a small population. However, with *San Andreas*, the whole community approach is identical in the real life, and encompasses the entire United States, California, and the individuals in Los Angeles and San Francisco. The approach is similar with *Your Name*, but it applies to Japan and the residents of Itomori instead. It is only necessary to compare the emergency efforts of *Jurassic World*, *San Andreas* and *Your Name* to the national and obtainable aspirations outlined in the *National Preparedness Goal* as all real-life emergencies are.

Response – *Jurassic World*

The mission area that will be compared to the emergency efforts in *Jurassic World* is response and will focus on the mass evacuation efforts portrayed in the film. Response can be defined as "capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred" (DHS, 2015, p. 12). In addition, "response

emphasizes saving and sustaining lives, stabilizing the incident, rapidly meeting basic human needs, restoring basic services and technologies, restoring community functionality…and supporting the transition to recovery" (DHS, 2015, p. 12). Local community involvement is critical for response, and thus it is important they are properly trained and practice what to do during a disaster (James & Long, 2012). A mass evacuation is "when a natural or man-made extreme event strikes or threatens a populated area exposing it to an immediate or imminent life-threatening condition" (Chiu, Zheng, Villalobos, & Gautam, 2006, p. 1). It requires the removal of a large mass of people out from the hazardous area. There are fifteen core capabilities for response, but only five will be analyzed for this research paper. The five analyzed are planning, infrastructure systems, critical transportation, mass care services, and situational assessment (see *Figure 2*) (DHS, 2015).

Figure 2 – Core capabilities for response

Response
Planning
Infrastructure Systems
Critical Transportation
Mass Care Services
Situational Assessment

Within each core capability, the *National Preparedness Goal* defines target outcomes and objectives. *Planning* is the ability to "conduct a systematic process engaging the whole community as appropriate in the development of executable strategic, operational, and/or tactical-level approaches to meet defined objectives" (DHS, 2015, p. 13). Isla Nublar is led by the Jurassic World operations center which houses the senior management and is responsible for the day-to-day activities of the park and oversees future assets. During the incident when the

Indominus rex escapes its paddock, the management relies on the Asset Containment Unit who is responsible whenever a dinosaur escapes its enclosure. They are rigorously trained to tranquilize and subdue the asset but are easily obliterated by the dinosaur. The operations manager initializes "phase one" which closes assets in the north portion of the island, and later in the film initializes "phase two" to begin mass evacuation. However, phase two is only initialized after the *Indominus rex* heads towards the center of the island where the majority of the visitors are waiting for evacuation. In addition, there is a lack of transportation from the center of the island to the ports, and the guests shelter-in-place until the following morning. The operation team's plan to use the *Velociraptors* to track the hybrid dinosaur also fails when the *Indominus rex* sways them to turn against the humans. Due to inadequate planning and foresight, the negative consequences resulting from the disaster lead to the park shutting down for good.

There are two types of evacuations: short notice evacuations, where emergency management agencies have 24 to 72 hours to decide when and where to evacuate such as for hurricanes and wildfires, and no-notice evacuations where evacuation takes place immediately after the occurrence of the event (Chiu, Zheng, Villalobos, & Gautam, 2006). The events portrayed in *Jurassic World* would classify as a no-notice evacuation, since the risk resulting from the *Indominus rex's* escape drastically increased within a few hours. For no-notice evacuations, the primary goal is to maximize the number of evacuees and minimize causalities (Chiu, Zheng, Villalobos, & Gautam, 2006). The operations team had this goal in mind when initializing "phase one" but failed to realize the potential impacts of the *Indominus rex* and prioritized the reputation of the park if they were forced to mass evacuate. During the disaster, there are three main decisions critical personnel must make: the safe evacuation destinations, the evacuation routes, and the evacuation times or intervals (Chiu, Zheng, Villalobos, & Gautam,

2006). After the hybrid dinosaur's initial escape, the decision was made to evacuate half of the island towards the center main attractions. Only when the dinosaur started to head towards the center of the park was the decision made to mass evacuate the island (Marshall, Crowley, & Trevorrow, 2015).

Infrastructure systems "stabilize critical infrastructure functions, minimize health and safety threats, and efficiently restore and revitalize systems and services to support a viable, resilient community" (DHS, 2015, p. 14). The critical infrastructure within the park include the exhibits, the monorails, other forms of transportation, the communication towers, food services for the visitors and dinosaurs, emergency and medical services, and sources of energy. During the incident, the only assets that are critically damaged are exhibits and the resort. While the dinosaurs are meant to be attractions, they are dangerous creatures and are a safety threat. They are also expensive to create and care for, so any damage to them hurts the park. During the incident, the *Indominus rex* releases several pterosaurs from their domed enclosure, and they attack the visitors waiting for evacuation. The main resort also is destroyed during the final fight scene, including several gift shops, restaurants, and attractions (Marshall, Crowley, & Trevorrow, 2015).

