Tsunami in Tohoku, Japan

Student's Name

Institutional Affiliation

Tsunami in Tohoku, Japan

**Introduction**

Tsunamis emerge as a geological phenomenon where giant waves emerge as a result of earthquakes or sometimes due to volcanic eruptions under the sea. One interesting aspect of tsunamis is that as they develop deep in the seas and oceans, their waves are not enormous in height or strength. They are soft; however, as they develop and move inland, their magnitude increases and their heights rise higher as the ocean's depth decreases (National Ocean Service, 2021). It means that the tsunami's speed does not depend on the distance from the source but the ocean's depth. Often the waves are so strong they carry everything on land away. Japan appears on the catastrophic end of tsunamis (World Data, 2021). It appears that the country has experienced tsunamis continuously since the year 1498, with the latest occurrence happening in November 2016, and the damages are often devastating.

**Japan's Geography**

The geographic constitution of Japan makes it prone to tsunamis, which often affect areas closer to the oceans. For instance, Japan emerges in several tectonic plate boundaries and the northwest pacific ring of fire. It exists as a string of islands, with the four main islands being Hokkaido, Shikoku, Kyushu, and Honshu. More so, the majority of the country is mountainous, with the alps running down to Honshu, the largest island. These attributes make Japan an aesthetically pleasing country, but they also make it a dangerous place. The three-earth forming tectonic plates meet and are often in motion against each other. It means that the possibilities for earthquakes are often high and the occurrences regular. It is the main cause of Tsunamis that appear rampantly in the country (Woessner & Farahani, 2020). Due to the geographic composition, the country faces risks for the highest Tsunamis. The largest-ever happened in 2011, in the offshores of the Tohoku region.

**The Event**

On 11th March 2011, an earthquake with a magnitude of 9.1 stormed the ocean floor approximately 45 miles (70 Kilometers) in Tohoku. It seemed to be the most enormous earthquake ever recorded in the country and proved to be the fourth-biggest worldwide. In the phenomenon, within a few hours, massive tsunami waves invaded the east coast of Japan, bringing a rise to approximately 5 to 10 meters tall walls and blocks of water into the towns and cities surrounding the coastal region (NASA, 2020). In some areas, the waters reached a 40.5-meter height, which amounted to the maximum elevation that the water had achieved from the shores. More so, in areas such as Sendai, the floods went to a distance of 10 kilometers into the land. The United States Geological Survey pointed out that the tsunami was massive such that it moved Honshu, the main island, by approximately 2.4 meters and shifted down the coastline by approximately 400 meters.

**Damages Caused**

The tsunami killed approximately 1800 residents. Statistically, the figure accounts for more than 8% of the population in this region, with more than 80% of the residential places. Consequently, the Takatamatsubara tree species got entirely wiped out due to the tsunami. These trees were planted in the 17th century for tidewater control. It means that the tides in this instance were massively enormous enough to destroy the pine forest planted for stopping tsunamis. More so, floodwaters remained in rice farms for long periods on rice paddies and the region's agricultural lands (NASA, 2020). Years later, during the reconstruction process, the agencies revealed that more than 400,000 houses and buildings got destroyed, with approximately 750,000 seeming partially damaged. The damages were catastrophic and had adverse effects on the human psychological setting for people in Japan and the world at large.

**Lesson Learned**

It was impossible to approximate or foretell an earthquake and tsunami of that magnitude hitting Japan since the country had not experienced such a predicament in a magnitude close to that one. Therefore, the researchers and scientists learned that it is not possible to determine the impact of a future tsunami from previous experiences. The predictions might emerge as an underestimation (Kusumoto, Goto, Sugai, Omori & Satake, 2018). After the Tohoku tsunami, scientists aimed at making significant improvements to earthquake measurement and predictive models for Japan and the whole world. The earthquake's magnitude provided in-depth data for basing their research.

**Disaster response**

Japan emerges among the countries with the best disaster response systems. For instance, the high-tech warning system often warns people eight seconds after the initial wave gets detected, it sends messages to more than 100 television stations and fifty-two million phones. More so, it automatically makes elevators stop instantaneously, and the bullet trains halt in the brace. New systems and alarm techniques needed to get imposed to alert people to prepare for a tsunami.

**Conclusion**

The tsunami in Tohoku was lethal, with the destruction of human life and plenty of property, buildings, and plants. However, it appears that the country's geographic location contributes to the emergence of earthquakes and tsunamis. It is a collection of four islands, Hokkaido, Shikoku, Kyushu, and Honshu. Scientists learned that it is not possible to determine the impact of a future Tsunami from previous experiences. Therefore, better alarm systems need to be put in place to ensure such catastrophes do not create much destruction. It is essential to realize that these are geological occurrences usually uncontrollable. Countries can prepare themselves for the impact but cannot stop it from happening.

References

Kusumoto, S., Goto, T., Sugai, T., Omori, T., & Satake, K. (2018). Geological evidence of tsunamis in the past 3800 years at a coastal lowland in the Central Fukushima Prefecture, Japan. *Marine Geology*, *404*, 137-146. Doi: 10.1016/j.margeo.2018.07.004

NASA. (2020). *Ten Years After the Tsunami*. Earthobservatory.nasa.gov. Retrieved 6 May 2021, from https://earthobservatory.nasa.gov/images/148036/ten-years-after-the-tsunami.

National Ocean Service. (2021). *What is a tsunami?* Oceanservice.noaa.gov. Retrieved from https://oceanservice.noaa.gov/facts/tsunami.html#:~:text=Tsunamis%20are%20giant%20waves%20caused,depth%20of%20the%20ocean%20decreases.

Woessner, J., & Farahani, R. (2020). Tsunami inundation hazard across Japan. *International Journal of Disaster Risk Reduction*, *49*, 101654. Doi: 10.1016/j.ijdrr.2020.101654

World Data. (2021). *Tsunamis in Japan*. Worlddata.info. Retrieved 6 May 2021, from https://www.worlddata.info/asia/japan/tsunamis.php.