Volcano case study Mount St Helens Volcano

Location: Mount St Helens erupted on the 18th May 1980 in Washington State USA. It is part of the Cascade Range Mountains. This was a catastrophic eruption, the biggest and worst eruption ever to hit the USA.

Causes:
- Mount St. Helens is a volcano which lies near to a destructive plate boundary where the small Juan de Fuca Plate is being subducted underneath the North American Plate. The Juan de Fuca Plate is subducted into the mantle where increased heat and friction cause the plate to melt. The magma produced in the melting rises up through the North American Plate via crack, forming Mount St. Helens.
- The trigger stimulus was a magnitude 5 earthquake underneath Mount St. Helens on the 18th of May at 8:32am. This caused a bulge on the North face of the volcano to become unstable and collapse as an avalanche. The volcano then went to erupt ash and produce pyroclastic flows - currents of hot gas and ash.
- Every plant and animal within 25km north of the volcano was killed - approximately 7000 animals died.
- Every tree within 30km of the volcano was flattened.
- The water produced from melting ice and snow on top of the volcano create mudflows, which choked rivers and killed all fish and water life. Spirit Lake was filled with mud. 12 million salmon died.
- The eruption also destroyed 250 homes, 47 bridges, 15 miles of railways and 185 miles of highway.

Effects on People and the Economy:
- 57 people died - most of whom were outside of the evacuated zones.
- Ash clogged up car engines and farm machinery. The cost of ash damaged to farmers crops and machinery totalled 100 million.
- 15cm of ash fell causing traffic chaos and airline flights to be cancelled.
- The timber industry in the area was destroyed by the flattening of trees which significantly damaged them.
- Telephone lines and electricity supply were knocked out.
- Tourists no longer visited the area causing a reduction in the local economy.

Predicting Mount St Helens
- There were warnings that a major eruption would eventually happen.... From March onwards in 1980 there had been minor earthquakes which were recorded and monitored using seismographs. The increased in size and frequency, indicated that the volcano was preparing to erupt.
- Small ash and steam eruptions during the 2 months prior to the eruption indicated increased volcanic activity too.
- A bulge on the north side of the volcano indicated that magma was moving up into the magma chamber. Tilt meters were used to monitor the changing size and shape of the mountain which would suggest volcanic activity is about to happen.
- The authorities used past eruptions to identify danger zone and evacuated residents from these areas, however some refused to leave and scientists stayed to study the volcano.
- Emergency Helicopters and aeroplanes were on hand in case an eruption occurred.
- The scientists were not able accurately when Mount St. Helens would erupt and so people were reluctant to leave their homes for a long period of time.
- The experts did not predict that the eruption blast would occur on the north side of the volcano. As a result the exclusion zones set up were in the wrong place and so 90% of the people that died were outside the exclusion zone in what were thought to be safe areas.

RESPONSES
Short Term Aid
- Short term aid involved rescuing stranded people, providing shelter for those who has lost their homes, giving medical supplies to those who were injured. The authorities were able to mobilise many people and much equipment quickly to help in these operations. The aid operation rescued 198 people. Unfortunately, the landscape had changed so much that maps were no longer accurate, this slowed down the rescue efforts.

Long Term Aid
- Long term aid involved returning the area to what it was like before the eruption and it took a very long time.
- A million tonnes of ash were removed from roads, buildings and airports. Removing the ash cost over $1 million in the town of Yakima and it took ten weeks.
- Millions of trees were replanted because there was a huge loss of timber which would cost $300 million.
- Compensation was given to farmers because what they produced on their farms was destroyed by being covered by ash. This would cost about $70 million.
- New tourist facilities were built because there were less tourists, meetings and conferences in the area after the eruption. It was important to get these people back as they input a lot of money into the economy.
- A channel was dredged to remove logs and levees were rebuilt to reduce floods which could happen in the future. This is because the Columbia River shipping channel was closed. This caused the port of Portland $3 million per month in lost trade.
- A new highway was built and major repairs were undertaken because 250km of roads and 25km of railways were damaged, costing $7 million.
- Money was given to rebuild houses after 200 homes were destroyed.
- Money was given to redevelop the salmon hatcheries after 12 million baby salmon were killed.