Critical transportation is "provid[ing] transportation (including infrastructure access and accessible transportation services) for response priority objectives, including the evacuation of people and animals, and the delivery of vital response personnel, equipment, and services into the affected areas" (DHS, 2015, p. 14). The staff at Jurassic World use a range of vehicles to maneuver between each exhibit, usually on dirt roads in the forest. The vehicles seen in the film include golf carts, motorcycles, all-terrain vehicles, and various types of four-wheelers. The only aerial method of transportation utilized was helicopters. The public primarily uses the monorails

to get to the center of the island and to the remote exhibits. They also use boats to reach the island from Costa Rica, though it is unclear if the park owns them. As seen in the film, the response staff use their vehicles to track down the *Indominus rex*, but the visitors are left to shelter-in-place in the center of the park without evacuation until the following morning. While the staff had access to reach the threat, their attempts to capture it were thwarted by hybrid dinosaur's schemes (Marshall, Crowley, & Trevorrow, 2015).

To stress the importance of well-planned transportation methods, Xuwei Chen's "Microsimulation of Hurricane Evacuation Strategies of Galveston Island" identifies the mass evacuation problem for an island off the coast of Texas (2008). Because of the island's notorious history with hurricanes, the population of approximately 58,000 is required to evacuate when the island is forecasted in the hurricane's trajectory. The study tested two types of simultaneous evacuations: rapid and long. As defined by the authors, rapid responses require residents to leave their properties within five hours, while long response requires leaving within hours (Chen, 2008). Based on a microsimulation system to determine transportation patterns and congestions, rapid evacuations from Galveston Island lasted approximately sixteen hours with long evacuations lasting approximately seventeen hours (Chen, 2008). The study also concluded that various staged mass evacuations are also effective if the areas near the main routes are first evacuated to make room for others (Chen, 2008).

Similar to Isla Nublar in *Jurassic World*, there are limited evacuation routes from Galveston Island. In *Jurassic World*, the pivotable means of travelling from the main park (located in the center of the island) to the ferry terminal are the monorails. Maps of the island are visible numerous times in the command center. One of the elements of the map include monorail routes, and the map shows one route to the ferry terminal. There could be multiple monorails

available, but numerous guests are shown waiting for the terminal in the main park. Chen's study maintains a mass island evacuation with limited escape routes requires several hours to thoroughly evacuate. Thus, the decision to evacuate the island must be determined as soon as possible requiring the operations team to carefully balance the potential risk and consequences of the threat (Marshall, Crowley, & Trevorrow, 2015).

In another example, Johnstone and Lence's "Use of Flood, Loss, and Evacuation Models to Assess Exposure and Improve a Community Tsunami Response Plan: Vancouver Island" stresses the importance of having a site-specific community response plan for highly vulnerable areas from high consequence hazards (2012). The analysis uses hazard identification and response management methods to estimate the loss of life and the critical infrastructure and people at risk and used site visits and community meetings to establish four tsunami evacuation plans for the Uculelet Peninsula. The study also considers the season and time of day when estimating at risk populations, noting higher populations during the summer tourist season (Johnstone & Lence, 2012). Tourists are a highly vulnerable group since they are unfamiliar with the area and may not be aware of the probable dangers and how to respond. Johnstone and Lence note this importance during the high tourist months when tourists can outnumber the locals from 4.6 to 1 in the Uculelet Peninsula and generally gather in the high-risk harbor areas (Johnstone & Lence, 2012).

Similar with Johnstone and Lence's article, Naghawi and Wolshon's "Operations of multimodal transport system during mass evacuations" highlights the importance of evacuation carless people in high-populated areas (2015). The study utilized microsimulations to calculate an average evacuation time for the residents of New Orleans, particularly with public transportation. The study also encouraged further research as microsimulation technology

progresses to determine more accurate routes and time estimates (Naghawi & Wolshon, 2015). Tourists are also considered as car-less populations since they usually travel from afar without personal transportation. The absence of sufficient escape trapped the visitors on the island and escalated the severity of the catastrophe. While the placement of the main park in the center of the island may be effective to mitigate the damage from potential tsunamis or storm surge threats, having inadequate transportation to the port inhibited a proper mass evacuation for the park. In addition, they are unfamiliar with the area and may not be aware of the present hazards. Tourists may not recognize the exhibits as potential threats since, as stated by Claire in the beginning of the film, "no one is impressed with a dinosaur anymore", implying the world is accustomed to seeing dinosaurs as people are accustomed to seeing lions and bears in zoos (Marshall, Crowley, & Trevorrow, 2015).

