

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Mount St. Helens erupts! Although the volcano is too far away for lahars and lava flows to reach our town, St. Helens is prone to large **tephra falls** (fragmented solidified lava that rises into the air).

Your town is now covered with 1 cm of ash!

This means transportation, business activity, and services are significantly disrupted for the 3 days!

1. Pay **\$100,000** to clear streets and care for citizens who experienced related health problems
2. Citizens demand you build a volcano-proof structure in the town, that is big enough for all residents to flee to in another similar event (**New building = \$750,000**)

The rivers and lakes flood! This winter, the town experienced very heavy snow and rainfall, and as the snow melts, the rivers and lakes rose over their banks!

Each structure (buildings and houses) within 0.75 km of water each experienced damages of \$100,000.

****** if you purchased **2 or more** research credits, the total expense is **cut in half** because homes were retrofitted in advance

A LANDSLIDE hits your town! The landslide was caused by seismic shaking beneath the volcano. Luckily, all the townspeople survived!

If you bought **3 or more** research credits, your research team saw this coming and the **damage and cost of this event are lessened.**

A) 3 or more research credits: **NONE** of your **houses** were destroyed by the landslide.

B) < 3 research credits: **1/4 of houses** destroyed and **any roads** you built all need to be replaced (*Note: Round down*)

*Note: Town must have a minimum of **five houses** throughout the game.*

A forest fire encroaches on the town!

This winter was relatively dry for the area, with significantly less rain and snowfall. The drought in the summer leads to more pronounced and regular forest fires in the region, one of which has hit your town!

Any structures that are more than 0.75 km from a body of water experienced \$100,000 in damages each.

****** if you purchased **2 or more** research credits, the total cost is **cut in half** because homes were retrofitted in advance

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Environmentalists take over the town!

Apparently there is a semi endangered owl that's found in these mountains, and needs protection. Environmentalists are demanding your city pays for more research and develops a plan to save the owl!

You have two options:

- 1) Make sure you have **at least 2** research credits to satisfy environmentalists' concerns
- 2) Pay **\$300,000** to hire **2** new wildlife biologists to research the owl habitat and preservation.

Dangerous volcanic gases in the air!

Your team of scientists report a dramatic increase in CO₂ in the atmosphere around the town. CO₂ is denser than normal air, so concentrates in low areas. *If any portion of your town is below 4,000 ft in elevation,* townspeople's livestock die and **3 citizens/house** are hospitalized!

If you purchased sufficient research credits, you may have saved some townspeople!

What happens now:

1. Pay **\$2,000/house** below 4,000 ft elevation to replace losses
2. Cover hospital fees of the citizens = **\$2,000 per person**

****** if you purchased **at least 3** research credits, only pay **\$1,000/structure** and only two people are hospitalized (**\$4,000 total**)

Award for being Green! The state of Oregon did a study and found your town has more trees per sidewalk area than any other! Congratulations!

What happens now:

1. Receive a bonus of **\$1.5 million**
2. **400** more people move to your town this means an annual increase in tax revenue of **\$100,000 in taxes** and you are required to build **2** more houses (at original price)

Temperatures and levels of dangerous chemicals in water rise!

Because your town's drinking water comes from a source over a volcano, it is subject to volcanic events such as this.

The town needs a new water treatment facility (**\$750,000**).

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Lahar deposits remobilized! Normal rainfall, snowmelt, and streams can remobilize sediment and continue to move it farther downstream for years after eruptions. The town is now covered in mud, ash, and rock deposits.

What Happens Now:

1. **2 houses are destroyed.** *Note: Your town needs a minimum of 5 houses throughout the game.*

2. **Pay \$200,000 to uncover town streets**

****** if you purchased **at least 2** research credits, the incidentals are lowered to a total of **\$300,000** because your research team was able to mitigate the problem faster. **Keep your houses.**

Dangerous volcanic gases in the air!

The United State Geological Survey has been monitoring the volcano closely, and found high levels of SO₂ in the air! SO₂ typically causes volcanic smog, and can lead to skin irritation and respiratory problems.

If you purchased sufficient research credits, you may have saved some townspeople!

