Land Use Policy 57 (2016) 759–763

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Agriculture and landscape interaction—landowners' decision-making and drivers of land use change in rural Europe

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ARTICLE INFO

Article history:
Received 28 January 2014
Received in revised form 21 April 2016
Accepted 24 May 2016

Keywords:
Landscape
Europe
Agriculture
Research

ABSTRACT

Agricultural land use has a large impact on landscape diversity and the types and quality of the services landscapes provide to society. This editorial introduces four papers in a themed section of *Land Use Policy* which examines different themes related to agriculture and landscape interaction. The papers present new findings from research undertaken within the scope of the VOLANTE research project (Kristensen et al., 2013). The main objective of the research was to increase our knowledge about landowners' decision-making processes and drivers of land use change in rural Europe.

1. Introduction

European landscapes provide important services to the citizens of Europe, ranging from primary production (food, feed and fiber) to ecosystem and socio-economic services (Brandt and Vejre, 2003; Vejre et al., 2007; Verburg et al., 2012; Potschin and Haines-Young, 2013; Wu, 2013). Agricultural land use has a large impact on landscape diversity and thereby the types and quality of the services they provide. Several trends characterise the development of European landscapes in recent decades, as highlighted by the State of the European Environment report in 2010. On a European scale, the most significant land cover changes between 2000 and 2006 were a modest increase in artificial area (urban areas and infrastructure) by 3.4%, and a much smaller increase in forest area (0.1%). Arable land and permanent crops decreased by 0.2% and pastures and mosaics (landscapes dominated by mixed small-scale land-use patterns) by 0.3%. Land with semi-natural vegetation, non-utilized land and wetlands also decreased in area (EEA, 2010).

The main pattern, as observed by Rienks (2008), can be described as a polarisation between areas and regions with either marginal or intensive agricultural production. In brief, areas where agriculture is declining and which experience field abandonment and bush encroachment are often found in Southern Europe while areas with intensive agricultural production are found in Northern Europe (Rienks, 2008). A mix of these dynamics characterizes many of the post-socialist East European countries. These macro-level changes are the result of local and regional development trends, which are caused by the interaction of multi-level drivers and factors. They may result in relative stability in some areas and hot-spots of land use change in other areas (Fresco and Kroonenberg, 1992; Burgi et al., 2004; Van Eetvelde and Antrop, 2004; Bender et al., 2005; Swetnam, 2007; Ruiz and Domon, 2009; Rounsevell et al., 2012).

EU policies and legislation constitute an important macro-level driver, due to the importance of the CAP policy for agricultural land use and increasingly also for nature management (in conjunction with EU environmental directives, such as the Habitats Directive, Water Framework Directive and Nitrates Directive). In addition, economy and market, transport and infrastructure, as well as technology and land improvement are important macro-level drivers of land use change (Kristensen et al., 2009). At the local level, the individual landowner plays a crucial role in the process of landscape management and transformation. Through land use changes on farms and rural properties, European landowners are instrumental in securing sustainable land use—or the opposite. Landowners act on the basis of the range of exogenous macro-level factors mentioned above in combination with a number of local factors. These are often categorised as endogenous farmer factors (e.g. education, succession status and age) and farm factors (e.g. farm size, farm type, tenure, and level of dependency on farm income) (Mills et al., 2013).

In the last two decades, national environmental policies and EU agricultural policy have funded many agri-environmental schemes and programmes to motivate farmers to undertake land use changes, which improve environmental conditions, e.g. through an extensification of land use (European Commission, 2013). It is therefore crucial, not least from a policy perspective, to study

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http://dx.doi.org/10.1016/j.landusepol.2016.05.025
0264-8377/

landowners' land use strategies and practice, to better understand the drivers of land use change.

The papers in this themed issue present the results of case studies, which investigated land use changes in Europe and possible drivers of change. The case studies were undertaken within the framework of the "Visions of Land Use Transitions in Europe" (VOLANTE) project. The VOLANTE project was financed by the European Commission under the Environment theme of the 7th Framework Programme (FP7).

The aim of VOLANTE is to provide a scientific basis to inform land use and natural resource management policies and decision-making and to use new insights in land system science to develop a "Roadmap for future land resource management in Europe" (Rounsevell et al., 2012). The Roadmap is the outcome of modelling and trade-off analysis of different scenarios and incorporates the views of a broad set of stakeholders to inform land use planning and natural resource management policies and decision-making. The project consists of three integrated modules, which study land use changes, causes and consequences at different spatial and temporal scales. Module **PROCESSES** identifies land use change and associated causative processes. Problem orientation is the basis for the Module **ASSESSMENT** which narrows down the infinite spectrum of policy decisions possible. Module **VISIONS** establishes interaction with decision makers at regional and European level, to produce a final Roadmap.

