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*Abstract*

# The Challenge in Increasing Water and Soil Resources Resilience by Landscape Restoration: Examples from Southern Ethiopia and Iceland †

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**Abstract:** Soil degradation and subsequent soil erosion is a major threat to vital ecosystem services, to food production, and finally to human societies. This threat is particularly imminent in subarctic Iceland and tropical Ethiopia. Both countries underwent large-scale deforestation in the past. Especially in Ethiopia, the demand for wood for cooking, heating, and construction is still high, inducing deforestation. On the other hand, Iceland solved the need for wood for energy purposes through the utilization of geothermal energy. Deforestation, overgrazing, and specific climatic conditions resulted in a high rate of soil erosion in both countries. In this study, the effectivity of restoration efforts is mapped in selected areas in Iceland and Ethiopia. Soil-water conservation (SWC) measures mapping was conducted in the Sidama zone and Halaba special district of southern Ethiopia, as well as in Thorlákshöfn, a municipality in southern Iceland. The Ethiopian study area is located in the Main Ethiopian rift valley. The Icelandic study area is in the Mid-Atlantic Rift. Degraded areas and applied SWC were GPS mapped in the field. The erosion agents in both countries are dominated by water erosion. In addition, Iceland has a high rate of soil loss due to strong wind erosion. In order to mitigate erosion, numerous SWC actions were implemented in both countries. In Ethiopia, indigenous SWC techniques have been applied since 400 BC, while the government-driven activities started after 1970. In Iceland, governmental soil reclamation programs started in 1907 through establishment of The Soil Conservation Service of Iceland (SCSI). Usually, all the reclamation program actions involve the closing of reclaimed area for livestock and people so that natural regeneration accompanied by additional measures such as planting seedlings can take place. In Ethiopia, such an area is called an "Area Closure". The land is owned by the community. The common problem in the restoration of Closure Areas lies in people not respecting the watershed divide. Hence, the approach to land degradation lacks a systematic approach covering the entire watershed. Another issue is the construction of the road and path network, which in many cases acts as ways of concentrate surface runoff. Degraded paths are frequently abandoned, and new paths are constructed. The main difference in Iceland from the Ethiopia case is land ownership, which is private in most cases. The land restoration began 50 years ago by sowing grass. Today the land is slowly being reforested.

**Keywords:** soil degradation; surface runoff; reclamation; reforestation; overgrazing; agriculture



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