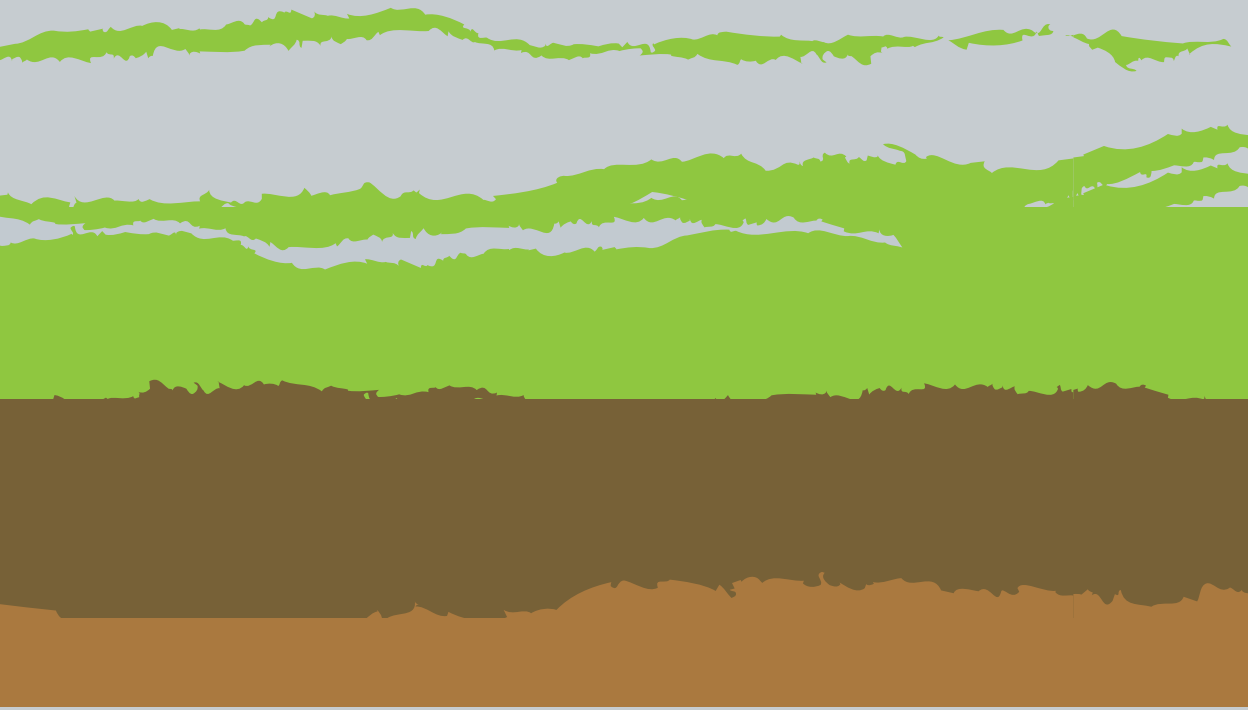
Soil management practices in the Alps

A selection of good practices - Case Study 17



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CS17.
Managing ski area Schmitten (Austria)

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Country, Region:	*Austria, Salzburg*
Organisation:	*Schmittenhöhebahn AG*
Sector:	*cable car company*
Land uses:	*180 ha ski slopes, 28 cable cars and lifts*
Main soil threat:	*ground stability and erosion*
Key soil ecosystem services:	*ecological ski piste management*
Summary:	*Knowledge of geological and geomorphological conditions of ski areas, such as slope stability, regenerative capacity, soil erosion, and growth rate, is imperative in determining the negative environmental factors that must be rectified. Recognising the increasing negative effects of the climate change on soils, this project launched a vegetation and soil-related inventory, which led to an action plan and subsequent implementation over a five year period, thus renewing the EMAS certification of the ski areas — an EU accreditation for organisations that have evaluated, reported, and improved upon their environmental performance.*
Keywords:	*ski resort, ground stability, erosion*

Background and description of the problem

Negative environmental effects that are related to soils in ski areas mainly concern ground stability and erosion – issues that can lead to damage and liability problems, as well as negative effects on groundwater. The geological and geomorphological conditions of a ski area therefore play an important role, as does its formation history. These factors allow inferences to be drawn regarding:

- slope instability or stability
- the sites' regenerative capacity
- growth rate
- potential consequential effects following construction measures (e.g. grading)

Information on soil formation is important to assess the regenerative capacity of the sites and to evaluate potential restoration options. Aspects of soil protection have gained significance in Europe thanks to the Environmental Liability Directive. The protocols of the Alpine Convention – in particular the tourism protocol – also focus on sensitive sites. Regarding ecological stability and naturalness, past construction measures conducted in connection with winter sports, such as grading or clearing, play a decisive role.

A survey of the construction measures conducted in the ski areas carried out in the past is a part of the important basic data. Depending on the intensity of the construction measures, machine-graded pistes can exhibit:

- altered soil drainage properties
- altered soil structure
- modified plant cover
- modified fauna in the soil

Expected improvements/ contribution to better soil management

The consideration of environmental conditions, especially soil and vegetation, is an important element of an environmental management system for ski resorts. In this case the ski-resort Schmittenhöhe-Bahn was EMAS certified and in this context the situation on the slopes was analysed in detail and improved in form of a detailed action plan.