Mass care services "provide life-sustaining and human services to the affected population, to include hydration, feeding, sheltering, temporary housing, evacuee support, reunification, and distribution of emergency supplies" (DHS, 2015, p. 14). This core capability is critical for an isolated island when hosting over 20,000 visitors. Before the incident, visitors were catered by numerous restaurants and bars in the center visitor area, and hotels lining the outskirts. During the pterosaur attack to the visitor center, the guests seek shelter in the shopping center buildings. There is limited footage regarding what happens to the guests after the attack, but they are seen huddled in the hotel lobbies in temporary cots.

Bacon's "Maximizing for Victim Evacuation and Recovery in Mass-Casualty Incidents" stresses the importance of emergency action positions, such as someone in charge of coordinating evacuation and power supplies (2006). Emergency Action Plans (EAPs) should also consider unforeseen scenarios, and the example provided is a fire that involves injuries

accompanied with severe weather. Certain disaster can occur simultaneously or result from cascading effects—one disaster can lead to another similar to dominos. Coordination between local law enforcement, fire and emergency response personnel with the EAP creation process is also suggested. Though not every emergency can be planned for, thorough and well-planned communication between the employees and other stakeholders is a necessity. Not much is seen in the film with coordinating with officials, but when the evacuees are resting in Costa Rica, paramedics and first responders are tending to the injured in a mass warehouse as volunteers communicate with their family members. It is unknown if the government planned for the warehouse to be used, but there are cots and blankets for hundreds of people to rest (Marshall, Crowley, & Trevorrow, 2015).

Situational assessments "provide all decision makers with decision-relevant information regarding the nature and extent of the hazard, any cascading effects, and the status of the response" (DHS, 2015, p. 17). In order to escape, the *Indominus rex* hides from thermo measuring technology and tricks its caretakers into entering the enclosure allowing escape. The dinosaur exhibited intelligence that surpassed other creations, and a thirst for blood. During the escape, the dinosaur killed two caretakers and obliterated the ACU. Only after the animal showed dangerous signs of hunting did the operations team initiate phase one. They did not evacuate the island until the *Indominus rex* killed other dinosaurs and made its way towards the resort. However, it was too late for the park's visitors because they were trapped when the *Indominus rex* released the pterosaurs onto the people. The park's inability to access the dangerous potential of the hybrid despite early evidence and not knowing the full extent of its genetics put the visitors, the park's assets, and reputation at risk (Marshall, Crowley, & Trevorrow, 2015).

Delladetsima, Dandoulaki, and Soulakellis' "An Aegean Island Earthquake Protection Strategy: An Integrated Analysis and Policy Methodology" (2006) adds the importance of the island operating as a closed and open system in order to cope to a disaster. A closed system as the island with a "self-contained entity…to cope…with an emergency without external help for many hours or perhaps days" (Delladetsima, Dandoulaki, & Soulakellis, 2006, p. 6). This places high priorities on emergency services, infrastructure and resource management. An open system is the "able to maximize its ability to receive and use external support effectively…to ensure that the population can be evacuated to the mainland or to neighboring islands if deemed necessary" (Delladetsima et al., 2006, p. 7). Attention should be drawn to points of entry, accessibility of the island, communication, and emergency networking. Open systems also rely heavily on effective transportation and entry/exit hubs to distribute relief to the island and evacuate people.

In *Jurassic World*, an island that services approximately 20,000 visitors a day, should be able to exist as a closed system in the event of an asset out of containment. As stated by the CEO of Jurassic World, the survival of the enterprise relies on the operations team to properly handled incidents such as the *Indominus rex* escaping. However, the *Indominus rex* proved to be too much to handle for the ACU and the entire management team after many failed attempts to contain the dinosaur. In order for the island to succeed as a closed system, the authors describe they must "ensure community survival for absorbing at least the first waves of a disaster event" (Delladetsima et al., 2006, p. 8). While the efforts of the operations team did create conflict for the *Indominus rex*, their attempts to create new challenges only allowed the dinosaur to use them to her advantage. This is shown prominently by the aviary breach and the double-cross with the *Velociraptors* (Marshall, Crowley, & Trevorrow, 2015).

Mitigation – *San Andreas*

The mission area that will be compared to the emergency efforts in *San Andreas* is mitigation and will focus on effective earthquake preparedness, the natural disaster, portrayed in the film. Mitigation "includes those capabilities necessary to reduce loss of life and property by lessening the impact of disasters" (DHS, 2015, p. 10). This includes reducing the consequences and vulnerabilities of a hazard by making the asset, individual, or community more resilient. Mitigation is also long-termed and focuses on long-term planning to reduce the impact of disasters and is more involved at the community level (James and Long, 2012). There are seven core capabilities for mitigation, but only four will be analyzed for this research paper. Those four are public information and warning, community resilience, long-term vulnerability reduction, and threats and hazards identification (see *Figure 3*) (DHS, 2015). Within the United States, there are several areas with the potential of catastrophic earthquakes: the Cascadia subduction zone in the Northwest, the New Madrid fault zone in the Midwest, the San Andreas Fault in California, and the Wasatch Fault zone in Utah (Rockabrand, 2017). The San Andreas Fault in particular could potentially cost California up to 65 billion USD in property loss and major disruptions to critical infrastructure and multiple sectors (Rockabrand, 2017).

