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[Economics](https://assignbuster.com/essay-subjects/economics/), [Budget](https://assignbuster.com/essay-subjects/economics/budget/)

MattieGeorgeMorisettEarthScience13December 2017Sendai Earthquake            At 2: 46 P. M. on March 11, 2011, oneof the most powerful earthquakes ever recorded in history hit northeasternJapan. An earthquake so powerful it triggered a series of large tsunamis thatdestroyed many coastal areas of the country and instigated a major nuclearaccident a power station along the coast. This earthquake was referred to as theGreat Sendai Earthquake.              The Great Sendai Earthquake, also referred toas the Great T? hoku Earthquake, was a magnitude-9.

0 earthquake occurred innortheastern Japan, off the country’s main island, Honshu (Pletcher). The epicenter, or the middle of the earthquake, was located 130 kilometers east of the city ofSendai. The focus happened at a depth of thirty kilometers below the bottom ofthe Pacific Ocean (Pletcher). It was felt as far away as Russia, Taiwan, and China(Pletcher). The natural disaster was preceded by several foreshocks. Thisincluded an event that happened by weeks after the main quake that had amagnitude-7. 2 event that centered roughly forty kilometers away from epicenter.

(Pletcher).             The disaster took the public by surpriseas few scientists predicted the country would experience an earthquake as largeas that, as the original forecast was a lot smaller and in a different area(Oskin). However, a decade before, Japanese geologist predicted the large earthquake, but the warnings went unheeded by officials as it was predicted based on pastevents that included earthquakes and tsunamis (Oskin).

Although, today, Japanesescientists are researching these past events to better predict future disasters(Oskin).              However, geologists suggest that thenatural disaster relieved stress that the tectonic plates had collected overcenturies (“ In”). Because of this, scientist are predicting that the Faultline isunlikely to create a large earthquake anytime soon (“ In”).  The earthquakewas caused by a rupture of the subduction zone, where plates slide beneath eachother into the hotter later beneath the crust, the mantle (Oskin).

This certainsubduction zone was associated with the Japanese Trench, which separates the Eurasianplate from the Pacific plate (Pletcher). These plates collided and released theenergy that cuild up over centuries of collecting energy from sticking to otherplates (Oskin). This caused these two particular plates to displace water thatsat above it which created a series of highly destructive tsunami waves thatmeasured approximately over thirty feet tall and reached as far as tenkilometers inland (Pletcher). Sendai wasn’t the only city affected by thetsunami waves; other communities, including Kamaisha and Miyako in Iwate; Ishinomaki, Kensennuma, and Shiogama in Miyagi; and Hitachinaka and Kitaibarakiin Ibaraki were also devastated (Pletcher).             Tsunami warnings were triggered bythe main quake throughout the Pacific basin (Pletcher).

The natural oceanicdisaster raced from the epicenter towards the land at about 800 kilometers perhour, generating waves that affected many other areas of the world, includingthe Hawaiian Islands chain, Aleutian Islands chain, and the west coast of NorthAmerica (Pletcher). Eighteen hours after, waves also reached Antarctica andcaused the outer-shell of the Sulzberger Shelf to break (Pletcher).             There was a warning of the seismicdisaster one-minute prior from the Japan early warning system that monitorstringent seismic building codes to predict when an earthquake is about tobegin (Oskin). This helped save many lives as this one minute warning shut downmany (possible high-casualty) facilities, for example trains (Oskin). Withintwo weeks of the disaster, the Japanese government’s official count of deathsurpassed 10, 000; more than one and a half times that were still listed as missingand presumed dead (Pletcher).

The numbers dramatically increased in thefollowing days which sprung multiple rescue operations along the Japanese coast(Pletcher). The official count rose to approximately 28, 500, butby the end of 2011, the number reduced to 19, 300 (Pletcher). More than half thevictims were age 65 years or older (Pletcher). Out of all the prefectures inJapan that were in the effected area, Miyagi suffered the greatest of losses as10, 800 were officially pronounced dead or missing and another 4, 100 wereinjured (Pletcher).