Stable soil conditions and vegetation are important for the provision of stable pistes in winter, they reduce the need for summer management and improve the aesthetic quality for summer guests as well. The positive effects also extend to the agricultural use in those parts of the slopes that are still in agricultural use.

Stakeholders and knowledge transfer

The entire project was led by an environmental advisory board including experts with expertise from different environment-related areas. In order to scientifically clarify the value of ski slopes regarding biodiversity and nature conservation, an investigation programme started to analyse the exact value. The collection of studies on Alpine fauna, butterflies, wild bees and grasshoppers is called “Ökologischen Pistenmanagement” (ecological piste management) and can be downloaded from the website www.schmitten.at/ecology.

Data and methods

The project was started in 2013. Meanwhile the second certification has been obtained.

Costs for study, certification, training, report: approx.. €150,000

Costs for activities: approx. €100,000 (additional costs for snow depth measurement, hybrid piste devices, etc.)

The Ski auditing and EMAS certification included a detailed inventory of vegetation and soil conditions in the entire ski resort Schmittenhöhebahn. The inventory of the current vegetation in the Schmitten ski area was made at the beginning of August 2011. According to Braunblanquet (1928, 1964), the vegetation stocks were assigned to the societies or local units described in the literature Oberdorfer (1993) using lists of the characteristics of dominant species. This was followed up by an action plan and implementation in the last 5 years. Furthermore, the external evaluation and certification will be renewed after 3 years.

The soil related inventory first considered the ground covered by plants (in percent) at the time of the survey, which identified "areas without vegetation" and "areas with sparse vegetation", defined as areas with a vegetation cover of between 15–50%. In this respect, the time of the survey plays an important role. The assessment was not made in early spring, immediately after winter, but in summer (July/August). Thus, vegetation has had time to fill the gaps, and the natural regenerative capacity of the site could be deduced. Another benefit of conducting damage surveys in summer is that impacts from summer use, e.g. damage due to grazing animals or summer tourism, will already have become effective. Thus, damage due to overlapping use can also be recorded. In addition, also large-scale erosion forms such as slope cracking, slumping or soil creep were detected. These are mostly due to natural causes (geologically unstable underlays, overly steep slopes, etc.) . The affected areas were mapped during the field surveys at a scale of 1:5,000. Finally, we also analysed point-based damage. In contrast to the larger-scale forms of damage, which are mostly explained by a number of different causes (machine-grading measures, ski edge abrasion, grazing, unstable sites), the linear and point-based forms of damage can usually be attributed to single causes. Point-based forms of damage are not only differentiated by cause but also by the extent of the damage.

This inventory also included an evaluation of the naturalness of the vegetation, in order to include it later in a GIS system on vegetation and the respective forms of damage. For the detail methodological approach see Pröbstl-Haider et al. 2018 in the book "Environmental Management in Ski Areas".

Results

If an enterprise is EMAS certified the related reports describing the situation, action plans and responsibilities as well as the achieved results must be published in a brochure that is publicly available. In this case, the respective recent report can be downloaded from the website www.schmitten.at under the following link: Ökobericht 2018.

Transferability and applicability to best soil management

The methodological approach can be applied to any ski resort. We recommend the book which offers helpful explanations and case studies. Pröbstl-Haider et al 2018 in the book "Environmental Management in Ski Areas".

Environmental and climate change impact

A stable vegetation cover offers a good protection against erosion and damage which may occur more often due to increasing rainfall events in summer (July), which are likely to increase because of global warming.

