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# Virtual farmland: Grasping the occupation of agricultural land by non-agricultural land uses

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ABSTRACT

Planners and decision-makers entitled for rural land use planning seem to be challenged by the growing multidimensional nature of rural areas. The emergence of non-agricultural land uses in land allocated for agriculture is an important aspect of this multidimensional nature of rural areas. The overall goal of this study is to map and better understand unplanned land uses taking place within the agricultural territory allocated by spatial policy in Flanders (northern region of Belgium). We used a two-staged methodology. First, by a GIS analysis on official datasets, parcels allocated as farmland but without a registered agricultural use, were identified as being part of an information gap. The results indicate that 15% of the statutory agricultural area is not factually used for agriculture. Next, using orthophotographs and Google Streetview images, we identified for six representative municipalities the actual land uses taking place parcels with an inconsistently determined land use. The fraction of 15% was then further differentiated into apparent farmland (33%), domestic gardens (36.3%) and nonagricultural economic activities (5.5%). Based on the in-depth survey, it can be estimated that over 10% of the statutory farmland in Flanders is not farmland in reality. Based on these results, the paper introduces the concept 'virtual farmland' as statutory agricultural land with non-agricultural land uses.

This concept is applicable elsewhere and can be a powerful concept to theorize and make progress in monitoring the so far little known occupation of statutory agricultural land by unplanned nonagricultural land uses. Especially in regions with a strong competition for land, the quantification of virtual farmland provides a scientific basis to weigh and to integrate different spatial claims.



## Introduction

### *A changing countryside*

For centuries agriculture formed the basis of rural economy (Slee, 2005), shaped the rural cultural landscapes (Antrop, 2005), and had a pervasive influence in the organization of rural society and culture (Woods, 2005). However, in rural areas with high degrees of urbanization this agricultural dominance has changed dramatically over the last decades. These areas are characterized by an influx of people and capital. Urban people move to the country for example in search of a 'rural' lifestyle, for retirement, as commuters, or as IT-based home workers (Primdahl et al., 2013). As a consequence, rural areas are now harbouring a wide range of stakeholders, each with their specific expectations and claims concerning the availability and usage of space (Kerselaers et al., 2013; Slee, 2005; Zasada et al., 2013).

At the same time, high degrees of urbanization appears in places characterized by a high agricultural suitability in the majority of European regions (64%) (Primdahl et al., 2013). As a result, agricultural land has become a scarce and costly good in more and more regions (Busck et al., 2006; Malucelli et al., 2014; Primdahl et al., 2013; Zasada et al., 2013). Also Flanders, the northern region of Belgium, is characterized by a small-scaled, densely populated and multifunctional rural landscape (Bomans et al., 2011; Dewaelheyns et al., 2014; Verhoeve et al., 2012).

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*Planning and management of rural land use*

Spatial and rural policies play their role in controlling urban growth and land use changes and in the direct protection of open space and farmland (Busck et al., 2008; Duke and Aull-Hyde, 2002; Kerselaers et al., 2013; Koomen et al., 2008). The division of the territory in different functional zones is a frequently used approach within spatial planning practice (Duke and Aull-Hyde, 2002; Farinós Dasi, 2007; Kerselaers, 2012; Ruotsalainen et al., 2004; Tan et al., 2009; Witt, 2002). Also in Flanders, land use rights for specific types of land uses are clearly defined and related to sectoral land use categories within such allocation plans (Laga et al., 2005; Van den Broeck et al., 2010; Gulinck et al., 2013). For the rural territory these are functions like nature conservation, forestry and agriculture (Kerselaers et al., 2011). So, in Flanders spatial allocation plans create the legal framework for sectoral policy.

Within this legal framework, the specific management of the land is organized by different sectoral policies (nature, forest, agriculture). Also data on the land use and management are collected by the different sectoral policies. For example, the agricultural policy domain gathers information about agricultural land use. So, territorial management is institutionalized within different sectoral policy domains.

Yet, rural policy making needs a new focus on places rather than sectors in order to include diversity in rural regions (OECD, 2006). The sectoral zoning approach of spatial planning as well as the sectoral institutionalization of territorial management are being criticized for their failure to appreciate complex dynamics of regional development. Among other authors, Graham and Healey (1999) re-launch the calls to replace the modernist legacy of single, unbiased representations of space trough zoning plans. More face-to-face interactions and open-ended processes are thought to be more appropriate. As such, a need is expressed for a more collaborative planning which engages the full array of stakeholders (Healey, 2007, 1998, 1997).

