Issues of conservation and land management in Iceland

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Landscapes in Iceland are characterized by unusual variability. This is in part due to its unique geology, being one of the youngest countries on Earth, but also by consequences of 1100 years of land use. The visitor will soon discover that the lack of trees and extensive barren areas are some of the most striking features. The nakedness of the land may seem a natural condition in a volcanic country with a chilling name. But, the reality is different. Most of the deserts and areas with little soil were once covered with lush vegetation. Despite more than a century of combating the destructive forces and restoring lost resources an enormous task is still ahead in healing the land and new conservation concerns are emerging.

A millennium of land degradation

Since settlement of Iceland about 870AD, more than half of the original vegetation and soils, and about 95% the birch woodlands may have been lost. Serious soil erosion characterizes 40% of Iceland of today (Arnalds *et al*., 2001). The current extent and composition of vegetation in Iceland bears little resemblance to what it was historically. The degraded state of the ecosystems and continued destruction of soil and vegetation are among the greatest environmental problems in Iceland.

Arnalds (1987) summarizes some of the various sources that can be used to reconstruct the vegetation of the past and trace some of the major changes in cover and composition through the centuries. Such information about changes in land health is important as one of the tools for setting goals for restoration of damaged land in Iceland. It is also a sharp remainder on the potential consequences of long-term unsustainable land use in a sensitive environment.

A century of healing the land - Reflections on the journey

The severity of land degradation prompted the establishment of one of the world´s oldest Soil Conservation Services (SCSI). There have been numerous success stories in more than 100 years of national effort on halting soil erosion and restoring land quality. However, in retrospect, the early work was very top-down in approach and various cultural barriers reduced local acceptance of the need to change land use practices and inhibited the rate of progress (Arnalds and Runolfsson, 2009, Crofts, 2011).

More recently, the Soil Conservation Service has increasingly provided guidance and leadership to all who can improve the care of the land. Over 30% of the sheep producers in Iceland, along with many other farmers and charitable organizations, are now actively participating in soil conservation work under the themes *Farmers Heal the Land* and, for larger projects, the *Land Improvement Fund*.

Grazing, mainly by sheep and horses, is the main determinant of land health in Iceland. In areas of sensitive soils and vegetation, overgrazing can have a dramatic effect, causing large-scale erosion and slowing down recovery of damaged areas. Strategies for more sustainable land use are being developed, following the path marked by other nations, based on an ethic of land stewardship.

Soil conservation in Iceland – a need for a holistic approach

Policies for conservation and restoration of the land resources of Iceland have been gradually evolving from single-issue localized conservation to more holistic approaches meeting a broader spectrum of environmental and societal needs. Five main elements embrace the current approaches.

Linking agricultural support to sustainability

First is the linking between agricultural support and land stewardship. Icelandic agriculture is characterized by high levels of governmental support, direct and indirect import barriers, and a growing realization of the need to maintain prosperous agriculture for food security.

Debates over the role of governmental support in causing land degradation are growing and can have major impacts on public goodwill towards agriculture. Only a third of the support to sheep farmers is linked to goals of land stewardship, with the consequence that the government has been paying at both ends: for food production and for repair of land damage. A revision of the support regime is essential; not only for the environment but also for the farmers to maintain their social license for continued agricultural support (Arnalds, 2011).

Fostering community engagement in caring for the land

Second, there is a need to foster community engagement in caring for the land, as restoration of degraded land and the quest for sustainability are unattainable without a commitment to good management by the agricultural community. Further steps in land user and other stakeholder involvement need to be taken.

For fostering community engagement, Iceland is increasingly seeking inspiration and models from globally evolving movements like *Landcare* and *Land Stewardship*. Both are important tools in improving livelihood of rural communities, increasing land literacy, aiding in more holistic planning at the landscape levels, and reaching goals of biodiversity conservation and restoration (Arnalds, 2014).

The needs and impacts of growing tourism – overcooking the golden goose

Third, is the growing awareness of the impacts of tourism, which has become the most important industry in Iceland. But the skills and funds for preventing damage to the sensitive nature are lagging far behind, so that tourism is fast becoming one of the biggest environmental issues.

The stark beauty of Iceland is partly related to low growing plant species and open landscapes. For tourism, this means that in addition to trampling damage and the building of infrastructure with insufficient regard for site sensitivity, new issues are emerging such as the need to protect scenic landscapes and preventing loss of view by tall growing non-native trees. Uncontrolled development of vehicle tracks, outside the planning system, is also resulting in massive soil and landscape damage, along with putting Iceland´s extensive wilderness areas under threat (Arnalds, 2015).

Role of conservation and land restoration in combating climate change

Fourth, is the vitally important role of conservation and land restoration in combating climate change and in attaining other foundations for sustainable development. Soil conservation and restoration activities preserve and convert Carbon dioxide, one of the main atmospheric greenhouse gases, to organic matter which in turn is the foundation of land fertility and food production (Arnalds, 2008 and Halldorsson *et al*., 2015).

As a result of the massive land degradation, vast amounts of carbon have been lost from Icelandic ecosystems; several hundred times more than current release of greenhouse gases to the atmosphere. The government is increasingly using the conversion of CO2 to organic matter as one of the tools in meeting national emissions targets, restoring biological diversity, combating soil erosion, revegetation of eroded land and reforestation. Linking carbon sequestration with such goals has been a boost for incentives to ecological restoration.

Policy and law

And, fifth is the need for a comprehensive law- and institutional change to promote sustainable use of soil and other natural resources in a holistic manner. The OECD Environmental Performance Reviews for Iceland, 2014, indicated several weaknesses that need to be rectified. This may especially apply to the ivory tower, single issue nature of both law on environment and land use, as well as a lack of coordination and cooperation between agencies and ministries. As a consequence, nature conservation may be regarded very weak on about 80% of Iceland. The importance of soil conservation and land restoration is also not well enough recognized as one of the most important tools for broad based nature conservation.

Work is currently under way exploring the feasibility of merging soil and nature conservation into one institute, and possibly also including forestry with native tree species, basically birch (*Betula pubescens*). The outcome is still uncertain, but his would open up new options for radically increasing sustainability of land management and ecosystem restoration in Iceland.

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