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Changes of the land use patterns in Polish and Lithuanian trans-border rural area

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Abstract The objective of this study was to analyse changes in the land use patterns of agricultural land and forests in Polish and Lithuanian trans-border rural areas. A studied territorial complex comprises two Polish voivodships (Warmia and Mazury, Podlasie) and two Lithuanian counties (Marijampolė and Alytus). The principal research sites were Polish counties (Polish: *powiat*, the second-level unit of local government and administration in Poland) and Lithuanian municipalities (Lithuanian: *savivaldybė*, the second-level unit of local government and administration in Lithuania), which represent corresponding territorial units in the respective national administrative structures. The analysed dataset covers the period of 2005–2010 and supports the identification of changes in the land use structure of farmland and forests which have taken place since the introduction of political and economic transformations in Poland and Lithuania. The dynamics and direction of changes were compared against different historical and economic backgrounds to assess the prevailing trends in land use profiles in both countries.

Keywords • Agricultural land • Forest cover • Land use patterns • Rural areas • Poland • Lithuania

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INTRODUCTION

Intense social and economic transformations in Poland and Lithuania have changed the structure of land use. The share of developed and urbanised areas continues to increase, mainly at the expense of agricultural land. The area of land allocated to housing, recreational, transport, industrial and service projects has increased visibly in recent years. This paper analyses changes in the land use patterns of agricultural land and forests in Polish and Lithuanian trans-border rural areas. Two voivodships in north-eastern Poland (Warmia and Mazury, Podlasie) and two counties in south-western Lithuania (Marijampolė and Alytus) were investigated. The dynamics of land-use changes in farmland and

forests in the investigated sites were evaluated in view of their geographic similarities as well as differences in conditions that determine their development.

Various global, regional, national and local processes contribute to changes in land use. Land use is the manner in which the Earth's biophysical attributes are used, it defines the purpose of activities that transform the Earth's surface, and the relevant management practices (Lambin *et al.* 2001; Turner *et al.* 1995; Verburg *et al.* 2004; Verburg *et al.* 2009). Land use types are determined by many processes which influence land use structure on different levels. At each level, land use patterns are conditioned by various factors (Veldkamp, Fresco 1996; Verburg *et al.* 1997). The main drivers of change in land use are natural and anthropogenic

factors or, in a different approach, endogenous and exogenous factors. Human activities are transforming the Earth's surface at unprecedented rates (Dec *et al.* 2009; Urban 2009).

The factors that contribute to changes in land use patterns are determined by the scale of conducted observations, and they are a consequence of various transformation processes. The following key drivers of land use change have been identified in literature (Bouma *et al.* 1998; Ewert *et al.* 2005; Kuemmerle *et al.* 2006; Lambin *et al.* 2001; van Meijl *et al.* 2006; Perner, Malt 2003; Rounsevell *et al.* 2006; Senetra, Szczepańska 2012; Shi *et al.* 2010; Tóth 2012; Veldkamp, Fresco 1996; Veldkamp, Lambin 2001; Veldkamp, Verburg 2004; Verburg *et al.* 1997; Verburg *et al.* 2006; Verburg *et al.* 2012):

- social (demographic factors – population density, population growth, education, migration, ownership structure),
- economic (level of economic development, development of transport, changes in settlement patterns, changes in consumer needs and lifestyle resulting from higher levels of social wealth, market globalisation, technological progress, EU membership),
- political (political transformations, leadership, policies and planning systems, environmental policy, agricultural policy, economic policy),
- environmental (natural forest succession, changes in agriculture, climate change, higher CO₂ emissions, natural resources, biophysical land conditions, including soil characteristics, climate, topography and vegetation),

- cultural (innovation, creativity, attachment to traditional farming practices).

Agriculture (crop production and grasslands) and forestry are the predominant types of land use in Europe. The key trends in European land use patterns include a decrease in agricultural areas, an increase in forest cover and the expansion of highly urbanised areas (EU-LUPA 2013; Reidsma *et al.* 2006; Rounsevell *et al.* 2006). Land use and cover change have been identified as one of the prime determinants of global change with major impacts on ecosystems, global biogeochemistry, climate change and human vulnerability (Verburg *et al.* 2009).

Similar trends in land use patterns are observed in Poland and Lithuania as a result of economic, social and political transformation initiated in 1989. The main changes in Polish land use structure include (Ciołkosz, Poławski 2006; Łowicki 2008; Matyka 2012; Poławski 2009; Potocki 2000; Raport o stanie lasów w Polsce 2011; Szwagrzyk 2004; Urban 2009) urban development and expansion, reduced area of agricultural land and rotation schemes – decrease in the area of arable land, increase in the area of orchards, meadows and pastures, higher forest cover (Fig. 1).