Luckily, the atmospheric levels are too low to kill any townspeople, but you are required to pay \$600,000 in incidentals.

****** If you purchased **> 2** research credits, the incidentals are lowered to **\$250,000** because your research team was able to mitigate the problem faster.

****** If you have **< 2** research credits, the Governor calls the atmospheric SO₂ increase a State of Emergency and invests in research because the volcanic system is so poorly understood. **Take 1 free research credit.**

ICE STORM! These rare winter storms can completely cripple a town and its citizens. This ice storm is intense enough (about 1/4 inch accumulation) to cause tree limbs to sag or break, roads to become dangerously icy and power line damages that cause massive power outages.

What Happens Now:

1. You make sure roads are treated with salt (**\$10,000**), release a warning to your townspeople not to drive, and make sure families can survive without electricity for a few days.

2. You must pay **\$100,000** to repair power lines and clear damaged trees.

Bear sightings are on the rise! You knew all along that bears resided in the same mountains as your town, but this is the first they've caused any problems! Citizens are nervous and request that you take action.

What Happens Now:

1. You are required to hire a temporary bear watch team to track bears in the area (**\$25,000**)

2. Set up a community bear-watch and safety educators

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the


Edge!



city planning in the shadow of a volcano

Justin Bieber plays concert in town! The presence of a celebrity performance meant an huge influx of people, and suddenly the town infrastructure is insufficient for all the visitors. People are camping on unstable slopes on the outskirts of town!

What Happens Now:

You decide to build a campground to support these tourists. You must level the ground and build a well for the campground to have reasonable amenities. This costs **\$250,000**. Denote campground location on map with this symbol: 

However, the campground charges a fee of \$15/night, which means you receive **\$30,000** more per year for the rest of the game.

A gold mine opens 20 miles outside of town! It turns out that gold commonly forms near volcanic systems. The State Department of Geology approved the opening of the mine, believing harm to the ecosystem was unlikely and the influx of taxes would help the state economy.

What Happens Now:

1. You are required to hire **2 environmental scientists (\$300,000)** solely responsible for monitoring the air and water quality of the town to ensure no harm comes to the townspeople due to the mining activity.
2. The mine brings **200 new people** to town (**build a new house**)! This means additional taxes every year.

A bicycle race takes place in town!

This event brings in visitors from all over the country - they all want to bike along the side of a volcano! As a result, there is an influx in tourism requiring you build a hotel to support all of the tourists.

What Happens Now:

You build a hotel in town for **\$750,000** and receive **\$100,000** per year in taxes from the hotel for the rest of the game.

Dangerous volcanic gases in the air!

A small gas eruption from the volcano caused no damage besides releasing HF, or Hydrofluoric Acid. In extreme situations, HF can cause bone disintegration and tooth decay. In your town there is just a small dusting of HF ash, which compromises the water supply and kills 50% of townspeople's livestock (and the mayor's dog!).

What Happens Now:

IF you have < 2 Research Credits:

1. Pay **\$850,000** to purify the town's water.
2. Pay **\$1,000** in reparations for the lost livestock **to each house** in the town.
3. The Governor raises concern and invests in volcanic research. **Get a free research credit!**

IF you have 2 or more Research Credits:

1. The livestock survived because researchers warned the town early enough to evacuated.
2. Only half of the water supply is compromised (**pay \$425,000**).

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the


Edge!



city planning in the shadow of a volcano

DIRTBAGS! Your town becomes a national hub for mountain biking and rock climbing fanatics during the summer. Not only do they refuse to book hotel rooms or campsites, but they illegally erect huge tent villages and bathe in the fountains in the middle of the city! All this activity takes a toll on the land, and soon the native grasses and vegetation begin to recede. The townspeople are frustrated and eventually, City Council holds a public forum to discuss their options.

You have two options:

- 1) Spend **\$100,000** to temporarily employ five police officers to patrol the area and prevent illegal campers from residing within the city.
- 2) Spend **\$250,000** to create new campgrounds for the campers which adhere to the department of natural resources guidelines (increasing annual taxes by **\$30,000**). Denote campground as: 

An avalanche hits the town! In the middle of winter, some seismic activity beneath the volcano dislodged the snowpack and a large avalanche broke off heading right for your town! It only reached houses at particularly high elevations, but a few people were buried in the snow! After 24 hours of Search & Rescue, all five missing people were found and are fully recovering.

