

Grayson Weers
Anamosa High School
Anamosa, Iowa, USA
Iceland, Crop Sustainability

Iceland: Sustainable Crops For The Future

The country I chose to research is Iceland. Upon investigating information about Iceland, I learned of a problem that Iceland has. A drawback that Iceland has is crop sustainability and production. This is an obstacle that is relevant in most parts of Iceland. After learning more about crop sustainability and production, I found some solutions that I am going to share with you. There are two propositions I am going to share with you. With that being said, I hope you enjoy learning about Iceland, a problem it has, and my solutions that will help solve the complication.

Iceland is a European country with a population of around 356,991. It has a very urban population, with 93.855 percent of people living in urban areas. Close to 80% of Iceland is actually uninhabited. Some of Iceland's main exports are fishing products, and metal products. The main crops include potatoes, barley, oats, hay, and other root vegetables. Some of these vegetables are farmed in greenhouses. Iceland has a windy, cloudy, and an unstable, but mild, climate. The reason Iceland has an unstable climate is because it is close to the Arctic Circle. It also receives currents from the Gulf Stream, so warm and cold temperatures are constantly mixing together, creating the unstable climate. The average wind speed in Iceland is 11.6 miles per hour, helping make it the second windiest country in the world. Rivers in Iceland are quite clean, and some people drink directly from them. A majority of Iceland is covered with plateaus, mountains, glaciers, and volcanoes. These land features make some parts of Iceland hard to access, and soils in these areas are hard. Most of the areas with farmable soil in Iceland are in the lowlands. Iceland has a total of 130 volcanoes, with an estimated 30 that are active. Iceland experiences a major volcanic eruption every five years. The average number of people per household in Iceland is 2.5. There is a 3.7% unemployment rate, and the average wage is 39,600 USD. Parts of the average diet in Iceland are lamb meat, dairy, and fish products. Most families get these foods locally from farmers or fishermen. Common jobs in Iceland are smelting, processing, energy plant workers, and tourist guides. Besides daycare or playschool, education is free and accessible. Geothermal energy is a humongous part of Iceland. Due to all of the volcanic activity in Iceland, power plants are able to create a lot of power and electricity out of geothermal energy. Geothermal energy makes up two-thirds of the energy produced in Iceland. Lots of houses, greenhouses, and schools use this energy created. Some farm fields are even heated by geothermal energy. Iceland is certainly an interesting country, and it is very unique.

A problem that Iceland faces is a problem that has to do with crop production and sustainability. Iceland does not have that much crop ground as it is. Only one-fifth of Iceland actually has suitable ground for farming, and of that area, only part of it is used for growing crops, the rest is mainly used for livestock. This percentage of land used for growing crops is very important to the communities around it, because it provides a main part of the food supply in these areas. Iceland has many volcanoes, and in some cases, volcanic ash can be good for plants, but most times, it isn't. Volcanic ash can bury plants under thick layers of ash, snapping off pieces of the plant. Volcanic ash also leads to acid rain, which can disintegrate the plant as well. Since Iceland has major volcanic eruptions every five years, volcanic ash is spewed out

a lot. Another problem connected with crop production and sustainability comes from the wind. The huge amounts of wind that Iceland gets causes soil erosion. The wind blows away rich topsoil that the plants need to grow. When the nutrients in the topsoil are gone, the crops will not grow as well or produce as much. The large amounts of wind also carries the ash from volcanoes a long ways away. This can cause the ash to spread out over a much wider range, affecting more crops. These issues have been happening for a long time, since people have been farming Iceland for a while, and volcanoes and wind have been there for a while as well. This topic affects rural communities more so than urban communities, because the crops grown are usually eaten in the communities where they are grown. This is not good for the people that live in the farming communities because they get their main source of food from the crops. Also, some of the crops grown are put towards feed for animals, so if there are low numbers of crops, there might not be enough food for the livestock. Both the volcanic ash and the wind have a major impact on the production and sustainability of crops in Iceland, by causing the crops to not produce as much.