The following changes in land use patterns have been observed in Lithuania (Balevičiūtė, Veteikis 2012; Hjortsø, Straede 2001; Ribokas, Milius 2007; Ribokas, Zlatkutė 2009; Veteikis *et al.* 2011): urban development and expansion (allocation of land to housing and recreation), spontaneous afforestation, deforestation, abandonment of unproductive land, decrease in crop acreage.

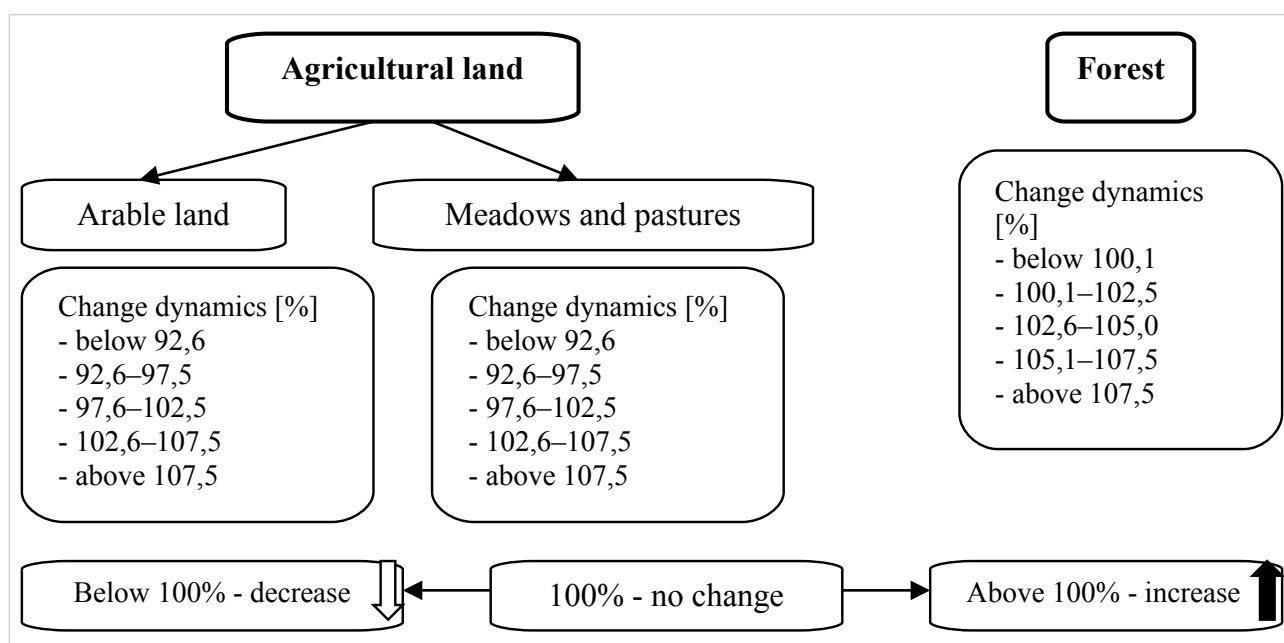


Fig. 1 Method used to evaluate changes in land use. Compiled by A. Szczepańska, 2013.

MATERIAL AND METHODS

Changes in the land use patterns of agricultural land and forests were analysed based on data supplied by the Polish Central Statistical Office, Head Office of Geodesy and Cartography and Statistics Lithuania. The information obtained from statistical authorities was used to develop a database for spatial analysis. Analyses and presentations were developed with the use of ArcGIS 10 software (ESRI) which offers a comprehensive set of tools for analysing, visualising and managing spatial data.

Changes in the land use patterns of agricultural land and forests in the investigated sites were analysed in the period of 2005 to 2010. A total of 33 rural counties (excluding towns with county rights) and nine rural municipalities (excluding municipalities with city rights) were examined. Changes in the types of agricultural land use were analysed across different categories of agricultural land, including arable land, meadows and pastures, whereas changes in forest land use were determined across different forest cover classes (measured by the percentage share of forests in the total area of the analysed counties and municipalities). The above land-use categories have been defined by Eurostat (Eurostat's Concepts and Definitions Database, 2013) and the World Bank (The World Bank Indicator, 2013) as:

- agricultural land - refers to the share of land area that is arable, under permanent crops, and under permanent meadows and pastures,
- arable land - is land worked regularly, generally under a system of crop rotation, which includes fallow land, this refers to all land generally under rotation whether for temporary crops or meadows, or left fallow,
- land under permanent meadows and pastures - this means land used permanently (i.e. for five years and more) for herbaceous forage crops,
- forest - land with tree crown cover (or equivalent stocking level) of more than 10% and area of more than 0.5 ha.