Figure 3 – Core capabilities for mitigation

Mitigation
Public Information and Warning
Community Resilience
Long-term Vulnerability Reduction
Threats and Hazards Identification

First, *Public information and warning* should "deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible,

and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available" (DHS, 2015, p. 11). While earthquakes can occur with little to no warning, the residents of San Francisco have an advantage. Dr. Lawrence, a seismologist, discovered a method of predicting earthquakes and uses this knowledge to warn San Francisco of impending earthquakes. With this knowledge, citizens are urged to flee the Bay area, and first responders are on scene to direct traffic flow. Prior earthquakes disabled cellular communication, leaving only radio and television as viable methods of communication. First responders later directed confused and shocked survivors out of the city by foot before the next earthquake.

The Earthquake Early Warning (EEW) is a system implemented by the Office of Emergency Management Director, Ryan Rockabrand in conjunction with the United States Geological Survey (USGS), the California Institute of Technology, the Department of Homeland Security, and the Federal Emergency Management Agency. The purpose of the EEW is to serve as an earthquake warning system to notify local governments in order to "effectively prepare for, respond to and recover from earthquakes [..] and whole community integration by opening the lines of communication for public-private partnerships and automated systems identification and notifications" (Rockabrand, 2014, p. 7). Some of the benefits of the EEW is to provide additional time for residents to evacuate of a plausible approaching tsunami, forewarning crowds in large areas, such as theaters and sports arenas, construction workers can evacuate hazardous sites, trains and port facilities can stop in a safe position, alert rescue workers of aftershocks, and much more (Rockabrand, 2014, p. 10).The EEW system installation involved identifying potential sites near Santa Barbara, installing sensors and the software programs, and campaigning with the public to promote the system (Rockabrand, 2014). While still in early development, on August

24th, 2014, the EEW system provided Santa Barbara County roughly 105 seconds prior to any shaking occurred and highlights the potential accomplishments of the system (Rockabrand, 2014). Shake Alert is another system still in the works, but is still in early testing phases (Rockabrand, 2017). While Dr. Lawrence did discover a method to predict earthquakes different from the EEW, the technology is becoming more attainable with each passing year (Flynn & Peyton, 2015).

Next, *Community resilience* "enables the recognition, understanding, communication of, and planning for risk and empower individuals and communities to make informed risk management decisions necessary to adapt to, withstand, and quickly recover from future incidents" (DHS, 2015, p. 12). Similar to the whole community approach, this core capability enables individuals to make sound decisions during a disaster. During the main disaster, Dwayne "the Rock" Johnson's character, a helicopter rescue pilot, is one of the few characters to make reliable decisions throughout the film. However, this is mostly likely due to his character's extensive first responder training and role as the main character. He and the other main characters urge the other bystanders to shelter in place, duck for cover, and stray away from potential hazards. There are also multiple first responders and seismic experts who urge and direct residents away to evacuate. Johnson is one of the first characters to notice the signs of an impending tsunami, and he and other background characters are seen trying to pass through the wave before it crests.

One article analyzed, Nakayachi, Johnson, and Koketsu's "Effects of Acknowledging Uncertainty about Earthquake Risks Estimates on San Francisco Bay Area Residents' Beliefs, Attributes, and Intentions" investigates the confession of experts and how their uncertainty of estimating earthquakes affects the beliefs of residents. The researches surveyed approximately

750 San Francisco residents in 2015 about their perceptions of their trust in earthquake experts, perception of earthquake risk and personal preparedness in the area. The surveyors were provided with several earthquake prompts and asked to give a numerical response. The questions included rating their trust in local earthquake experts, the probability a magnitude 8 earthquake would strike their area, and how accurate they believe seismologists to be. After each response, the researchers provided participants a fake news article with variations of the following message: "We have agreed that an earthquake of magnitude 8 (M8) will occur in the San Francisco Bay Area with a probability of 20% [70%] [100%] within the next 10 [30] years. However, the Council cautions the public and the government that seismic risk assessment is a field with little evidence to guide experts. There is high uncertainty about the assumptions needed to conduct M8 earthquake forecasting, and this uncertainty cannot be completely eliminated" (Nakayachi, Johnson, & Koketsu, 2018, p. 670). The participants were given the questions again and their responses were recorded.

