THE DIPLOMAT

The Social Fallout From Pohang's 'Man-Made' Earthquake

The revelation that the 2017 quake was triggered by an energy project has had a complicated impact on the city.

By **Juheon Lee**
December 21, 2019

Locals take shelter in a gymnasium after the Pohang earthquake, November 18, 2017.
Credit: Wikimedia Commons/ Sim1992

In March 2019, a government-commissioned research team in South Korea concluded after a year-long study that the 5.4-magnitude earthquake that rattled the city of Pohang in November 2017 was triggered by geothermal power generation.

A government-led renewable energy project was scheduled to build South Korea's first geothermal power plant in Pohang's Heunghae township by 2018. Different from a traditional geothermal system, which uses underground heat released naturally from the earth to generate electricity, Pohang's enhanced geothermal system cracked open impermeable rocks to create conduits and infuse water with high pressure to bring the underground heat to the surface. The government research team's report concluded that the drilling and infusing process initially created microearthquakes around the facility, but the accumulated pressure from the water injections over time ultimately led to the Pohang earthquake, the second-largest earthquake in South Korean history. The quake left 1,800 people displaced and 135 injured as well as damaging 57,000

structures that cost around 144.5 billion won ($123 million) to repair. A large number of residents are still living in shipping containers and gymnasiums due to the risk that their buildings might collapse.

How has the report that confirmed the correlation between the earthquake and the geothermal power project affected the victims and residents of Pohang? What social issues emerged after this unprecedented, large-scale man-made earthquake?

Holding the Central Government Responsible

The first issue emerged from the fact that the disaster was not an "act of God." According to the research team's report, the massive earthquake occurred far away from the rock that was cracked by the geothermal facility; therefore, the earthquake was "triggered" rather than directly "induced" by the facility's activities. Nevertheless, the causation was clear enough for the citizens of Pohang to hold the central government and the operating company responsible for the damage they endured.

The victims asked that the central government apologize and offer compensation, although it still has not formally admitted its responsibility for the incident. To date, the government has only provided funds to the earthquake victims based on pre-existing regulations concerning disaster relief, such as 9 million won ($7,735) for a totally destroyed house and 4.5 million won ($3,868) for a half-destroyed house. That response has been unacceptable to the victims, and tens of thousands of citizens have organized groups to file lawsuits against the central government.

With more and more citizens participating in the lawsuits, Pohang's local government is asking the central government and the National Assembly to closely cooperate on special legislation that defines and compensates the victims of the 2017 Pohang earthquake, which is a more efficient solution than being faced with numerous lawsuits. According to Pohang Mayor Lee Gang-deok, nearly 80 percent of Pohang citizens are complaining about mental damage, while 42 percent are still suffering from post-traumatic stress disorder. Therefore, the special law should comprehensively address both the physical and mental sufferings inflicted by the earthquake. Bills have been offered for the National Assembly's consideration, but debates regarding the law's details are currently ongoing.

Recovering the City's Reputation

After the research team's report was published, the citizens of Pohang celebrated that the city could finally rid itself of the dishonorable nickname of "earthquake city." In their eyes, Pohang had been proven a safe place in which to live, work, and invest. The fact that the earthquake was a man-made disaster is considerably important to the citizens because, contrary to natural events that are unpredictable and often recurring, a man-made disaster offers a sense of comfort as well as the notion that the situation is controllable and that further earthquakes can be prevented.

Pohang has been suffering from reduced house prices, a decreased number of tourists, population outflow, and the shrinking of local businesses since the earthquake. Therefore, the citizens and the city government alike have been trying to disassociate Pohang from the

negative earthquake image by highlighting that the event was technological rather than natural.

These efforts have rendered many citizens sensitive to how their city is portrayed in the media, especially with regard to natural events. For example, in February 2019, a relatively small-scale underwater earthquake occurred 50 kilometers off the coast of Pohang. The earthquake occurred far away from the city, and most citizens did not feel it at all. Nevertheless, the media reported it by saying "an earthquake occurred in Pohang" simply because Pohang was the closest city to the epicenter. This statement sparked criticism among the city's citizens, who refused to accept the media's unfair use of their city's name. Thus, these citizens have been opposed to any media coverage that reinforces the earthquake image associated with Pohang.

Fear for the Future: "No More Environmental Experiments"

Problems have also emerged from the citizens' fear of the geothermal facility that still remains in their city. Immediately after the report was published, the Ministry of Trade, Industry, and Energy, which owns the geothermal power generation project, asserted that it had accepted the results reached by the research team and would immediately stop the facility's operations; however, doing so has not reassured the citizens of Pohang of their safety.

The facility previously injected 13,000 tons of water at high pressure into the rock strata, which produced a network of fractures and activated a previously unknown underground fault. Although about half of the infused water has been removed from the underground well, citizens are still worried about whether or not

the water that remains in the fractures might result in future instability. Their worries originate from a similar case in Basel, Switzerland in 2006. The Swiss government immediately stopped operating a power plant following a few microearthquakes, but small-scale earthquakes nevertheless continued for years after the facility's shutdown.

The facility's complete removal is not reassuring, either; to ordinary citizens, it is unclear how the removal of geothermal pipes and structures can affect the underground situation. Therefore, the central government must conduct a sufficient variety of studies and share the results with these citizens before deciding whether or not the facility will be removed for restoration.

Furthermore, the citizens of Pohang are calling for the shutdown of the two underground carbon dioxide (CO_2) storages built near the coast of Pohang. The experimental storages are designed to infuse waste CO_2 into an underground space so that it does not enter the atmosphere. The technology is important for the South Korean government to meet the CO_2 emission reduction requirements of the Paris Agreement. Nevertheless, the citizens of Pohang are strongly opposed to any drilling or infusing fluids underground that might cause future earthquakes.

Calling for More Transparency and Communication in Government Environmental Projects

The citizens of Pohang are still furious at the central government and argue that it did not care about their lives and properties when it

constructed an experimental power plant, regardless of its generation of clean and cheap energy. Most significantly, the central government and the operating company did not sufficiently communicate with the local government and Pohang's citizens. Small earthquakes that occurred for weeks should have been recognized as a sign of larger seismic activity; however, project committee meetings held during that period ignored the potential impacts of the microearthquakes, and the central government did not exert sufficient effort to communicate with the local government and citizens regarding possible outcomes from the situation.

According to Stanford Professor William Ellsworth, although an earthquake poses the same amount of "hazard" whether it occurs in a densely populated city or an uninhabited desert, the "risk" is considerably higher in the former. Therefore, it is important to consider risk rather than hazard with regard to geothermal projects. No matter how important and urgent renewable energy projects are in combating climate change, greater transparency and active communication with the local governments and citizens, who are victim to the potential risks, must be implemented.

The lessons learned from the Pohang earthquake are not limited to the field of natural sciences. Natural geothermal systems are an important source of clean energy from which we may achieve significant benefits if we safely develop the technology. However, with more drilling and fracking occurring on a global scale, human-induced earthquakes will become an increasingly common concern for all citizens of the world, and it is precisely they who can stop

renewable energy projects like the one pursued in Pohang.

Juheon Lee is a visiting assistant professor in the Government and Law Department at Lafayette College, the United States. His research focuses on environmental politics, disaster resilience, and social capital, and he has published multiple articles on the social impacts of natural hazards in the East Asian region.

TAGS

The Koreas Environment Society East Asia South Korea geothermal energy man-made earthquake Pohang city Pohang earthquake South Korea renewable energy