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Analysis

The impact of changing agricultural policies on jointly used rough pastures in the Bavarian Pre-Alps: An economic and ecological scenario approach

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ABSTRACT

The paper assesses the impact of different policy options on the land use and associated biodiversity values of jointly organised low-intensity grazing systems ('Allmende') in Bavaria. We use an integrated economic and ecological modelling approach to compare three scenarios with the situation in 2003/05. We base the economic sub-model on single farms, which alter their land use in response to economic stimuli. Within the economic part, factors like the farm's endowment with machinery and quota are regarded. Within the rule-based ecological sub-model we analyse: area of protected habitats according to the EC Habitats Directive; biodiversity for selected taxonomic groups and habitat quality for different target species. An overall evaluation of the scenarios indicates that decoupling has a limited effect, because higher direct payments compensate the effect of lower product prices. If all payments are strictly targeted to agri-environmental measures and set to a level which guarantees a low-input management of the grassland, the public costs could be reduced and additional habitats for the target species could be provided. Regarding all indicators but the extent of protected habitats and the public costs, a scenario with a cessation of public payments and market liberalisation performs the worst.

1. Introduction

The extensively used mires of Southern Bavaria are of high conservation value (Lederbogen et al., 2004). Some of these lands are still traditionally used and jointly organised as low-intensity grazing systems (known as "Allmende"). Through the maintenance of these pastures, the attractiveness of the region for recreation and tourism is enhanced; there is a high level of natural and cultural specificity, and the landscape is diverse (Spittler, 2001). Heifers graze the "Allmende" during the vegetation period. Although the utilisation of these pastures is supported by a wide variety of financial measures (agri-environmental payments and less-favoured area payments), the future utilisation of the "Allmende" is uncertain. First, the low productivity and the remoteness of the land often results in high costs per grazing animal. Second, few of the farms realise the full time-saving benefit of not having any heifers in comparatively labour-intensive cow stables (stanchion stables, solid dung removal) during the vegetation period. Third, increasing milk production to approximately 100 kg per cow per year implies that the number of animals per farm needed to fulfil the milk quota is constantly decreasing (BayStMELF, 2008). Consequently, less-favoured areas, such as the cooperative pastures in the mountains, might be laid fallow in the future.

The continued utilisation of the cooperative system, and therefore, the maintenance of high-value natural grassland, crucially depends on the competitiveness of the involved production systems. This particular factor cannot be assessed without taking into account both national and EU policies and promotion schemes and the likely development of the Common Agricultural Policy (CAP). Many surveys and agri-economic models expect a decline in cattle farming in the EU (e.g., Tranter et al., 2007 and overview in Gohin, 2006) due to the decoupling implemented with the Fischler Reform (Council regulation 1782/2003).

In recent years, several studies using agri-economic models have analysed the impact of a changing business environment on environmental indicators. The integration of indicators for agricultural effects on diffuse emissions (e.g., erosion, global warming potential, NO_3 leaching) is state-of-the-art, even for regional agri-economic models (e.g., Schmid et al., 2007; Mittenzwei et al., 2007; Pacini et al., 2004). The impact of a changing business environment on the biodiversity of agricultural (semi natural) habitats is analysed using single farm models (Meyer-Aurich et al., 2003; Oñate et al., 2007) or is restricted to the evaluation of land cover changes (e.g., arable land to grassland or fallow) (Gottschalk et al., 2007; Brady et al., 2009).

However, the response of grassland farming systems to economic drivers is often more gradual than of arable farming [i.e., reduced

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intensity (e.g., stocking) rather than a change in the type of management (e.g., abandonment)]. Furthermore, the low availability of land is one of the main factors limiting the expansion of dairy farms in Southern Bavaria. We therefore aimed to develop an agent-based modelling approach to cover the interdependencies of farm development and to delimit the impact of different policy options. The economic model is based on single farms, which can alter their land use in response to economic stimuli and interact on the land market. We link this model to rule-based ecological models that assess the consequences for biodiversity indicators for a typical landscape in Southern Bavaria. The considered policy options are: (1) decoupling of the 1st pillar CAP payments, (2) the abolition of all public payments and (3) the restriction of public payments to agri-environmental payments. We compare the results of these scenarios with the status quo in 2003/05. In this study area, the status quo describes a situation in which agriculture is essentially supported by price support measures and a variety of support payments, each with a different conditionality (animal payments, less-favoured area payments and agri-environmental payments). With decoupling, the importance of price support instruments declines and payments of the so-called 1st pillar of the CAP are no longer linked to the acreage of certain arable crops or to the number of cattle and sheep kept. With the reform, the payments only depend on the acreage and management according at least to the GAEC (good agricultural and ecological conditions) standards. Less-favoured area payments compensate farmers for natural disadvantages of the land that impede intensive agricultural utilisation (low temperatures, steep slopes, etc.) and for the socio-economic handicaps of the region (e.g., low population density). In contrast to agri-environmental payments, less-favoured area payments rarely restrict farmers' management decisions. The decoupling implies that payments with low levels of conditionality (decoupled area payments and less-favoured area payments) are the most important support instruments. As the different public payments in the first two scenarios sum up to roughly 500 € per hectare (ha), their abolition might have serious consequences. In the last scenario, the initial amount of public payments for the area is maintained. However, the payments are only awarded to the farmers if they maintain high standards regarding the ecological impact.

