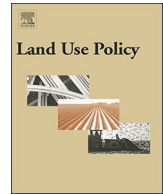




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## Agricultural landscapes, ecosystem services and regional competitiveness—Assessing drivers and mechanisms in nine European case study areas

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### ABSTRACT

Agricultural landscapes affect regional development and competitiveness in a way far beyond the production of agricultural commodities. However, comprehensive assessments of the relevant cause-effects between agricultural landscape and regional competitiveness are complex and they require a range of ecological, economic and social aspects to be considered. This study proposes a stakeholder-based ‘Analytic Network Process’ applied in nine European case-study areas in order to assess the role of economic actors, ecosystem services, socio-economic benefits and regional competitiveness in the agricultural landscape system. The results reveal that agricultural food production is still perceived as a major element for creating value from landscapes. However in some case studies, the importance of non-marketable, socio-cultural and environmental public good-type ecosystem services outweighs the importance of agricultural production. Region-specific variations of cause-effect relationships are discussed and a range of drivers, related to biophysical conditions, land-use patterns, agricultural management and remoteness are identified. Our study reveals the perception of non-monetary services and their impact on regional competitiveness and provides considerations on entry points for rural policies promoting landscape valorisation.

### 1. Introduction

There is consensus that sustainable growth in Europe cannot be achieved without the contribution of its rural regions. These regions

have been coping with substantial challenges over the last decades. Profound changes in the agricultural sector such as changing policies (Jongman, 2002), institutional modifications, technical progress and mechanisation (van Vliet et al., 2015), and the focus on production

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efficiency have all led to a reduction in agricultural employment, a price decrease for agriculture commodities and a general increase in the socio-economic disparities among regions (Pedroli et al., 2016). The transformation of the agricultural sector, together with the comparatively slower development of other sectors of the rural economy, in several regions has led to a reduction in investments, the depletion of rural infrastructures and to outmigration (Wilson, 2010). Against this background, in recent years there has been growing interest in how the competitiveness of European rural regions can be strengthened and to what extent agriculture still contributes to this process. In particular, the concepts of multifunctionality and ecosystem services (ESS) are discussed, indicating that agricultural landscapes do not provide private good-type commodities only, but also a broad range of public good-type services, which constitute important socio-economic assets for the rural economy (Costanza et al., 1997; Huang et al., 2015; Huylenbroeck et al., 2007).

The ESS concept, in particular, has gained much attention and numerous frameworks have refined the classification of services (Haines-Young and Potschin, 2010; LaNotte et al., 2017). Moreover, a large number of studies has investigated social and economic effects related to the supply of private and public good-type ESS in agricultural landscapes. The main effects which have been identified are enhanced recreational opportunities (Sharpley and Vass, 2006; Rodríguez-Entrena et al., 2017), the creation of niche-market opportunities for local and quality products (Tempesta et al., 2010), enhanced quality of life and the viability of rural crafts and traditional skills (Sharpley and Vass, 2006). Furthermore, upstream and downstream effects have been reported in branches connected to agricultural production, eventually opening up opportunities for added value creation and rural employment (Dissart and Vollet, 2011). The aforementioned studies acknowledge that, depending on the regional context and the given territorial potentials, agricultural landscapes affect regional development in a way far beyond the production of agricultural commodities. However, it is also acknowledged that the complexity of the cause-effect chains, and the multitude of direct and indirect, multi-staged and multi-faceted effects, as well as the variety of feedbacks and loops characterising the pathways between agricultural landscape and local economy, are a substantial challenge for a comprehensive assessment. This is particularly true if benefits stemming from the use of public good-type ESS are included (Dissart and Vollet, 2011; Manrique et al., 2015).

In this paper, drivers and mechanisms linking agricultural landscape, ESS provision and the local economy are assessed, by means of the multi-criteria technique ‘Analytic Network Process’ (ANP). The focus is on different sectors of the rural economy, their impact on the provision of landscape services, the most important socio-economic benefits resulting from the use of these services, and the factors of regional competitiveness affected by such benefits. Based on the framework proposed by van Zanten et al. (2014), an analytic network has been developed, involving an intensive multi-step stakeholder co-construction and validation process. Data from 9 European rural case study areas (CSAs) have been collected and analysed. The paper presents supra-regional and region-specific results, which are interpreted and validated against the background of CSA specificities. The findings are discussed, and conclusions are drawn with the aim of outlining opportunities for environmental and agricultural policy design.

