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Iceland: Lack of Reliable Farming Soil

How Poor Soil Quality Challenges Icelandic Agriculture Production

Iceland is an island in Northern Europe, famous for its stunning Northern lights, hot springs, volcanoes, and glaciers. Approximately 389,444 people reside there, and it is often referred to as the "Land of Fire and Ice." Despite its natural beauty, Iceland faces a major agricultural problem. With Iceland's volcanoes, glaciers, harsh climate, and land uses going back to the Viking age, this has led to severe soil erosion, poor soil fertility, and little arable land. Because of this, Iceland depends heavily on imports and fishing, which impacts food prices and food security. (Statistics Iceland, 2025, Iceland: History, Maps, Flag, Population, Climate, & Facts: Britannica, 2025)

When the Vikings, specifically Norse settlers, first arrived in Iceland around 874 CE, the island was more heavily vegetated than it is today. Iceland's native forests and birch woodlands gave the Norse access to timber, fuel, and grazing land for livestock, specifically sheep. (World Economic Forum, 2022) However, over time, the use of wood for building, fuel, building more farms, and grazing caused birch forests to slowly decrease in size over time. Removing access to trees and other plants weakened the soil. Grazing by sheep and other livestock prevented new forests from growing and removed protective plant cover, which sped up the process of soil erosion. (Saving Iceland, 2017)

Iceland's soil is largely volcanic. It's highly known for andosols in the soil (formed from volcanic ash and parent materials), which, although sometimes can be nutrient-rich, are often fragile and result in fragmentation. They are also highly vulnerable to erosion by wind and water once vegetation is removed. (Wageningen University & Research Depot, 2010) Over centuries of deforestation, overgrazing, harsh weather, and natural events such as volcanic activity and climate change have combined to degrade large pieces of land. (ScienceDirect, 2020)

Around 40-45% of Iceland's land has been classified as "considerable or extensive" soil erosion, making it unsuitable for agricultural use. (Government of Iceland, 2021). Natural vegetation cover has shrunken drastically over the years, and forests that once covered important parts of Iceland have now been reduced to a mere fraction. (World Wildlife) Therefore, the decisions made by the Vikings and early settlers have caused long-term consequences for land fertility and agricultural growth across Iceland.

Today, agriculture remains a small part of Iceland's economy, contributing only about 4-5% to Iceland's GDP and employment. Most of the "agricultural land" in Iceland is used for livestock grazing (sheep, dairy cattle) rather than for crop production. The growing season in Iceland is very short, roughly around only four months, which limits crops from being harvested correctly and increases production and transportation costs. Only a small part of Iceland's land is actually arable, and even then, products from farmland are not as good as products from imports. (OECD, 2023)

Because of these limitations, agricultural production can only provide about half of the country's food (excluding fishery products). As a result, Iceland is heavily dependent on food imports, a problem caused

by damaged soil, harsh climates, and geographic challenges like climate change. (OECD, 2023, OECD Globserver, 2025) This dependence on imports is very important. Imported foods tend to be more expensive, especially for fresh produce and perishable items, because of transport costs, making healthy, fresh, nutrient-filled food less accessible or more costly for many households. This can contribute to inequalities in food access. Some may argue that Iceland's limited agriculture contributes to challenges in food security and nutritional diversity. (ShunWaste, 2025)

In 2024, the average household in Iceland had about 2.42 people living in each house (Helgi Library, 2024). The average full-time worker earns about 984,000 Icelandic króna (ISK) per month in 2024. Converting that into USD, they make around 7,738.28 US dollars a year, while regular monthly earning workers make about 758,000 ISK, or 5,960.99 US dollars. (Statistics Iceland, 2024) Employment in Iceland mainly focuses on jobs in services like tourism, fishing/food processing, energy (geothermal/hydropower), and industries rather than agriculture jobs, which is a small part of Iceland's economy. (OECD) Despite high wages, the cost of living in Iceland is quite high, food prices, housing costs, and other living expenses are high, especially since most food is imported and the housing demand is strong.

Although Icelanders earn high wages, with full-time workers averaging around 984,000 ISK per month, the high cost of living, especially the price of imported food, places significant pressure on household budgets. (Statistics Iceland, 2024) Imported foods are often more expensive due to transportation costs, making fresh and nutrient-dense produce less accessible for many families. Expanding geothermal-powered agriculture would directly support Icelandic households by reducing the country's dependence on imports from other countries and help with lowering food costs overall. By increasing local food production, geothermal greenhouses would allow families to spend a smaller amount of their income on basic groceries, improving affordability and economic stability, particularly for lower-income households who are most affected by rising food costs.

From a societal perspective, Iceland's inability to grow enough food leaves it more prone to issues with global supply chain disruptions, price fluctuations, and import dependency. For lower-income households, this may mean limited access to fresh, nutritious food or higher food costs. The loss of traditional farmland and soil erosion means that rural communities and farms may struggle to maintain their livelihoods, especially those relying on small-scale agriculture or livestock. Over time, this can cause social and demographic shifts, rural depopulation, increased urbanization, and the loss of traditional agricultural culture.

