

Can collaborative governance approaches enhance the spatio-temporal fit between agricultural related ecosystem services?

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Abstract

Provisioning services show spatial and temporal trade-offs to other services, which makes assessments challenging. We identify trade-offs related to agriculture by using examples from three study regions (protected areas in The Netherlands, Austria and Germany) to deal with them.

Keywords

Provisioning services, trade-offs, synergies, collaborative approaches, agricultural production

Introduction

Ecosystem services (ES) which are related to agriculture, not only comprise provisioning services like agricultural yields, but also regulating ES like erosion control, supporting and habitat services, e.g. pollination, and cultural services including the landscape attractiveness (TEEB 2010a, 2010b). All ES delivered by agriculture are connected through trade-offs and synergies (POWER 2010). While acknowledging the main objective of agriculture to produce biomass for human uses - a typical provisioning ES - there is an increasing societal demand to shift the balance of the ES towards environmental sustainability, i.e. to strengthen ES other than provisioning. Not only trade-offs and synergies do occur between different ES, but these interrelations might be delivered at different times and in various locations, if supply and demand differ in these dimensions, as it is usually the case with the provisioning services. IVERSON et al. (2014) found four types of combination between ESs (lose-lose, lose-win, win-lose and win-win). The increasing requirements towards ES and their trade-offs and synergies call for management and steering procedures, which can be integrated into governance approaches. The intensity of the ecosystem services delivered by arable agriculture depends on the cultivated crops and the related management practices. Spatial trade-offs can occur on-site, off-site in different directions or distances and thus be decoupled in the further surroundings of the agricultural fields. Temporal trade-offs may also appear in various types, for example accelerated, constant and delayed. All these situations should be covered by specific governance approaches.

A suitable governance approach would take the trade-offs and synergies of ES into consideration, make their intensities and side-effects transparent, reduce trade-offs and enhance synergies (VATN AND VEDEL 2012). The increasing societal requests to agriculture are reflected in many governance approaches on the European level as well as on and national or subnational level, for example the agri-environmental-climate-schemes, which are based on the European Common Agricultural Policy (CAP). On a regional level, also collaborative approaches can be initiated (e.g. to improve structural and habitat quality of an agricultural landscape; to support marketing activities; to regulate the regional water balance for affected land users). Collaborative approaches can complement existing hierarchical and market-based approaches, like the agri-environmental-climate-schemes, especially due to the knowledge of stakeholders about local conditions, the focus on common regional objectives and the cooperation of different groups of stakeholders to approach the objectives.

We aimed to analyze and systematize the trade-offs and synergies of ES which are related to the agricultural production in study areas in three European countries. All are protected areas located in the Netherlands, Germany and Austria. Typically for agricultural landscapes, in each of these areas a multitude of governance approaches act simultaneously, representing a mix of different governance types. We analyzed the collaborative governance approaches to answer the question: can they complement other types of governance approaches, like hierarchical or market based approaches, in order to reduce trade-offs and enhance synergies, and if so, how?

Methods

Case study regions

The region 'Berg en Dal' (area size of 93 km²) in the eastern part of the Netherlands (province Gelderland) is part of the national landscape Gelderse Poort and so of agricultural, natural and historic value for the Netherlands. The most dominant agricultural activity in the region are livestock (dairy cattle, sheep) and arable farming with corn, sugar beets, wheat and potatoes as the main crops.

The region 'Spreewald' (475 km²) in the north-eastern part of Germany (Federal State of Brandenburg) is a Biosphere Reserve, and as such part of the UNESCO program 'man and biosphere', which is differentiated into four protection zones: core zone, management zone, harmonious cultural-landscape zone, and regeneration zone and which protects a very unique landscape within the vast delta around the river Spree which small watercourses and channels through the whole area, and it is characterized by forests, arable lands and grasslands. The arable farming is characterized by the cultivation of arable crops, especially rye, corn, winter oilseed rape, roughage such as clover-grass-mixtures, for livestock forage, and winter wheat. Region specific is the vegetable production, especially gherkins. The region 'Jauerling-Wachau' in Austria (state of Lower Austria) is protected as the nature park 'Jauerling-Wachau' and the area along the Danube river in Lower Austria is located within the Wachau cultural landscape region, a UNESCO Heritage site. The agricultural production covers wine and fruit (apricot) production, dairy farming as well as the cultivation of Christmas trees. The three regions, represented in this order, show increasing shares of non-agricultural used areas and declining land use intensity.

Analysis

We identified the regional agricultural production (like cultivated crops and management practice) and the regional ecosystem services related to agriculture and analyzed the trade-offs and synergies between these ES. We integrated regional and scientific knowledge to identify and assess the synergies and trade-offs between agricultural production and regulating, supporting and cultural ES. We analyzed how existing regional governance approaches can reduce trade-offs and enhance synergies between the agricultural related ecosystem services, especially the collaborative approaches.

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