Based on the researchers' results, there was a marginal increase between all of the variables after the participants were given the uncertainty message. However, these results were marginal by only a few decimal points, but the uncertainty message did positively impact the respondents. The researchers also found the responders believed the experts more for the 20% probability earthquakes and 10-year time periods. "Scientific uncertainty message effects on trust did vary significantly in interactions with time period and probability; more with small (20%) than large (70%) probabilities, and short (10 years) versus long (30) time periods with substantively tiny changes" (Nakayachi, Johnson, & Koketsu, 2018, p. 677). The researchers added that "…perhaps respondents expect scientists to be confident about a lower probability event, thus making expert uncertainty more acceptable and thus more trustworthy in those

conditions" (Nakayachi, Johnson, & Koketsu, 2018, p. 677). In conclusion, "If they admit their uncertainties, they might receive slightly positive reviews of their honesty—and possibly increase trust in experts…without suffering negative impacts on their apparent competence, or on preparedness intentions" (Nakayachi, Johnson, & Koketsu, 2018, p. 678).

Prior to the manipulation, the residents of San Francisco trust in seismologists were on average around 3.5 on a scale from 1 (low trust) to 5 (high trust) (Nakayachi, Johnson, & Koketsu, 2018). However, in the film, Dr. Lawrence tells his team that nobody listens to the scientists about major earthquakes in the region for the near future. He mentions this again when reporters visit to get his opinion about the destruction of the Hoover Dam to get a "survivor's tale" about the event. Dr. Lawrence is also the major voice behind urging the residents to evacuate San Francisco, something everyone seemed more than willing to do after Dr. Lawrence was proven right. The film demonstrates a typical reactive response to trusting seismologists after an incident occurs (Flynn & Peyton, 2015).

In the past several years, research has dictated that community-based preparedness organizations have a positive effect on individual preparedness (Simpson, 2002). However, current drills, one of the most popular preparedness tools, are focused on testing the skillsets of emergency services and the government (Simpson, 2002). While it is beneficial to frequently test them, it is also important to include the local community residents (Simpson, 2002). After a community wide "Drill Day" was conducted in San Francisco on April 20th, 1996, the annual event has evolved into less structed drills and general disaster preparedness and education (Simpson, 2002). As a result, community driven drills encourage freedom to speak, change the political climate about preparedness programs, can provide an effective means of accomplishing program goals, and visibly demonstrate earthquake preparedness (Simpson, 2002). This could

potentially provide another effective preparedness tactic for the citizens in *San Andreas* (Flynn & Peyton, 2015).

Long-term vulnerability reduction is to "build and sustain resilient systems, communities, and critical infrastructure and key resources lifelines so as to reduce their vulnerability to natural, technological, and human-caused threats and hazards by lessening the likelihood, severity, and duration of the adverse consequences" (DHS, 2015, p. 12). While reinforcing or creating earthquake resilient buildings and structures is beneficial, preparing individuals how to respond to an earthquake is just as critical; prepared individuals make resilient communities. During the 7.1 earthquake in Nevada, the Hoover Dam collapsed, and its destruction undoubtedly sends multiple cascading effects downstream. When California was struck with two 9.1 and 9.6 earthquakes, several skyscrapers were damaged and collapsed. During the earthquakes, some bystanders knew how to properly respond and seek shelter, but most were ordered by the main characters to drop and cover (Flynn & Peyton, 2015).

In another analyzed, Basolo, Steinberg, Burby, Levine, Cruz, and Huang's "The Effects of Confidence in Government and Information on Perceived and Actual Preparedness for Disasters" conducted research on the difference between how prepared residents perceive themselves to be and how prepared they actual are (2009). The researchers utilized a survey in the Los Angeles County area and asked residents how confident they felt about the local government's preparedness in response to a major earthquake, 45.1 percent of residents reported a high level of confidence (Basolo, Steinberg, Burby, Levine, Cruz & Huang, 2009). For the differences between perceived and actual preparedness, over 60 percent of residents reported having a family plan in the event of an earthquake and knew how to shut off their utilities (Basolo, et al., 2009). However, "less than one quarter of the respondents had the full set of

supplies suggested to have on hand in the event of a disaster, and less than 16 percent had done three common earthquake mitigation measures: securing heavy furniture, securing the water heaters, and installing latches on cupboards" (Basolo, et al., 2009, p. 350). Russell, Goltz, and Bourque (1995) also found similar results in the 1970s. After two major earthquakes, residents in California bought supplies and knew how to shut off their utilities, but many more failed to reinforce large furniture (Russel et al., 1995). Most of the residents focused on "actual survival preparedness" by acquiring a battery-operated radio and flashlight and stories supplies, instead of the bigger and more expensive preparedness techniques (Russell, et al., 1995). The Alfred E. Alquist Seismic Safety Commission, which surveyed 2,081 households in California in 2008, also found similar results (2010). Siegel, Shoaf, and Afifi (2003) found that emotional and physical injury during a prior disaster only marginally increases overall disaster preparedness for the individual. This possibly demonstrates an increased awareness about the severity of a disaster, however, those who were injured in a prior disaster did not rate themselves better prepared than those who were not injured (Siegel, Shoaf, & Afifi, 2003).