Soil degradation and vegetation in Iceland have not only economic but also serious environmental impacts. With most of the fertile soil being severely eroded, Iceland's ability to support ecosystems has declined drastically. Areas that once supported forests, grasslands, and wetlands are now barely vegetated, leading to reduced biodiversity and habitat loss. (Globserver, 2012) Research also shows that a large portion of the soil's organic carbon, which is essential for soil fertility and ecological health, has been lost over centuries due to erosion. According to one study, between 120 and 500 million tons of soil organic carbon have been eroded in Iceland since settlement, and about half of that carbon has been oxidized and released into the atmosphere. This loss is not only harmful to soil fertility but may also contribute to broader environmental issues, such as decreased carbon sequestration potential and increased vulnerability to climate change.

With almost all of Iceland's soil being unsuitable for agriculture, ecosystems like wetlands, natural grasslands, and forests that would help control the climate, conserve water, and support biodiversity are being decreased, reducing the stability of Iceland's natural environment. Preserving these ecosystems is crucial for keeping the ecological balance and strength against environmental changes like climate change. Investing in the restoration and protection of such areas can provide sustainable benefits for communities, including more ecotourism opportunities and the potential for renewable resources. (Government of Iceland)

Given the environmental, social, and economic challenges tied to poor soil quality and limited agriculture, Iceland faces a difficult but solvable agricultural issue. Multiple strategies could help improve this issue, such as land restoration and sustainable agriculture, to technological innovations and policy reforms. These methods/solutions can also include precision agricultural technologies to improve resource use and reduce waste, adopting regenerative farming practices that rebuild can possibly help with soil health, educational programs to raise awareness about sustainable land management, and supporting community-driven conservation initiatives alongside policy incentives. One important step to take in this could be large-scale soil repair and land reclamation. The Soil Conservation Service of Iceland (SCSI), a government agency founded in 1907, already works to rehabilitate degraded land. By expanding their efforts to plant grasses, stabilize soil, and restore vegetation cover, this could reclaim some of the lost farmland and slow further erosion. (Government of Iceland)

At the same time, controlled-environment agriculture, such as greenhouses heated by geothermal energy, could let Icelanders grow vegetables and fruits despite the short growing season and poor soil fertility. This way would help reduce dependence on imports, improve access to fresh produce/foods, and support food security. Because Iceland has plenty of geothermal and hydroelectric energy resources, greenhouse farming would likely be energy and cost-efficient compared with countries relying on fossil fuels.

Despite the challenges, there is one clear and promising solution: geothermal-powered agriculture. Using Iceland's geothermal energy to power greenhouses allows for year-round growing of vegetables and fruits, even in areas where agriculture is almost impossible. Compared to other approaches, geothermal solutions are highly effective because they address multiple problems at once. They overcome climate limitations, reduce dependency on imports, and increase the availability of fresh, nutritious food for Icelanders. When combined with soil restoration, sustainable land-use policies, and community engagement, geothermal agriculture is the best solution for creating a food-secure nation.

Iceland can fix damaged land, invest in sustainable ways of growth, and focus on geothermal-powered solutions to rebuild its agricultural ability while protecting cultural heritage and the environment. These methods not only improve food production but also make the country less vulnerable to changes in the world's supply chains and climate change. In the end, Iceland can guarantee a healthier, more sustainable, and more food-secure future for all of its citizens by using its natural resources with careful land management.

Another solution that is gaining popularity in Iceland is the use of backyard geothermal greenhouses and community greenhouse projects. By using geothermal heat on a small scale, individual households can grow vegetables and herbs throughout the year, making fresh produce more accessible even in urban or rural settings with poor soil. Community greenhouses, supported by local governments or cooperatives,

offer shared spaces where communities can collectively grow food, share knowledge, and help with the burden of food security. These grassroots not only supplement household nutrition but also strengthen community ties, encourage sustainable practices, and further reduce Iceland's reliance on imported foods. (BTL Liners, Think Geoenergy)

Backyard geothermal greenhouses are also cost-efficient for many Icelandic households because geothermal heat is one of the cheapest and most widely available energy sources in the country. (OECD, 2023) Heating is normally the most expensive part of greenhouse farming, but in Iceland, geothermal energy keeps operating costs low and stable throughout the year. (OECD Globserver, 2025) While the actual cost of building a small greenhouse can vary depending on where you are, how big a greenhouse you make/buy, the long-term expenses are minimal, making it affordable for families to grow their own vegetables instead of buying costly imported produce. (Statistics Iceland, 2024, OECD) Community greenhouses are even more economical because the cost of materials, maintenance, and heating is shared among many people. As a result, these geothermal-powered systems help households save money on groceries while increasing access to fresh, locally grown food.

Iceland's damaged soil and limited farmland created major challenges for it, but the country has realistic and actual ways to improve its food system. Through land restoration, sustainable farming, and geothermal-powered agriculture, Iceland can reduce its dependence on expensive imports and increase access to fresh, local food. Community and backyard greenhouses strengthen this effort by helping households grow produce year-round. By investing in these solutions, Iceland can build a more sustainable, food-secure future.

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