Photos/ illustrations/ maps

Figure 61: Damage related to grazing *(Photo: Ulrike Pröbstl-Haider)*

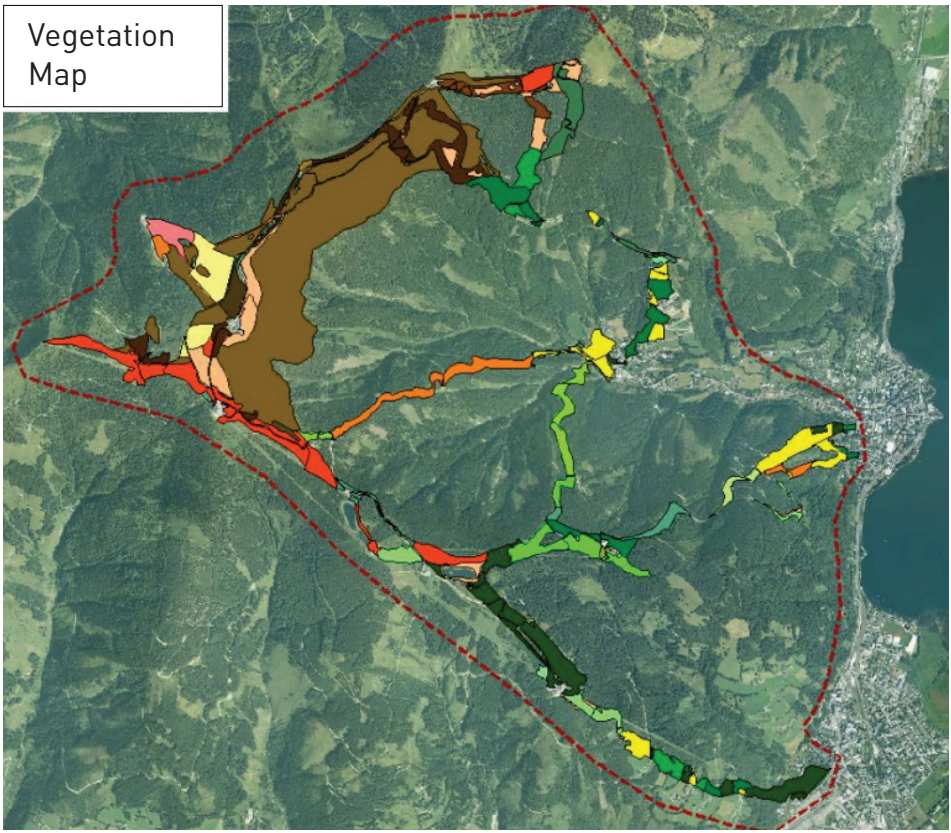

Figure 62: Extract from the vegetation survey in the ski area Schmittenhöhe in Zell am See/Austria *(Pröbstl-Haider & Dorsch 2013)*

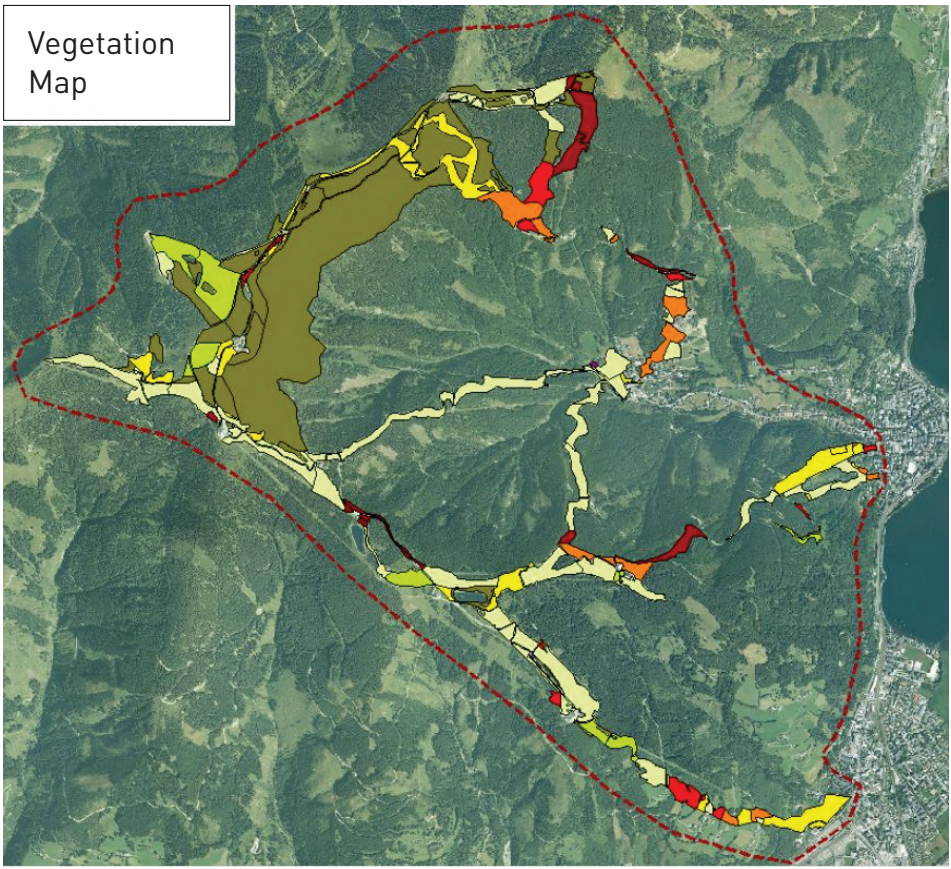

Figure 63. Naturalness of vegetation communities in the ski area Schmittenhöhe in Zell am See/ Austria *(Pröbstl-Haider & Dorsch 2013)*

Figure 64: Damage related to mulch mowing
(Photo: Ulrike Pröbstl-Haider)

Figure 65: Damage related to skiing operation (characteristic piste groomer marks)
(Photo: Ulrike Pröbstl-Haider)

Figure 66: The documentation in the environmental declaration within EMAS was in 2017 and 2019 selected as the best one in Austria and awarded by the Ministry of Environment.

Figure 67. The environmental policies of the company, that can be downloaded at: https://www.schmitten.at/Downloads/Oekologie/2018_Oekobericht.pdf

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