When comparing the two results, there is a correlation between perceived and actual preparedness for earthquakes in the Los Angeles area. A vast majority of residents reported receiving earthquake preparedness tips from at least one source, but less than one fifth of them failed to mitigate their home, and less than 25 percent had an emergency supply of resources (Basolo, Steinberg, Burby, Levine, Cruz & Huang, 2009). Assuming the preparedness information included the earthquake mitigation measures, there was a vast 60-70% drop between receiving and acknowledging the information and executing them (Basolo, Steinberg, Burby, Levine, Cruz & Huang, 2009). The researchers describe this finding as "a significant concern" and "in the Los Angeles area, where earthquakes provide little or no warning of a major event

and thus evacuation is not a viable strategy, stocking the recommended supplies would be an effective strategy" (Basolo, et al., 2009, p. 357). Protecting one's self during an earthquake is imperative when living in an earthquake prone zone, including personal preparedness.

Conducting a *threats and hazard identification* "identify the threats and hazards that occur in the geographic area; determine the frequency and magnitude; and incorporate this into analysis and planning processes so as to clearly understand the needs of a community or entity" (DHS, 2015, p. 12). By identifying threats and hazards, communities can be informed of the higher risk threats and capability gaps. One of the most popular assessment is the threat and hazard identification and risk assessment (THIRA). Within THIRA there are three steps: identify threats and hazards, give threats and hazards context, and establish capability targets (U.S. Department of Homeland Security [DHS], 2018b). After identifying the local hazards, communities should provide the estimated impacts and descriptions (DHS, 2018b). Using the *National Preparedness Goal,* communities should establish capability targets and long-term goals (DHS, 2018b). As a result from using THIRA, residents can be better prepared for threats and hazards specifically for their community. In the film, Johnson's daughter, Blake, utilized what her father taught her about earthquake preparedness. She encourages her friends to find a radio to listen to emergency warnings, leads them away from downed power lines and other hazards, and seeks higher ground before the tsunami approaches.

Noriega and Ludwig (2012) identify social vulnerability as an important factor when conducting a threat and hazard identification since they are historically less likely to respond and recovery from a disaster. In order to mitigate hazards, communities must recognize weaknesses within their community. After conducting a study about the social vulnerabilities in Los Angeles County, the researchers concluded some cities are "disproportionally exposed to larger

earthquake losses" due to larger percentages of ethnic minorities, lower income rates, and lower percent of renters/tenures (Noriega & Ludwig, 2012, p. 1351). Historically, the three variables would prepare, respond, and recover far worse than other values. By taking these social vulnerabilities into consideration, emergency planners, such as the ones in the film, can grasp a more knowledgeable understanding of potential impacts from earthquakes.

Protection – *Your Name*

The mission area that will be compared to the emergency efforts in *Your Name* is protection and will focus on prospective NEO countermeasures. NEOs are "asteroids and comets that come close to or pass across Earth's orbit around the Sun" (National Science & Technology Council, 2018). The impacts could potentially release enough smoke and dust into the atmosphere to block out the sun and send the planet into months of darkness (Rosen, 2016). Historically, these impacts have caused at least one mass extinction 65 million years ago with the dinosaurs, and more recently in Chelyabinsk, Russia that injured over 1,500 people (Perna, Barucci, & Fulchignoni, 2013). The *National Preparedness Goal* defines protection as "capabilities to safeguard the homeland" (DHS, 2015, p. 8). Protection differs from prevention because the latter solely focuses on thwarting imminent terrorist attacks, while protection includes defending against all three types of hazards: manmade, natural and technological. There are eleven core capabilities for protection, but only four will be analyzed for this research paper. The five analyzed are public information and warning, interdiction and disruption, access control and identify verification, screening, search, and detection, and physical protective measures (see *Figure 4*) (DHS, 2015).

Figure 4 – Core capabilities for protection

Protection
Public Information and Warning
Interdiction and Disruption
Screening, Search, and Detection
Access Control and Identity Verification
Physical Protective Measures

First, *Public information and warning* systems "deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available" (DHS, 2015, p. 8). In the alternate timeline of the film, Mitsuha, the only person in town who knows that the comet is going to impact the town, and her friends hack the town's emergency alert system and encourage the residents of Itomori to evacuate to the high school. Sayaka, one of Mitsuha's friends, inform portions of the town to evacuate due to approaching wildfires caused by exploding the power plant, and verifies the alert is from the town hall. The oral message through the speakers is the only method of alert in the town. However, many of the townsfolk do not believe the message and question its plausibility despite the blackout. Law enforcement ceases the alert with orders from the mayor, and Mitsuha tries once again to persuade him of the impending collision. The film cuts, and it is implied that Mitsuha managed to persuade her father to verify the validity of the alert to the townsfolk. However, once the comet hit, there were no deaths (Kawaguchi, Kawamura, & Shinkai, 2016).

