



Review article

Manifestations and underlying drivers of agricultural land use change in Europe



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HIGHLIGHTS

- We synthesized case study evidence for agricultural land use change in Europe.
- Agricultural change was manifested as intensification and disintensification.
- Major land use change trajectories relate to globalization, societal change and post-socialism.
- Land manager characteristics are important moderators of agricultural land use changes.

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ABSTRACT

Agricultural land use in Europe has changed considerably in the last decades. However, our understanding of agricultural land use changes, especially changes in land use intensity, is limited because the evidence is fragmented. This paper presents a systematic review of case study evidence on manifestations and underlying drivers for agricultural land use change in Europe. We analyzed 137 studies that together report on 76 cases of intensification and 143 cases of disintensification. Observed changes were manifested as expansion or contraction of agricultural land as well as in changes of land management intensity, landscape elements, agricultural land use activity, and specialization/diversification. Economic, technological, institutional and location factors were frequently identified as underlying drivers, while demographic drivers and sociocultural drivers were mentioned less often. In addition, we found that farmers were very important as moderators between underlying drivers and manifestations of agricultural land use change. Farmer decisions differed between different farmer types, and according to their characteristics and attitudes. We found major land use change trajectories in relation to globalization of agricultural markets, the transition from a rural to an urban society, and the shift to post-socialism in central and eastern Europe.

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¹ Our colleague Piet Rietveld passed away on November 1, 2013.

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1. Introduction

In spite of rapidly urbanizing societies, a large part of the European land is used for agricultural activities. This agricultural land is constantly changing, following different development trajectories: some mountain areas have faced land abandonment (MacDonald et al., 2000), peri-urban areas are affected by changing societal demands (Zasada, 2011), and yields have increased considerably due to technological developments (Olesen et al., 2011). These agricultural land changes have important consequences as agricultural areas provide a wide range of goods and services, including the provision of food, feed, and fiber, but also biodiversity preservation (Young et al., 2007), climate change mitigation (Freibauer, Rounsevell, Smith, & Verhagen, 2004), and landscape esthetics (Van Zanten et al., 2014). Policy measures and regulations at the European level directly influence agricultural land use and its impacts. Consequently, understanding agricultural land use change processes and their drivers is important to anticipate future development trajectories and assess the influence of land related policies.

Land use change and its causes are typically investigated in local case studies. Biophysical as well as socioeconomic conditions differ considerably from one location to another. Therefore case study findings cannot be generalized easily. In order to aggregate case study findings, meta studies have been presented that synthesize land change case study evidence (Magliocca et al., 2014). Examples include studies on the drivers of desertification (Geist & Lambin, 2004), agricultural intensification in the tropics (Keys & McConnell, 2005), wetland conversion (Van Asselen, Verburg, Vermaat, & Janse, 2013) and changes in shifting cultivation in tropical forests (Van Vliet et al., 2012).

Land use change meta-studies distinguish between proximate causes of land use change, and underlying driving forces, where proximate causes are the human activities or immediate actions that take place at a location, while underlying driving forces denote the fundamental societal processes that drive these proximate causes (Geist & Lambin, 2002). However, changes in agricultural land are themselves typically identified as proximate causes, for example as cultivation of new fields can cause wetland conversion (Van Asselen et al., 2013) or deforestation in tropical forests (Geist & Lambin, 2002). Therefore, the conceptualization of proximate causes and underlying drivers requires adjustment for studying agricultural land use changes. Instead of addressing proximate causes, agricultural land use change can be characterized by the manifestations of these changes. Moreover, many meta-studies synthesize the relationship between underlying drivers and proximate causes of land changes, but in doing this they ignore the diversity in actors and their decisions (Hersperger, Gennaio, Verburg, & Bürgi, 2010). Case studies often provide information on actors and actor characteristics, and meta-studies should address this explicitly to assess their influence.

This paper presents a systematic review of the manifestations and underlying drivers of agricultural land change in Europe. For this purpose we systematically searched for case studies that report on agricultural land use change on a sub-national scale. We distinguished two major types of change: intensification and disintensification of agricultural land use. Intensification includes

both changes toward more intensive land management and expansion of agricultural land in a region, while disintensification represents both changes to reduce the intensity of land management and contraction of agricultural land, including abandonment. Based on this case study evidence, we categorize manifestations of agricultural land use change and their underlying drivers, and identify major land change trajectories based on typical combinations of manifestations and related underlying drivers.

2. Materials and methods

2.1. Case study evidence

This systematic review of drivers for agricultural land change is based on cases that have been reported in peer-reviewed publications in English. A systematic search in Web of Science (Topic = (agricultural + intensification) OR Topic = (land + abandonment) OR Topic = (land + use + change + agricultur*); Timespan = 1945–2013; Search language = English) yielded 3201 potentially relevant publications. From these potential publications, 52 were selected for inclusion in this study after screening the title and abstract first, and subsequently reading the full paper. We included all publications that reported on observed agricultural land use change in Europe, on a sub-national level, starting after 1945. Accordingly, publications that describe the state of agricultural land at one particular moment in time were excluded. Subsequently, we applied a snowball search procedure in which publications referenced from and referencing to eligible studies were considered iteratively. This snowball search yielded an additional 85 publications, resulting in a total of 137 publications. We did not consider gray literature such as conference proceedings, because these documents typically refer to work in progress, while finished work is generally published in peer reviewed journals or book chapters in geography. Designing and conducting a systematic review benefits greatly from the application of well-defined guidelines, in order to increase its credibility and reproducibility (CEE, 2013). This study was designed and reported according to the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009), which is provided in the Supplementary material S1. The complete list of cases is included in the Supplementary material (S2).

From the selected studies we identified 218 cases of agricultural land change. A case is a unique combination of an agricultural change type, a location that was analyzed separately, and a publication. The agricultural land use change types that were identified for this review are intensification and disintensification. Both types of change were taken broadly, hence intensification includes all changes that increase the agricultural land use intensity on the scale of the case study region, ranging from hedgerow removal to expansion of the total area of agricultural land, and disintensification represents the opposite, including conversion to organic farming to complete abandonment of agricultural areas. When a publication describes and analyzes changes in different case study areas separately, these were considered as separate cases in this review. When more than one paper describes the same case study areas, these are treated as separate cases and coded accordingly if both papers apply different methodologies or include different datasets.

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