Although nearlyall the human casualties were caused by the large tsunami waves along the coast, the earthquake was responsible for a considerable amount of damage over a widerarea (Pletcher). Fires took place in many cities such as a petrochemical plantin Sendai, a portion of the city of Kensennuma, and an oil refinery at Ichihara(Pletcher).  Infrastructure throughouteastern T? hoku was heavily affected with roads and rail lines damaged, waterand sewage systems disrupted, and electric power knocked out (Pletcher). A dam, near the prefectural capital, Fukushima city, burst due to the earthquake causingthe destruction of thousands of homes in Fukushima, Ibaraki, and Chiba prefectures(Pletcher). The tsunami also caused a considerable amount ofoceanic litter to become a considerable concern among habitants near thePacific Ocean. The National Oceanic and Atmospheric Agency reported that thetsunami carried out five million tons of debris and trash out to the sea(Oskin). Within weeks following the disaster, much of the debris from the coastof Japan showed up along the North American west coast (Oskin).             Another result from the natural disasterincluded the significant concern of the status of several nuclear powerstations in the T? hoku region (Pletcher).

Three nuclear power plants shut downtheir reactors at they were closest to the epicenter (Pletcher). Theaftershocks from the earthquake cut the main power and the tsunami wavesdamaged the back up generators at some of the plants, most notably the FukushimaDaiichi plant, also known as “ Number One” plant, a plant situated in the northeasternFukushima prefecture about 100 kilometers south of Sendai (Pletcher).             With the power gone, the coolingsystems failed and a few days after the disaster, the cores overheated which ledto partial meltdowns of the fuel rods (Pletcher).

The melted material fell andburned sizable holes in the bottom of the containment vessels in reactors oneand two, exposing nuclear materials in the cores (Pletcher). Pressurized hydrogengas in the outer containment buildings enclosing the reactors caused multipleexplosions to erupt (Pletcher). Fuel rods stored in reactor four were touchedoff by the fire resulting from the explosions in the first three reactors(Pletcher). The facility released significant levels of radiation in the weeksfollowing the earthquake; workers sought to stabilize the damaged reactors bycooling them with seawater and boric acid (Pletcher). Japanese officials were afraid of possible radiationexposure, so they established a thirty kilometer no-fly zone and created anarea of twenty kilometers around the Fukushima Daiichi plant (Pletcher).

Therewas a spike in levels of radiation found in the local food and water suppliesthat prompted officials in Japan and overseas to issue warnings about theirconsumption (Pletcher). Towards the end of March 2011, seawater near the Daiichifacility was discovered to have been contaminated with high levels of iodine-131, cesium-134, and cesium-137, and other radioactive isotopes which stemmed fromthe exposure of pumped-in seawater that workers used to cool the fuel coils (Pletcher). The water later had leaked in water-filled trenches and tunnels between thefacility and the ocean (Pletcher). Japanese nuclear regulators, in mid-April, elevatedthe security level of the nuclear emergency at the Fukushima Daiichi from fiveto seven—the highest level on the scale created by the International AtomicEnergy Agency (Pletcher).

This placed the Fukushima accident in the samecategory as the Chernobyl accident, which happened in the Soviet Union in 1986). Evaluation zones were thought to be uninhabitable for decades, due to radiationlevels remaining high for many weeks after the accident (Pletcher). However, several months after the accident, government officials announced radiationlevels in five towns just beyond the twenty kilometer radius had declinedenough to allow residents to reenter their homes, but some former residents stayedaway, concerned about the amount of radiation in the soil (Pletcher). In December 2011, Japanese Prime Minister NodaYoshihiko declared the Fukushima Daiichi facility stable, but numerous leaksfollowed the accident (Pletcher). Years later, a significant leak happened inAugust 2013, which was severe enough to prompt Japan’s Nuclear RegulationAuthority to classify it as a level-3 nuclear incident (Pletcher).

In the first hours of the earthquake, the Japanese Prime Minister Kan Naoto moved to set up an emergency commandcenter to be located in Tokoyo (Pletcher). In result, many rescue workers and approximately100, 000 members of the Japanese Self-Defense Force were mobilized quickly todeal with the disaster (Pletcher). Many Japanese citizens criticized Japan’s meteorologicalAgency for underestimating the size of the tsunami wave (Oskin). Japaneseofficials upgraded and installed a new tsunami warning system because of thecriticism (Oskin).             However, the warnings the systemissued were unheeded by citizens as people underestimated their personal risk, assuming that the tsunami wouldn’t reach their area (Oskin).