The importance of communication is highlights from the United Nations' General Assembly "Recommendations of the Action Team on Near-Earth Objects for an international

response to the near-Earth object impact threat" (Committee on the Peaceful Uses of Outer Space, 2012). The assembly argues NEOs could be prevented if done in a timely international manner. Among others, the United Nations suggests the establishment of an international asteroid warning network (IAWN) to discover potential hazardous NEOs, coordinate international efforts through a portal, send out notifications, and assist with international analysis and public communication (Committee on the Peaceful Uses of Outer Space, 2012). IAWN could be further improved to incorporate new technologies and implement into existing national emergency alert systems, such as the system used in Itomori to evacuate the town. The National Near-Earth Object Preparedness Strategy and Action Plan identifies incorporating other counties into IAWN as an international collaboration to improve data sharing and research (2018). Participation within IAWN and other forms of communication will assist any community with the phases of emergency management.

Next, *Interdiction and disruption* include "delay, divert, intercept, halt, apprehend, or secure threats and/or hazards" (DHS, 2015, p. 9). While Mitsuha is informed of the impending collision only a few hours before, she could only evacuate the town before it hit. If the Japan Aerospace Exploration Agency (JAXA) or other government departments were aware of unstable comet, they could have initiated some protective measures such as possibly diverting or destroying the comet. Another possibility would have been once the comet split, triangulating the impact area and sending an official warning to the town. Thus, the townsfolk would have been more likely to believe the plausibility of the message. Warning the town would have been more likely than intercepting the comet. However, JAXA and other space agencies had nothing unusual to suspect of the Tiamat Comet and were certain the fragments would burn up in the atmosphere (Kawaguchi, Kawamura, & Shinkai, 2016).

Relating to NEOs, Bradley, Plesko, Clement, Conlon, Weaver, Guzik, Pritchett-Sheats, and Huebner's "Challenges of Deflecting an Asteroid or Comet Nucleus with a Nuclear Burst" indicates possible deflection methods for a comet nucleus or asteroids prior to its impact (2010). The authors believe NEO impacts are preventable as compared to other natural disasters such as earthquakes and tsunamis and insist "deflection method is ruled to be the safest and most effective means of PHO impact prevention" (2010, p. 433). Deflecting the NEO would prevent hundreds of smaller pieces from plummeting into the atmosphere and doing more harm than good (Rosen, 2016). It would also require less energy than blowing it up. They determined chemical explosives, kinetic energy impactors, and nuclear weapons as the only possible means of deflecting a NEO (Bradley, Plesko, Clement, Conlon, Weaver, Guzik, Pritchett-Sheats, & Huebner, 2010). Based on their simulations, nuclear munitions releasing approximately 10 to 1000 kilotons can deflect NEOs with 100-meter diameters off their course by as much as 500 centimeters per second without causing fragmentation (Bradley, et al., 2010). A different study conducted by Sazonov and Yakovlev revealed the amount of energy required to deflect an incoming NEO is contingent on its composition; NEOs mostly comprised of iron would require nearly 2.7 times more energy than those made of stone (2006). However, numerous articles hint on a quick response from the moment of detection of an imminent impact to the calibration and launch of the nuclear weapon (Bradely et al., 2010; Sazonov & Yakoview, 2006). The *National Near-Earth Object Preparedness Strategy and Action Plan* also highlights international cooperation and developing new technologies to potential deflect NEOs (National Science & Technology Council, 2018).

In *Your Name*, the comet's perigee, when it was closest to Earth, occurred at approximately 7:40 pm Japan Standard Time (JST). Not long after, the comet's nucleus

collapsed, and a fragment impacted Itomori at approximately 8:42 pm JST. Nuclear munitions could have been a viable option if there was quick response. However, the collapse surprised everyone, including the international space agencies. Even so, experts were certain the fragments would burn up in Earth's atmosphere. Fortunately, in the alternative timeline of the film, Mitsuha and her friends managed to evacuate the portion of the town where the comet fragment would impact prior to the disaster. The impact still obliterated part of the town, but with few injuries and no deaths (Kawaguchi, Kawamura, & Shinkai, 2016).

Access control and identity verification "applies and supports necessary physical, technological, and cyber measures to control admittance to critical locations and systems" (DHS, 2015, p. 9). In order to provide a valid "reason" for the townspeople to evacuate the town, Mitsuha and Tessie use water-gel explosives to incapacitate the power plant. This eliminates all power in the town during the festival. The power plant is unguarded and protected only with a chain-linked fence and low lighting. As the only power plant providing electricity to the town and as a critical infrastructure, it should have more physical security installed. However, had the power plant had more physical protection, the high schoolers would not have destroyed it and evacuated the town (Kawaguchi, Kawamura, & Shinkai, 2016).