The first solution I have to the issue is one both eco friendly and simple. The solution is to plant windbreaks around the fields that are located in the farmable area. This solution would mainly target the people living near where the crops are produced. The windbreaks could be planted in strips parallel to the rows of crops. This way, when the strong Iceland winds blow, the windbreaks could block off some of the wind, so there is not as much erosion. If the wind were to carry ash from the volcanoes, the windbreaks would also be able to stop some of the ash from landing and covering the crops. The ash from volcanoes has some value as a fertilizer. It contains nutrients and minerals like calcium, sodium, magnesium, iron, and quite a few more. These minerals and nutrients help crops grow and stay healthier, but too much ash breaks and buries the crops, causing them to wither and die. Farmers could spread ash across their fields in appropriate layers to ensure the plants get the nutrients but not enough ash to kill the crops. The trees could be provided for in a government grant, or money to buy them could be raised through a fundraiser. Large foundations such as the Arbor Day Foundation could also be involved. The Arbor Day Foundation focuses on planting and growing trees across the world. The Arbor Day Foundation could give input as to what would be the best trees to plant, how to plant them, and how to care for them. The Arbor Day Foundation could also donate some money to get the trees, or encourage people to donate to the cause. When the trees are fully grown, they would block out some of the sun however. Some of the plants that are more shade tolerant than others like cabbage, carrots, celery, potatoes, radishes, and rutabagas would do fine. The crops just listed are normally planted in Iceland, so there would not be as big a difference there. Since Iceland gets so much wind, the farmers could use windmills or wind turbines to pump water to the trees or crops, to ensure they grow well. The wind turbines could also provide electricity to power the house where the farmer lives. If the farmer makes extra energy from the turbines, they could sell it to energy companies for money. The turbines could be installed by companies or the farmer could do it by themselves. The first pro to this idea would be that it would be eco-friendly. Volcanoes emit lots of carbon dioxide, and the trees planted can help convert some of that back to oxygen. Another pro is that depending on where the communities are located, the windbreaks can also act as a barrier for the communities, slowing down the wind and blocking it from hitting the community. A con is that it would take a while before the trees would be tall enough to adequately block the wind. During this period when the trees are still small, the ground and crops will still be vulnerable to the high wind speeds Iceland has, which can cause more soil erosion. Another con is

that the trees will take up some of the farmable ground the crops are planted on, causing a bit less land to be available for crops to be planted on.

The other solution I have can be used all over Iceland. It will protect the crops from both the wind and the volcanic ash. The solution I have is to build greenhouses across Iceland to grow crops in. These greenhouses can also be built in areas where the soil is not able to support crops. The farmers could create or mix their own soil for the crops to grow in. They could mix in some of the volcanic ash to add fertilizer to the soil. This way, places other than the Iceland lowlands will be able to produce crops that their community can use. The owner of the greenhouse could use wind turbines to power the greenhouse. Also, with all the geothermal energy Iceland creates, they could put that energy into powering their greenhouses. The greenhouses could use geothermal energy to adjust the room to a certain temperature, or it could maintain a misting system to moisten the crops. The idea of using geothermal would also keep carbon dioxide from being emitted from the greenhouse. There would already be enough carbon dioxide and other harmful gases in the atmosphere from the volcanic eruption, so at least the greenhouse would not be a cause of emissions. The plants inside of the greenhouse would not be bothered by the wind, because the walls of the greenhouse would be able to keep the wind from disrupting the crops. The roof of the greenhouse would be able to keep out any potential volcanic ash coming down. The farmers that build the greenhouses could get support from the government or other non-profit charity groups. The government could provide tax breaks on the greenhouses to make the greenhouses more affordable for the farmers to build. Large organizations like the United Nations could also have an input on the greenhouses. They could lead fundraisers or have people take part in helping create the greenhouses. One pro to this idea is that there is a wide variety of crops that could be grown. The greenhouses could adjust the temperature to where it needs to be by using geothermal energy, so lots of different types of crops could be grown. The next pro I have is that all the energy needed to power all the systems of the greenhouse could be controlled by geothermal. This is very convenient to the farmers because they would not have to get their energy from a power plant, they could get the energy near their farm. Another pro is that it would not take as long to be available as the windbreaks were, because it would not take near as long to build the greenhouses as it would to wait for the windbreaks to grow. A con to this idea is that even though there could be potential tax breaks and money raised through fundraisers, it would still probably cost the farmer some money to build the greenhouses. The next con I have is that the greenhouses would take up a lot of area, so you would have to have enough land to be able to build the greenhouse. Another con is that it would take lots of work to build the greenhouses. It would take lots of labor to build the greenhouses, but if charity groups got involved they could help build the greenhouses. This solution would target both people in cities and in rural areas. People that live in towns or cities could build greenhouses if they have the space, and they could use or sell the crops they produce. As for the farmers living in rural areas, they would have more space to create the greenhouses they need. There are some greenhouses in Iceland now, and they are continuing to become more popular. However, there is still much more potential for there to be a lot more greenhouses to produce vegetables and crops. This solution would help the crops be protected from the wind and ash, and a wider variety of crops could be grown.