Also a growing critique on sectoral land use management can be noticed in planning practice (Gulinck et al., 2013). An important aspect of this critique is related to the emergence of non-agricultural land uses within areas allocated for agricultural land use. These unplanned land uses question the validity and efficiency of current spatial planning practices.

In literature, such land uses deviating from spatial planning policy are often indicated as spontaneous, autonomous (Antrop, 1998) or unplanned processes (Anstey, 2009; Kuffer and Barrosb, 2011). They appear wherever local people take autonomous decisions to develop private activities, like private gardens, recreational and economic activities on their own property (Bomans et al., 2010b; Busck et al., 2008; Dewaelheyns et al., 2014; Præstholm and Kristensen, 2007; Verhoeve et al., 2012). Although spatial policy allocates land for agricultural use within a restricting framework towards other activities, local people do introduce other non-agricultural activities and land-uses in agricultural land Even if they appear solely at the scale of a single parcel (Primdahl and Swaffield, 2010; Verhoeve et al., 2012), these unplanned and autonomous actions do shape places. We further call these land uses, not related to professional farming, unplanned land uses.

As Van Eupen et al. (2012) state, rural areas should be defined with regard to their specific multidimensional nature and character. Unplanned uses in agricultural land should be recognized as an important aspect of this multidimensional nature. Therefore, systematic insights into their presence is vital for a sound understanding of the complexity of rural development.

*Data challenges on unplanned land uses*

Knowledge on unplanned non-agricultural land uses within rural areas is limited. First, due to the sectoral institutionalization of territorial management, data collection is often organized in a cultural mindset of monofunctional sectors of society and economy. This sectoral organization hampers the identification and representation of other uses not related to the specific sector. So, multifunctional uses as well as unplanned non-agricultural uses systematically stay unnoticed within this sectoral data collection (Gulinck et al., 2013).

Other reasons can be found in the characteristics of the unplanned land uses. They often occur at a parcel level and may be morphologically similar to regular agricultural practices. Remote sensing and orthophotograph analyses is not always capable to grasp the differences between professional agriculture and other uses. One example is the incapability of orthophotographs to indicate if an open air storage belongs to professional farming practices or to a building contractor. In such cases, only terrain observation of human-made objects like signposts can give clear additional information on the type of user (Hersperger et al., 2012).

Furthermore, some limitations of land cover approaches are related to time aspects. Several unplanned land uses in agricultural land are relatively new and fast occurring, whereas monitoring methods are characterized by a larger time frame. For example, orthophotographs are not taken daily. Also data processing and analysis requires time, adding up to the time difference between the appearance of an unplanned phenomena and its detection. For example, non-agricultural economic re-use of rural buildings often starts within the buildings. Since a long period passes before this changes become conspicuous enough to be measurable by land cover approaches, these activities already have an important spatial impact (Verhoeve et al., 2012).

Finally, these unplanned developments often take place at the very edge or beyond the limits of legal frameworks. Since unplanned uses are not conform the legally allocated land-use or functioning, they are often outside the limits of sectoral census data registration. Therefore land uses and functions other than the standard rural sectors, like non-agricultural economic activities are often kept hidden from official registrations.

Examples of recent studies that sought to overcome the above discussed limitations are found in Australia (Anstey, 2009), the Netherlands (Daalhuizen et al., 2003; Van der Vaart, 2005) and Denmark (Busck et al., 2008). These explorative studies collected empirical data on a small (time-place) scale. In Flanders, efforts were made to describe phenomena such as garden sprawl (Dewaelheyns et al., 2014), the occupation of rural buildings by non-agricultural economic activities (Verhoeve et al., 2012) and the occupation of pasture for keeping hobbyhorses (Bomans et al., 2011).

However, the impact of these unplanned land use changes on the functioning of professional agriculture is still unclear. The question remains to what extent non-agricultural land uses, like domestic gardens and non-agricultural economic activities (abbreviated to NAEA) (Dewaelheyns et al., 2014; Verhoeve et al., 2012), affect the actual availability of agricultural land within zones allocated for agricultural use. Farmers interpret these non-agricultural activities as a source of growing pressure on the availability of agricultural land (Wauters et al., in press.) and rising land prices (Kerselaers et al., 2013; Primdahl et al., 2013).

As their presence contributes to a multiplex rural reality, land use regulators that keep a mindset of a uniplex world are challenged (Graham and Healey, 1999).