This paper addresses the consequences of the above-mentioned policy options with respect to biodiversity, nature conservation value, employment opportunities and agricultural value in this region. The paper is structured as follows. First, we present the applied models. Second, we give a brief description of the study area, the initial support regime and the analysed scenarios. We then highlight the most important results. In the final section, we draw some conclusions from our work.

Due to the existing institutional organisation of the "Allmendes" and the agricultural structure in the study area, aspects generally associated with the extrapolation of common pool resources are only of minor relevance for these questions. Therefore, we refrain from presenting the institutional characteristics of the investigated systems. We refer to Gueydon et al. (2007) for a detailed description of the institutional settings.

2. Modelling Approach

The model consists of one economic and three ecological sub-models (Fig. 1). The agri-economic sub-model is implemented as an agent-based model. In this model, agents adapt their land use in response to changes in the business environment (scenarios). The agri-economic model provides area-type specific information on the applied management regime and intensity for the ecological sub-models. The first ecological model derives the extent and location of EUNIS (EEA, 2009) habitat types using information on the current vegetation cover and study area-specific vegetation trajectories. For a set of selected target species, the second ecological model calculates the changes in the overall habitat suitability. This calculation is based on the changes in the extent of the habitats and study area-specific data on the habitat suitability of given EUNIS habitats for designated species. The third ecological model derives indicators for overall species diversity based on survey data and changes in the extent of the strata. The ecological assessment of the agri-

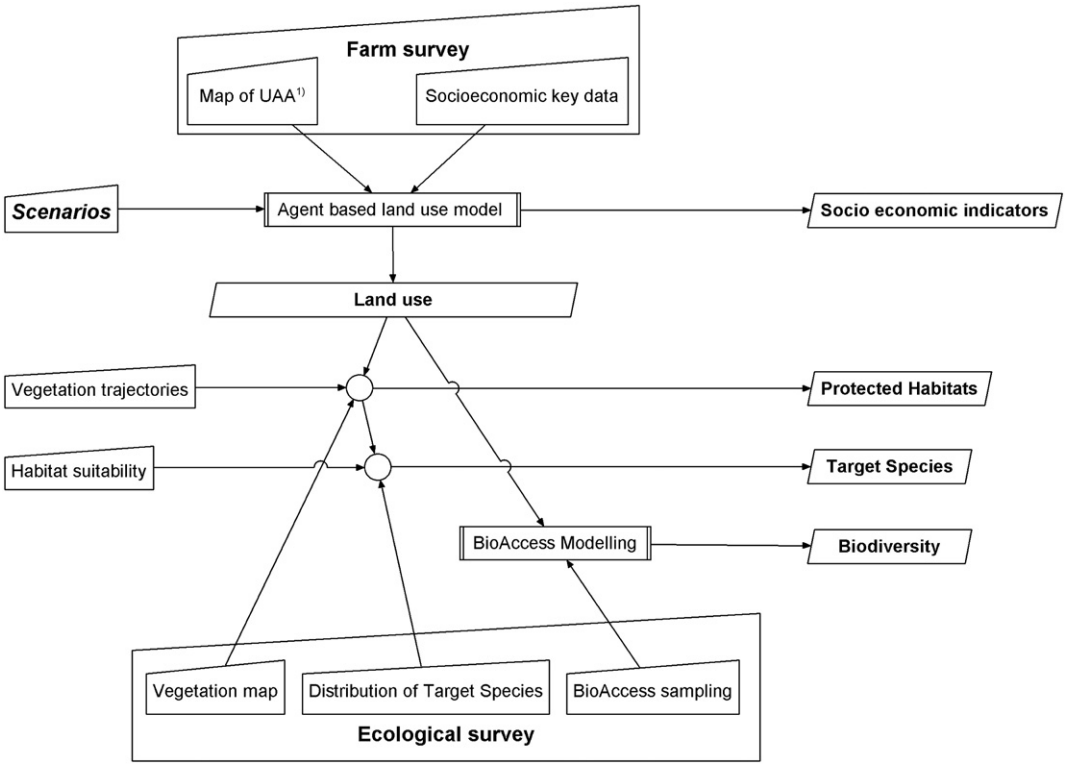

Fig. 1. Information flow within the model. 1) UAA: utilised agricultural area.
Source: own data.