What Happens Now:

1. All structures (houses and buildings) that are above 4,800 ft are covered by snow! For each structure, pay \$10,000 to clear the snow away and \$5,000 for damages (**\$15,000/structure above 4,800 ft elevation**).
2. The Search and Rescue mission cost the town a total of **\$150,000**.

DROUGHT HITS OREGON! The snowpack was less than 15% of average this winter, and it continued to stay dry into the spring. Now, in the middle of July, nearby streams are starting to dry up and the Governor calls the drought a State of Emergency.

What Happens Now:

1. Drinking water needs to be shipped in from Canada, and all the local produce dies so there are rampant food shortages (**a total cost of \$350,000**).
2. Ask townspeople to take steps to conserve their water usage as much as possible. Open a temporary clinic to assist people with illnesses brought on by extended heat and lack of water (**\$5,000**).

Dangerous volcanic gases in the air!

There is a high concentration of HCl, or Hydrochloric Acid, which easily dissolved in water to make acid rain. Citizens of town develop irritated eyes and itchy throats during acid rainstorm.

What Happens Now:

1. One person for every house is hospitalized with doses of > 100 ppm (causing heart failure and closing throat). The town covers medical expenses at **\$5,000 each**.
2. One person dies from the rainstorm, so there is a townwide funeral. This costs **\$20,000**.

*** If you have **more than 2** research credits, damage is mitigated because researchers warned you about the threat early on. No one dies, and medical fees are **half as much** as they were without the researcher's help.

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Living

on the

Edge!



city planning in the shadow of a volcano

Gas Chromato—what? Congratulations!! Your research team invented a brand new state of the art **gas chromatograph**, an instrument used to analyze dissolved gases emitted by a volcano. Now the town is better prepared than ever to detect early signs of volcanic unrest. The newly invented gas chromatograph is quickly snatched up by research institutions around the world and the profits are strong. So the research team decides to donate funds to the city to encourage classes and training on hazard preparedness for the community!

What Happens Now (*dependent on how many research credits you have purchased!*):

- 0 Research Credits: **\$50,000** donated
- 1 Credit: **\$100,000** donated
- 2 Credits: **\$200,000** donated
- 3 Credits: **\$300,000** donated
- 4 or more Credits: **\$500,000** donated

LAVA FLOW! This summer, the volcano has a small, effusive eruption that only results in a tiny lava flow coming off the side of the mountain. Luckily, no one is harmed. However, the resulting panic leads the Governor to demand all research projects halt so that all funds can be focused on understanding the eruption and predicting future eruptions.

What Happens Now:

1. The town spends **\$100,000** in emergency funds to protect townspeople and guarantee safe travel along roadways.
2. **Lose half of your research credits** (*Note: round down*)! Make sure to re-invest in research as it's the best way to prepare for subsequent hazards.

ShakeOut! – Millions of people worldwide practice how to drop, cover, and roll every year during the annual Great ShakeOut Earthquake Drill. Your town is assessed and compared against towns of similar circumstance (living next to a volcano).

What Happens Now:

IF you have 2 or more research credits:

Your town was determined to be the most prepared community to survive and recover from big earthquakes – You are awarded a prize of **\$300,000** from the American Red Cross in recognition of your efforts. Congratulations!

IF you have < 2 research credits: Your town is underprepared for an earthquake, so you do not win the prize. The Red Cross is concerned about your town's safety and donates money to boost your investment in research. **Get a research credit for free!**

Google Campus – Google decides to build a “Mountain Top” satellite campus somewhere in the Cascades and your town is selected as the winner! This decision attracts several jobs to the area and increases city revenue by **\$60,000** each year. Bring on the electric cars!!

What Happens Now:

1. Receive **\$60,000** more in taxes per year for remainder of game.
2. The growing job market means an influx of people – build 1 new house (**\$300,000**) to accommodate (means **\$50,000** more per year in taxes)