## 2. Materials and method

### 2.1. Analysing ESS from agricultural landscapes with the ANP

The most common approaches for assessing the impact of landscape services on the generation of socio-economic benefits and regional competitiveness include environmental economic valuation (Hein et al., 2006; Turner et al., 2003; Vandermeulen et al., 2011), dynamic input-output modelling, including multiplier effect analysis (Dissart and

Vollet, 2011; Heringa et al., 2013), spatial econometrics combined with regional growth models (Ferguson et al., 2007; Kim and Johnson, 2002), or regression analysis (Partridge et al., 2008; Zasada and Piore, 2015). In addition, multi-criteria analysis (MCA) approaches are considered appropriate for analysing ESS provision in rural landscapes (Parks and Gowdy, 2013). The main advantages of MCA approaches are their potential to overcome the limits of economic valuation of non-tangible goods and benefits (Parks and Gowdy, 2013; Spangenberg and Settele, 2010) and their capacity to assess multiple dimensions and complex pathways within a specific system (Finn et al., 2009; Gasparatos and Scolobig, 2012). The ANP is a MCA technique specifically designed to cope with systems characterised by loop effects and the presence of feedbacks and trade-offs between a system’s constituent parts (Saaty, 2005). Taking advantage of these features, the ANP has been used for a wide range of assessments in environmental and landscape evaluation. There are, for example, studies on solid waste management (Aragónés-Beltrán et al., 2010), sustainable tourism (García-Melón et al., 2010), sustainable urban development (Gómez-Navarro et al., 2009), farmland appraisals (García-Melón et al., 2008), soil erosion risks (Nekhlay et al., 2009), landslide hazard (Neaupane and Piantanakulchai, 2006), alternative fuels (Erdoğan et al., 2006), landowners’ adaptation to socio-environmental changes (Eakin et al., 2011), and sustainable forest management (Wolfslehner et al., 2005). ANP studies specifically focusing on the provision of public goods and ESS by farming systems are found in Villanueva et al. (2014), Parra-López et al. (2008) and Carmona-Torres et al. (2016). The methodological advantages of the ANP, to integrate comprehensively a broad set of factors and as a tool able to provide a comparative analysis of the impacts of different economic sectors on landscape services, have been recently discussed by Zasada et al. (2017) and Villanueva et al. (2015) respectively, representing direct precedents for the study at hand.

### 2.2. Using the ANP for the assessment of pathways between agricultural landscape, ecosystem services and regional competitiveness

The ANP consists of several methodological steps, namely (1) network design, including the identification of the observed system’s main elements and relationships; (2) comparative assessment of the relative importance of the elements by means of expert judgments; (3) calculation of so-called ‘priority vectors’, summarising the elements’ overall importance in the system; and (4) validation of the results through an expert-panel evaluation (Saaty, 2013).<sup>1</sup>

#### 2.2.1. Design of the ANP network

The ANP network builds upon the framework developed by van Zanten et al. (2014). This framework suggests that the provision of goods and services in a landscape is affected not only by ‘landscape providers’ (e.g. agriculture or forestry), but also by a variety of other actors demanding ESS from landscapes to derive personal and societal benefits. On this theoretical basis, multi-staged cause-effects between agricultural landscapes and the competitiveness of rural regions are addressed. The elements and pathways of van Zanten et al.’s (2014) framework were synthesised in the ANP network by involving a participative co-construction process based on local stakeholder workshops. The workshops were held in nine CSAs between November 2012 and March 2013. The evaluation of the relationships between the single ANP elements was centred on the potential of landscapes to create benefits and value for society, which was paraphrased as ‘Landscape valorisation’.<sup>2</sup> (Fig. 1).

The final network consists of 16 elements, which were identified in

<sup>1</sup> A more detailed description of the ANP methodology is provided in Appendix A.

<sup>2</sup> The term ‘landscape valorisation’, defined as the potential of landscapes to create benefits and values for society, was used as the control criterion (in ANP jargon) of the assessment. Landscape valorisation should not be confused with the ‘valuation’ of ESS.

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