In a study doneover the Miyagi and Fukushima prefectures, officials found that only 58% ofpeople headed for higher ground after the earthquake (Oskin).             The country also requested U. S. military personnel stationed in the country to be a part of the relief efforts, and in turn a U.

S. Navy aircraft was dispatched to the area (Pletcher). Severalother countries, such as Australia, China, Indian, New Zealand, South Korea, and U. S., helped by sending teams for search-and-rescue, while dozens of othercountries and major international relief organizations helped with financialand material support (Pletcher). Private and other nongovernmentalorganizations from all over the world established relief funds to aid in therescue and recovery efforts (Pletcher). Scientists, from all over the world, also swarmed the country to study the Faultline that caused the earthquake(Oskin).

They dropped sensors in the ocean, along the Faultline to measure theforces that caused the seismic disaster (Oskin).             Initially, the rescue work wasessentially difficult as it was hard to get personnel, supplies, and equipmentto the devastation zone, and periods of inclement weather hindered with airoperations (Pletcher). Once workers did reach the devastation zone, they dealtwith the widespread area of destruction of entire cities that were washed awayor covered by great piles of mud and debris (Pletcher). Even though many peoplewere rescued in the first several days of the natural disaster, much of therelief work consisted of the recovery of bodies (Pletcher). Hundreds of bodieswere washed ashore in several areas after they had been swept out towards to theopen sea (Pletcher).             Shelters were limited in their foodand supplies as several hundred-thousand people swept into them, while tens andthousands more remained isolated in worse conditions, waiting for reliefefforts to reach them (Pletcher). These numbers only grew with the Fukushimaaccident (Pletcher).

Two weeks after the earthquake, aquarter million survivors were housed in relief shelters (Pletcher). Over twoyears later, a small number remains housed in shelters as the effects of theland were devastating (Pletcher). More than 300, 000 residents were displacedand lived in temporary homes, such as hotels, public housing units, or privatehomes (Pletcher). Four years later, 230, 000 people were still displaced, however a large number was due to the continuation of the Fukushima accident(Pletcher).

The country worked to repair theinfrastructure of public services and wouldn’t stop until they were fullyoperational again (Pletcher). The region’s power supply continued to beaffected with the ongoing nuclear accident in Fukushima, which caused many temporarypower outages and rolling blackouts (Pletcher).             The economy also took a hit in themonths following the disaster as it caused a severe reduction in the region’smanufacturing output (Pletcher). The earthquake and tsunami combined causeddamage and loss of business and factories, but by late summer, the economyrepaired itself and grew briskly (Pletcher).

In early 2012, industrial output reachedthe level it was before the disaster (Pletcher).             The government sought to push supplementbudgets through the legislature, managing to push three different ones through(Pletcher). In early November, the largest budget, the third one, was approvedand provided roughly $155 billion (Pletcher). A bulk of the money raised forrelief efforts went towards the reconstruction of the devastated areas (Pletcher).            In February 2012, the government alsoestablished a cabinet-level reconstruction agency to help coordinate efforts inthe coastal area (Pletcher). The government planned for the agency to last theprojected estimate it would take the Japanese northeastern coast to be repaired; the estimate was roughly ten years (Pletcher).

The agency worked to attempt todetermine if the buildings they rebuild could be made to withstand earthquakesand tsunamis (Oskin). In late 2015, the agency reported that the disaster wasalmost cleaned up as nearly all the debris from each devastated area has beenremoved (Pletcher).                   WorksCited            “ In Japan, small shakes presage bigquakes.

” Nature News, NaturePublishing Group, www. nature. com/news/in-japan-small-shakes-presage-big-quakes-1. 19252. Oskin, Becky.

“ Japan Earthquake & Tsunami of 2011: Facts and Information.” LiveScience, Purch, 13 Sept. 2017, www. livescience.

com/39110-japan-2011-earthquake-tsunami-facts. html.            Pletcher, Kenneth, and John P.

Rafferty. “ Japan earthquake and tsunami of 2011.” Encyclopœdia Britannica, Encyclopœdia Britannica, inc. 22 Nov.

2016, www. britannica. com/event/Japan-earthquake-and-tsunami-of-2011.