The contrasting results of earthquake predictions

Science, Geology

Earthquake predictions effect many a people around the world and have different outcomes. Two specific cases of earthquake predictions will be discussed and compared to each other to see how the public was affected over all. One case is the Parkfield Earthquake in California and the second case is the L'Aquila Earthquake in Italy. There will be several pieces of the earthquakes that will be discussed: geology around the area, what information was gathered before the earthquake, information that was provided to the public before the earthquake, how the public reacted, and the aftereffects. Earthquake predictions are not perfect but there are warning signs of when they are about to occur. The warning system for earthquakes will also be explained.

The Parkfield Earthquake of 1992 never happened like the scientists predicted it would. It didn't occur until 2004, but the residents of Parkfield, California were prepared due to the warnings and predictions given by scientists. Earthquakes of a magnitude of 6 or higher in the Parkfield area have happened in 1857, 1881, 1901, 1922, 1934, and 1996 (" Earthquake Research at Parkfield" 9). The frequency of those earthquakes was due to where Parkfield is located which is over the San Andreas Fault and is why scientists from the USGS (United States Geological Survey) predicted an earthquake by the end of 1992. The San Andreas Fault is known for being one of the more active faults in the United States and is a transform fault that divides the Pacific Plate and the North American Plate. There are theories about why these plates slip so often along the San Andreas Fault and one is that there might be talc which is the softest mineral of having a hardness of one on the Mohs scale. Other softer minerals could be there as well which would make the fault move more often.

This is why the Parkfield Earthquake Prediction Experiment was set up by the USGS to monitor the tectonic activity of Parkfield and to attempt to predict the earthquake. The two goals of the project were to record the geophysical details before and after the earthquake and to tell the public a short term prediction (“ Earthquake Research at Parkfield” 10). They wanted to test how the public would react to the predictions of the earthquake and to prototype warning systems. There has not been a proper way of warning the public of an earthquake until mere moments before it occurred or even have a system set up with different levels of how likely an earthquake could occur.

Improvements in monitoring earthquakes were also a result of this project. This was the first time the US put a lot of work into placing real time monitoring of probable precursory signals and geophysical info in an area that has many earthquakes (“ Earthquake Research at Parkfield” 12). New instruments were created for the data the USGS wanted to collect and then would have to be placed where the best/more accurate info would be gathered. Several of the instruments that were used were: tilt meters, alignment arrays, Global Positioning System (GPS) geodetic measurements, ground water radon measurements, and ground water level transducers (“ Earthquake Research at Parkfield” 12). With all this tech, this region in California became where the most instruments where placed in a highly active earthquake zone to monitor said activity in the entire world.

The instrument’s readings were able to form baselines to use to study before, during and after earthquakes to see how much the reading’s changed in comparison to the baseline data. The data can also be used to correlate tides, rainfall events, and slow strain events (“ Earthquake Research at Parkfield” 12). Those instruments and data were able to let the USGS see how the Parkfield region reacted to closer and farther away earthquakes. That information was to be used to help create where the monitoring stations should be set up; the information would also lead to the creation of the alert systems for their region and others (“ Earthquake Research at Parkfield” 13). Those monitoring stations and alert systems would help improve the earthquake warnings in the Parkfield region.

There were three different sections that the experiments at Parkfield fell into: experiments that study the effects of earthquake induced ground shaking on man-made and natural structures, experiments to monitor possible pre-earthquake happenings, and lastly an experiment to monitor how the region behaves around the predicted spot (“ Earthquake Research at Parkfield” 13). The first set of experiments would be helpful for people who need to build structures in the area and can see which materials would be more effect to resist the effects of earthquakes or be less damaged in the aftermath. The second set of experiments would contribute to the earthquake predictions and warnings for the region and could improve the timing or accuracy of warnings specifically. That will benefit the local population for preparing for a potential earthquake and have access to the related data. The third set of experiments would be valuable to scientists for studying the different variables that are affected in the region by earthquakes.

The Parkfield Earthquake Prediction Experiment was considered a success for the response community point of view due to how the public responded to the exercises of a predicted earthquake and to how the information was given out (“ Earthquake Research at Parkfield” 14). The USGS worked with the local government and emergency services to set up practice exercises testing an alert system to see how the public reacted. The entire process worked out with how the public reacted to earthquake predictions and provided insight into implementing similar processes in more earthquake prone areas to lessen the panic or confusion of the information/data of the predicted earthquake.

The L’Aquila Earthquake happened on April 6, 2009 in the Abruzzo area of Italy and was a 6. 3 magnitude and a 5. 9 on the Richter scale (Marincioni et al. 1). It got its name from where the epicenter was located which was in L’Aquila the capital of Abruzzo. The earthquake killed about 308 people, injuring about 1, 500, 22, 000 were left homeless, and displaced about 65, 000 people (Marincioni et al. 1). It caused about 21. 6 billion U. S. dollars in damage and had about 14 km long and 2 to 6 km wide streak of destruction. This amount of destruction was in part due to the poor infrastructure of their buildings for dealing with earthquakes. L’Aquila has relatively high earthquake frequency in the past but their homes were never built for handling earthquakes better or more efficient. Some towns had 80% of the buildings collapsed and the remaining 20% were uninhabitable. This case study also involved how the public reacted before and after the earthquake in relation to how the prediction was given out.

In L'Aquila there were four different building structures: old masonry buildings, brick masonry buildings, cut stone buildings, and reinforced concrete buildings. These buildings do not do well in earthquakes due to not having much give in their structure especially concrete. Wooden structures that are built on a foundations typically do better in earthquakes due to having way more give and have more flexibility during an earthquake. Some of the previous mentioned buildings do respond better than others but overall are still not the best structures for surviving an earthquake. There are also not many building codes for housing dealing with earthquakes even though the region has a long history of earthquakes.

After the 2009 earthquake, is a different story due to large amount of lives lost and those who suffered and more media coverage. This region of Italy is known for having frequent earthquakes for the past few decades with nearly the same frequency as in Parkfield, California. It is also common for people who live in earthquake prone areas, that they are more likely to downplay the seriousness of an earthquake (Marincioni et al. 4). Many residents in the L'Aquila area were surveyed (before the 2009 earthquake) about how secure they thought there home was if an earthquake happened. At least 74% thought there home could withstand an earthquake and it was based on how they felt about there home, not on the material or how their home was built (Marincioni et al. 14). This is surprising about why they felt safe in their homes since it is not based on a logical reason but more on an opinion. Taller buildings have a more open floor plan on the first floor due to being a parking garage or a store or something similar which makes it more susceptible to collapse to an earthquake (Marincioni et al. 7).