Iceland has a problem that is relevant across much of the country. This problem has been happening for a long time, and crops have been affected ever since. The outcome of this difficulty causes some issues with food sustainability, because small rural communities rely on those crops as a source of food. The

solutions I have presented in this paper will solve the problems for some of the population and they are available to people all over Iceland. I hope you enjoyed discovering more about Iceland, some complications it has, and the solutions to those complications.

Bibliography

“6 Facts You Didn't Know About Icelandic Water: Guide to ...” *Guide to Iceland*, guidetoiceland.is/history-culture/6-facts-you-didn-t-know-about-icelandic-water.

Admin. “Geothermal Heat for Greenhouses.” *Center for Agriculture, Food and the Environment*, 24 Jan. 2018, ag.umass.edu/greenhouse-floriculture/fact-sheets/geothermal-heat-for-greenhouses#:~:text=Soil%20and%20water%20below%20ground,in%20greenhouses%20and%20other%20buildings..

“Agriculture and Horticulture in Iceland.” *Climatechangepost.com*, www.climatechangepost.com/iceland/agriculture-and-horticulture/#:~:text=Approximately%20one%20fifth%20of%20the,is%20mainly%20for%20domestic%20consumption.

“Agriculture in Iceland.” *Wikipedia*, Wikimedia Foundation, 17 Mar. 2021, en.wikipedia.org/wiki/Agriculture_in_Iceland.

Albert, Steve, et al. “Vegetables and Herbs for Growing in Shade.” *Harvest to Table*, 18 Mar. 2020, harvesttotable.com/vegetables-for-growing-in-shade/.

ArcGIS Hub, hub.arcgis.com/datasets/6c2c291bdb604be1b087e7002f9821cf?geometry=-22.273%2C64.431%2C-14.769%2C65.248.

Budiman Minasny Professor in Soil-Landscape Modelling, et al. “How Mount Agung's Eruption Can Create the World's Most Fertile Soil.” *The Conversation*, 29 Apr. 2020, [theconversation.com/how-mount-agungs-eruption-can-create-the-worlds-most-fertile-soil-85134#:~:text=Over%20time%2C%20chemical%20and%20biological,put%20it%20in%20the%20soil\).](https://theconversation.com/how-mount-agungs-eruption-can-create-the-worlds-most-fertile-soil-85134#:~:text=Over%20time%2C%20chemical%20and%20biological,put%20it%20in%20the%20soil).)

“Climate - Iceland.” *Iceland Climate: Average Weather, Temperature, Precipitation, Best Time*, www.climatestotravel.com/climate/iceland.

“The Complete Guide to Iceland's Volcanoes.” *Guide to Iceland*, guidetoiceland.is/nature-info/the-deadliest-volcanoes-in-iceland.

“Education in Iceland.” *Wikipedia*, Wikimedia Foundation, 24 Jan. 2021, en.wikipedia.org/wiki/Education_in_Iceland.

Geography, www.iceland.is/the-big-picture/nature-environment/geography#:~:text=Iceland%20is%20the%20least%20populated,%20including%20Europe's%20largest%20Vatnaj%C3%B6kull.

Smith, Written by Jemma. "Work in Iceland." *Prospects.ac.uk*, www.prospects.ac.uk/jobs-and-work-experience/working-abroad/work-in-iceland.

Stillerman, Karen Perry. "A Look at Iceland's Food and Farming System (Or, What I Ate on My Summer Vacation)." *Union of Concerned Scientists*, 30 Aug. 2016, [blog.ucsusa.org/karen-perry-stillerman/a-look-at-icelands-food-and-farming-system-or-what-i-ate-on-my-summer-vacation#:~:text=Icelanders%20grow%20\(and%20eat\)%20what%20they%20can&text=So%20while%20its%20coastal%20waters,is%20pretty%20limiting%20for%20agriculture](http://blog.ucsusa.org/karen-perry-stillerman/a-look-at-icelands-food-and-farming-system-or-what-i-ate-on-my-summer-vacation#:~:text=Icelanders%20grow%20(and%20eat)%20what%20they%20can&text=So%20while%20its%20coastal%20waters,is%20pretty%20limiting%20for%20agriculture).

Stotz, Jon. "Average and Minimum Salary in Iceland." *Check in Price*, 29 Jan. 2021, checkinprice.com/average-and-minimum-salary-in-iceland/#:~:text=Currently%2C%20average%20wages%20in%20the,the%20highest%20salaries%20in%20Europe..

"The Weather in Iceland: 7-Day Forecast." *Arctic Adventures*, adventures.is/information/the-weather-in-iceland/.