In "Strategy for Protecting and Preparing the Homeland Against Threats of Electromagnetic Pulse and Geomagnetic Disturbances" (DHS, 2018a), the United States government acknowledges the real threat of "science fiction" threats as the probability increased with technology. One of the three goals the Department of Homeland Security provides is to protect critical infrastructure by reducing vulnerabilities and improve protective measures (2018a). While some of those objectives may not be practical for NEOs, the importance of protecting critical infrastructure is still prevalent.

Screening, search and detection "identify, discover, or locate threats and/or hazards through active and passive surveillance and search procedures. This may include the use of systematic examinations and assessments, bio surveillance, sensor technologies, or physical investigation and intelligence" (DHS, 2015, p. 10). This core capability monitors potential threats and would be applicable for space objects as they are all viewed from afar. While near-earth objects are not a high probability threat, the space agencies should have assessed the stability of the comet as it approached closer to Earth. However, international space agencies and the general public suspected nothing more of the passing comet other than a once-in-a-lifetime view (Kawaguchi, Kawamura, & Shinkai, 2016).

Bucknam and Gold's "Asteroid Threat? The Problem of Planetary Defence", discusses the foundations of NEOs and potentially hazardous objects (PHOs) (2008). They define NEOs as objects that pass 193 million kilometers (or approximately 120 million miles) near the Sun, which is close enough to reach Earth (Bucknam & Gold, 2008). The authors also define PHOs as NEOs less than 1 kilometer (or approximately .62 miles) in diameter and pass 7.4 million kilometers (or approximately 4.6 million miles) within Earth's orbit (Bucknam & Gold, 2008). Therefore, PHOs pose a much higher risk than NEOs because of a higher likelihood of impacting Earth. As of the article's publication, the National Aeronautics and Space Administration (NASA) and other space agencies have tracked thousands of NEOs and PHOs (Bucknam & Gold, 2008). One study reported NASA finding over 15,000 NEOs with none on track to confront the planet (Rosen, 2016). In addition, the National Research Council on Hazards from Near-Earth Objects (2010) discusses the probability and previous danger from NEOs, and acknowledges the uncertainty of when to mitigate, if at all, for a NEO before it is too late to act.

By then, the only option would be civil defense ones, which furthers the need for more research and monitoring of NEOs.

Physical protective measures "implement and maintain risk-informed countermeasures, and policies protecting people, borders, structures, materials, products, and systems associated with key operational activities and critical infrastructure sectors" (DHS, 2015, p. 10). This core capability is similar with diverting and disrupting NEOs. With the increasing awareness of near-earth objects, international governments are recognizing the importance of including NEOs as considerable threats. While the film demonstrates the destructive power of NEOs, it does not ease the public's consciousness about what governments are going to do to protect against them. Similar to interdiction and disruption, implementing and practicing methods to counteract NEOs and improve evacuation time would be beneficial. However, destroying the comet fragment before it impacted Itomori would not have supported the emotional conclusion of the film (Kawaguchi, Kawamura, & Shinkai, 2016).

Reinhardt, Chen, Liu, Manchev, and Pate-Cornell's "Asteroid Risk Assessment: A Probabilistic Approach" encouraged the need for NEO observations (2016). It paralleled previous events, such as in 2013 when a meteor exploded with the power of kilotons of TNT over Chelyabinsk, Russia (Reinhardt, Chen, Liu, Manchev & Pate-Cornell, 2016). In 1908, an asteroid exploded over Tunguska and destroyed 2,000 square kilometers of forest, and caused a small minor earthquake and fires, but did not cause significant damage to humans due to its remote location (Mignan, Grossi, & Muir-Wood, 2010). Based upon their calculations, there would be a probability of nine percent of a NEO impacting Earth within the next 100 years. They also call for more research to cascading effects, such as tsunamis, and risk reduction options (Reinhardt, Chen, Liu, Manchev & Pate-Cornell, 2016).

Conclusion

In conclusion, *Jurassic World, San Andreas,* and *Your Name* do not represent effective response, mitigation, and protection for the disasters the films portray based upon analysis with the *National Preparedness Goal*. The purpose of the *National Preparedness Goal* is to support a resilient nation that can prevent, protect against, mitigation, respond to, and recovery from threats and hazards, and all three of the films fail to withstand their respective disaster. These films also contribute to the highly exaggerated problem with disasters portrayed by Hollywood (McEntire, 2007). However, disaster films can demonstrate a lack of preparedness in order to educate. If done properly, for example, disaster films can provide talking points for how a family or community should prepare for a disaster. They can also increase awareness for often perceived as fictionalize disasters, such as near-Earth impacts. At their core, disaster visualized in the film—mass evacuations, earthquake preparedness, and NEOs—are hazards emergency planners must consider and plan for. With assistance from federal guidelines and the emergency management cycle, communities can effectively protect against, mitigate, and respond to disasters often exaggerated in Hollywood.

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