

# Land management paths for alpine pastures and mountain meadows in the Eisenwurzen region

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**Abstract** - Due to the traditional cultivation by farmers and their unique flora and fauna, alpine pastures and mountain meadows can be considered as highly valuable but at first glance contradictory cultural and natural assets for the region and people who live there and visit it. The aim of this analysis is to gain a better understanding of the societal preferences of managing alpine pastures and mountain meadows and identify utilization strategies and framework conditions in order to develop an optimum of both, the cultural and natural asset and also consider recreational aspects. Therefore, we combine different methods of participatory research as well as a discrete choice experiment (DCE). This process identified six crucial attributes, having all positive preferences, in particular with regard to an increase in the diversity of plant and insect species. Based on final model results and further interactions with stakeholders, we aim to outline alternative land management paths for alpine pastures and mountain meadows in the Eisenwurzen region.

## INTRODUCTION

Austria's landscape has been shaped by agriculture for centuries. Agriculture is thus instrumental in shaping the living space in rural regions and the resulting cultural landscape. In alpine regions cultural landscape extends up to high altitudes in the form of alpine pastures and mountain meadows. Due to the traditional cultivation of these alpine areas by farmers, alpine pastures and mountain meadows can be considered as a highly valuable cultural asset for the region and people who live there (Pötsch, 2010). Additionally, they form a habitat for a unique flora and fauna and can therefore be considered as natural asset (Hilpold et al. 2018). With the aim of preserving these habitats, some alpine pastures and mountain meadows in Austria have been included in the zones of Natura 2000 areas, nature reserves and national parks.

However, the clash of different interests with regard to conservation and future development of cultural and natural assets can lead to conflicts of use. In particular such conflicts occur between agriculture and nature conservation. Since both alpine agriculture and nature conservation are of great societal relevance and these alpine areas are a point of attraction for recreation, societal expectations play a crucial role in the future development of cultural and natural assets.

The aim of this analysis is to gain a better understanding of societal preferences for managing alpine pastures and mountain meadows within the

Eisenwurzen region and its surrounding areas. The results will be used to shape utilization strategies and framework conditions of such areas in order to achieve an optimum of both - at first glance contradictory - cultural and natural assets and also consider recreational aspects.

## METHODOLOGICAL APPROACH

We apply a participatory approach combining qualitative and quantitative methods of social research. Firstly, we elicit local expert knowledge by means of stakeholder interviews and conduct a literature review to identify the crucial features (attributes) of the design of alpine pastures and mountain meadows. Secondly, we organized workshops with local experts in order to identify the most crucial attributes in terms of their natural and cultural assets. Within the workshops we apply different methods of participatory research which can help to facilitate processes in which all stakeholder groups are on an equal footing. These include the method "Personas", which aims to motivate stakeholders to look at the problem from different perspectives.

Thirdly, different configurations of these attributes are combined to land use scenarios and assessed by the local population through a discrete choice experiment (DCE). DCEs are increasingly applied to analyse preferences of individuals with respect to non-market goods and services connected to agriculture. The key advantage of such a stated preference approach is that it can be used to value non-market outputs, for which no market values can be derived. DCEs are based on the rationale that people do not derive utility from goods and services directly, but from their attributes. In a DCE, choice data is generated through the construction of a hypothetical market by using a survey, where respondents are presented with several choice sets, each consisting of at least two alternatives, which are marked by a set of attributes with varying outcomes (i.e. levels). By choosing their preferred alternative in each choice set, they make trade-offs between the levels of the attributes of the respective alternatives in each choice set, from which their preferences for the good/service of interest can be derived. We analyse the choice data of the DCE with a Multinomial Logit Model (Train, 2009) and estimate the parameters reflecting preference weights for the attribute levels using a maximum likelihood estimation.

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#### CASE STUDY REGION

The Eisenwurzen region, which is located in the border region of Upper Austria, Lower Austria and Styria, serves as a case study region for the present analysis. Being part of the international network of Long-Term Socio-Ecological Research (LTSER), the region offers a regionally and internationally networked field of research. Small scale agriculture has been of great importance in this region for a long time and contributes to the preservation of the cultural landscape to a very large extent. So far, the touristic activities within the region are relatively low, but the region has a high potential for sustainable tourism. Two national parks, low population density and an attractive and diverse alpine landscape all have the potential to be appreciated by people from nearby urban centres who look for outdoor activities, both in summer and winter.

#### PRELIMINARY RESULTS

Through the participatory approach we developed 6 attributes for the DCE, which are shown in Table 1. In the survey, respondents were presented with 6 different choice sets, each consisting of 3 alternatives. One of these three alternatives was always identical, referring to a reference scenario, which described the possible status of alpine pastures and mountain meadows in the case study region in around 10 years in a business-as-usual scenario. The other two alternatives were varied based on a d-optimal experimental design (Street et al. 2005).

**Table 1.** Attributes and levels used in the DCE.

Attribute	Levels (number of level) <sup>a</sup>
Mountain hut function	<i>Resting place (1)</i> ; food and drinks (2); accomodation (3)
Scenery	<i>Forest dominated (1)</i> ; grassland and forest balanced (2); grassland dominated (3)
Share of regional food	<i>Low (1)</i> ; medium (2); high (3)
Diversity of plants and insect species	<i>Low (1)</i> ; medium (2); high (3)
Knowledge transfer	<i>None (1)</i> ; information signs (2); guided tours and courses (3)
Price (€/household and year in additional taxes)	0, 60, 120, 180, 240

<sup>a</sup>reference level in *italic*. n = 360 respondents

360 respondents from Eisenwurzen and surrounding areas with complete and valid responses were included in the econometric analysis. First preliminary results of a basic Multinomial Logit Model are shown in Table 2. The model was specified, so that all the parameter estimates describe the difference in utility with respect to the business-as-usual scenario. Results indicate overall positive preferences for all non-monetary attributes, in particular regarding an increase in the diversity of plant and insect species, and a negative preference for the price attribute, reflecting disutility for an increase in taxes for scenarios other than the reference scenario.

**Table 2.** Preliminary results of Multinomial Logit Model

Variable	Estimate	Std. Err.	Sign.
Alternative 1	0.642	0.140	***
Alternative 2	0.983	0.133	***
Mountain hut function (2)	0.440	0.074	***
Mountain hut function (3)	0.234	0.076	**
Scenery (2)	0.222	0.077	**
Scenery (3)	0.164	0.076	*
Share of regional food (2)	0.359	0.077	***
Share of regional food (3)	0.360	0.075	***
Diversity of plants and insects (2)	0.544	0.076	***
Diversity of plants and insects (3)	0.773	0.080	***
Knowledge transfer (2)	0.528	0.074	***
Knowledge transfer (3)	0.306	0.077	***
Price	-0.009	0.001	***

Note: \*\*\*, \*\*, \* and . indicate significance at the 0.1%, 1%, 5% and 10% level, respectively. Level numbers of the respective attributes are in brackets.

#### DISCUSSION AND OUTLOOK

The results of the DCE are currently further analysed with econometric models (latent class models) to better reflect heterogeneity in preferences, between different segments of respondents in the sample (Train, 2009), using several of the socio-demographic variables of the respondents. Based on final model results and further interactions with stakeholders, we aim to outline how alternative land management paths for alpine pastures and mountain meadows in the Eisenwurzen region could look like. The recommendations to be derived from this analysis should increase both, the (agri)cultural value as well as the natural value of such alpine areas, support policy in the development of appropriate strategies and avoid future conflicts between agriculture, nature conservation and tourism.

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