The work package "Decision-making at the local level: understanding land transformation processes" (WP1) under the Module Processes studied the patterns of decision making at the local landscape level through a mixed methods approach which incorporated quantitative and qualitative methods. The main inspiration was found in the actor-network school of thought (Law and Hassard, 1999; Law and Callon, 1989), which has been a conceptual foundation for studies of the interaction between different types of actors in rural settings (individuals, private companies and institutions) and their environment. It has given rise to such concepts as "farming styles" in rural sociology and stresses the role of individual strategies and plans for farm development as a result of local endogenous factors rather than a passive response to exogenous factors (Long and Ploeg, 1994a,b; Whatmore, 1994; Robinson, 2004).

WP1 studied the significance and interaction between exogenous and endogenous factors which influence landowner decision-making with a specific focus on intensification or extensification of land use. A common understanding of factors and processes has structured the different studies undertaken by the partners in WP1 and all studies took their point of departure in the conceptual framework outlined in Fig. 1.

Several studies have highlighted the importance of distinguishing between the farmer's role as property owner and as a producer of agricultural products (Primdahl, 1999; Primdahl and Kristensen, 2011). There is much evidence indicating that 'property management' or property related issues play a vital role in the farmer's landscape practice and may explain why landowners undertake land use changes that are not production related or even profitable, because they are based on value sets that are related to family and individual strategies (Primdahl et al., 2006; Farmar-Bowers and Lane, 2009; Sutherland et al., 2012). Furthermore, when the land is leased and the producer and the owner are two different persons it is often the owner who is legally responsible for landscape activities, because of the long-term perspective of such changes (Walford, 2002). This makes the farmer as owner perspective particularly relevant for the study of landscape activities, and we therefore, focused on the farmer as an owner and thus used the term 'landowner 'in the research.

The research on different patterns of adoption and implementation of CAP agri-environmental measures at national level was

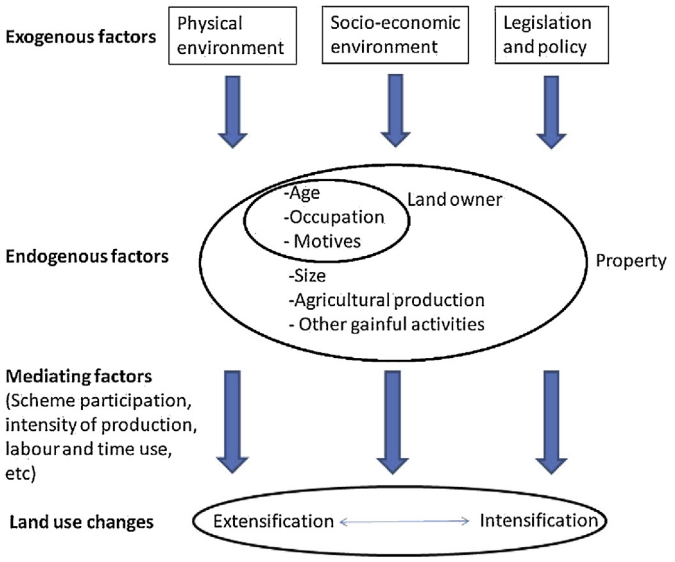

Fig. 1. Overview of factors and processes studied by WP1 in the framework of the VOLANTE project.

based on a literature review and expert interviews while a questionnaire survey with 437 landowners in six purposively selected case study areas constituted the empirical basis for the remainder of the analysis. The survey themes investigated different dimensions of the relationship between land use changes between 2002 and 2012, drivers of change and landowners' decision-making processes. This information was supplemented by qualitative interviews with representative landowners in the study areas. The study areas represented *peri*-urban landscapes (Roskilde Municipality, Denmark), mixed *peri*-urban/traditional rural landscapes (Heerde municipality, the Netherlands), marginal agricultural landscapes (Reichraming municipality, Austria; SE part of Lesvos, Greece; Portofino Regional Park, Italy) and post-socialist landscapes (Stăncuţa and Răteşti municipalities, SE Romania). Common to all areas is that the traditional role of agriculture is under pressure, although for different reasons. In addition, the case studies represented North-South and East-West transects to reflect the diversity in rural contexts in different regions of Europe.

More details about the different landscapes and the types of land use dynamics they represent in a European perspective can be found in Kristensen et al. (2013).

The four papers included in this themed issue each deal with specific aspects of the interaction of exogenous and endogenous factors. They contribute with insights on the processes and patterns of key factors which influence landowners' decision-making strategies across a range of European landscapes.

2. Diversity in national adoption and implementation of CAP Agri-environmental policy

Agri-environmental policy (AEP) has a long history in the EU Common Agricultural Policy, with the first voluntary measures dating back to the 1980s. Over time, AEP measures have become increasingly significant in terms of financial resources and instruments and today constitute the largest expenditure under the EU Rural Development programme. The current model of implementation was originally based on the subsidiarity principle with a large degree of flexibility for member states in terms of organisational set-up, selected measures and mode of implementation. At present, other policy areas are increasingly being implemented through the AEP (eg. the EU Habitat and Water Framework Directives), which have quite strict conditions concerning implementation models