Iceland SDS Management Case Study – A Nature-based Approach

When Iceland was first occupied by Vikings in the 9th century, the island was not all ice and barren lands, but included large areas covered by grass as well as birch forests. Over the succeeding centuries, human land use led to large scale deforestation and significant reduction in natural ground cover. This loss of natural vegetation led to widespread encroachment of sand on farming and grazing lands and dust storms, which, in some cases, led to the death of animals and abandonment of farms.

In many ways, Iceland is a geologically violent location, with volcanic eruptions, geysers, floods, avalanches and severe winter weather common events. That Iceland could experience sand and dust storms is a natural part of this environment.

Ash and pumice from volcanoes, once on the ground, can easily be picked up by the strong winds which blow across the island. The fine silt created by glaciers is another source of dust. The erosive action of Iceland's many rivers creates large volumes of sand which can blow into communities and over otherwise productive lands.[1]

As a result of the threat posed by blowing sand, farmers and then the Government initiated a range of control efforts. These efforts started as early as the 12th century with the building rock or turf walls to stop the movement of sand. SDS management evolved to include a range of options, including

- Installing fences and reducing or excluding grazing in current or potential source areas.
- Planting trees, bushes and grasses to reduce wind erosion on open land and adjacent to roads and communities.
- Using fertilizer and, more recently, bonemeal, to encourage a natural recolonization of birch forests, willow thickets and native grasses. (Volcanic soils are often nitrogen poor.)

For over 100 years, many of these efforts have been piloted at Gunnarsholt, managed by Land and Forest Iceland. Success can be measured by the fact that the farm at Gunnarsholt was once abandoned due to drifting sand and was barely functional when taken over by the government in 1929. The site is now a combination of fields, small forests and windbreaks, with no semblance of its windswept baren past.

field near Gunnarsholt, Iceland.

The work at Gunnarsholt demonstrated that Iceland's natural environment is resilient. This is the basis for the Hekla Affrestation Project, located to the south of the Hekla volcano, the most active in the country. Hekla is responsible for extensive lava fields and areas covered by ash, the latter contributing to a long history of sand and dust storms in the area, including those previously experienced at the Gunnarsholt farm.

[1] See **Devastating sand and dust storms: the role of Sustainable Land Management (SLM) for an Icelandic fishing town**, SLM Policy Brief, WOCAT, https://wocat.net/documents/1015/DEF_Iceland_WOCAT_Policy_Brief.pdf.

Research into the natural history of the area indicated that birch forests and other vegetation had flourished near the volcano even given its frequent eruptions. This led to a realization that restoring the natural birch forest and other indigenous vegetation could help minimize blowing volcanic ash following eruptions and protect farm and grazing lands downwind.

The Hekla Aafforestation Project started in 2006 and has been progressively revegetating areas north from the Gunnarsholt Land and Forest Iceland base towards Hekla, with an ultimate target of revegetating 1% of the area of Iceland.

Looking north, Hekla Volcano on the right side, with reclaimed field in the foreground and planted forests in the middle ground, developed before the Hekla Project.

Over time, the process of fertilizing to increase nitrogen levels in the soil has become less reliant on imported fertilizers and increased the use of bone meal and other sources of organic fertilizer available in Iceland. There has also been an increased use of natural propagation of birch from remnant colonies in the project area and a reduced need to plant trees. Core to these efforts has been the involvement of land owners and land users, and a nature-based approach focused on allowing the land to heal itself.

An unanticipated expansion of the revegetation effort has been as the result of an increase in small housing plots around the project area. These generally small houses have been built for weekend use or as rentals. Frequently, the owners have planted birch and allowed revegetation, actions which are, in fact, expanding the area protected from becoming an SDS sources.

The Hekla Project and other afforestation and revegetation efforts across Iceland will not stop all SDS events. The violent geology and strong winds will always come together to move sand and dust from the large number of natural source areas on the island. But the Hekla Project and similar afforestation and revegetation efforts are contributing to reducing SDS risks and making Iceland safer against a hazard which the history of Iceland has shown had been made worse by human actions.

This case study is based on the following sources:

Aradottir, A. (2005). 2.1 *Restoration of birch and willow woodland on eroded areas,* **Effects of afforestation on ecosystems, landscape and rural development**. Proceedings of the AFFORNORD Conference, Reykholt, Iceland, June 18–22, 2005. Eds. Gudmundur Halldorsson, Edda Sigurdis Oddsdottir and Olafur Eggertsson.

Crofts, R. (2011). **Healing the Land, The story of land reclamation and soil conservation in Iceland**. Soil Conservation Service of Iceland, https://catalogue.unccd.int/133_Healing-the-land.pdf.

Consultation Committee on Hekla Forests (2006). **HEKLUSKÓGAR - Restoration of Forests in the Vicinity of Hekla**. Machine translated from the original Icelandic **HEKLUSKÓG A R Endurheimt Skóglenda Í Nágrenni Heklu Forsendur Og Leiðir**.