The remaining types of agricultural land had a negligible share of the evaluated areas, and they were not investigated. The results were presented in the form of cartograms illustrating the percentage share of agricultural land in the analysed counties and municipalities and their forest cover. To facilitate the analytical process, land use changes expressed in percentage terms were grouped into intervals.

The dynamics of land use changes in forests, total agricultural land and agricultural land divided into arable land, meadows and pastures were presented in separate cartograms. Change dynamics were referenced to the level of 100% (no change). Five classes with 5% intervals were introduced in cartograms depicting agricultural land, arable land, meadows and pastures. Values above 100% represented an increase

in area, whereas values below 100% were indicative of a decrease in area. Additional graphic symbols were introduced to illustrate the direction of the observed trends. Changes in forest cover were less dynamic, and cartograms depicting this phenomenon contain classes with 2.5% intervals. Five interval classes and additional graphic symbols were introduced to depict the direction of the noted trends. The intervals illustrate the rate of changes in the analysed phenomena.

OUTLINE OF THE STUDIED AREA

The study investigated a dense territorial complex comprising two Polish voivodships (Warmia and Mazury, Podlasie) and two Lithuanian counties (Marijampolė and Alytus) (Fig. 2). The Warmia and Mazury voivodship consists of 21 counties (including two towns with municipal rights), and the Podlasie voivodship comprises 17 counties



Fig. 2 Geographic location of analyzed sites in the context of the EU Baltic rim countries. Compiled by A. Szczepańska, 2013.

(including three towns with municipal rights); Polish: *powiat*, the second-level unit of local government and administration in Poland. The Lithuanian territory comprises the Alytus County with five municipalities (including the Alytus city with municipal rights) and the Marijampolė County with five municipalities; Lithuanian: *savivaldybė*, the second-level unit of local government and administration in Lithuania (Fig. 3). The principal research sites were Polish counties and Lithuanian municipalities which are corresponding territorial units in the administrative structure of the analysed countries.

The main drivers of the changes in land use structure that have taken place since Poland's declaration of independence in 1989 include political, economic and social factors as well as the progress of human civilisation. The observed changes were also conditioned by Poland's membership in the European Union and the adoption of the Common Agricultural Policy. Rural transformations were largely induced by changes in land ownership structure and demographic factors.

Villages, arable fields, meadows, pastures and forests are the predominant features of the Polish



Fig. 3 Analyzed sites in the Polish and Lithuanian trans-border area. Compiled by A. Senetra, 2013.

landscape. The political transformations led to the closure of State-owned farms, and they engulfed agricultural regions in a deep crisis. Vast parts of arable land were neglected, which led to plant succession, mostly the uncontrolled expansion of trees and shrubs. Patchwork fields, namely small, adjacent areas of arable land planted with various crops, are a characteristic feature of the rural landscape. The quality of Polish soils remains among the lowest in Europe (Skłodowski, Bielska 2009). The average productive capacity of one hectare of Polish land is equivalent to that of 0.6 ha in Europe. Soils with the highest productive capacity account for less than 1% of the national territory. Forests occupy more than 29% of the country (Report on the condition of Polish forests, 2011).

The Warmia and Mazury voivodship has an area of 24 173 km², it is inhabited by around 4% of the Polish

population, and its population density is 59 persons per km² (the Polish average is 122 persons). Warmia and Mazury is characterised by highly attractive scenery due to its landform diversity, a high share of forests and water reservoirs which occupy 6% of the region's area (Results of the National Census of Population and Housing 2011). Recreation is the preferred type of land use in the region on account of its high scenic value. More than 50% of land is occupied by agricultural land characterised by average soil quality. The average farm size is 19.17 ha, and it is significantly higher than the national average of 7.93 ha (National Agricultural Census 2010. Report on Results).

The Podlasie voivodship has an area of 20 187 km², and it is inhabited by around 3% of the Polish population. Population density is 59 persons per km². The region is characterised by considerable landform di-

versity, but it features fewer water bodies than Warmia and Mazury. Surface waters cover less than 2% of the region's territory, but large lakes with high recreational value are found in the northern part of Podlasie (Results of the National Census of Population and Housing 2011). Podlasie is characterised by attractive scenery, considerable landform diversity and significant forest cover, which contribute to the development of tourism. Agricultural land occupies more than 50% of the region's territory, and the regional economy is based heavily on agriculture. The average farm size is 12.16 ha, and it approximates the national average (National Agricultural Census 2010. Report on Results).

The analysed regions are characterised by low competitive advantage, high unemployment and weakly developed transport networks. The main trends in regional development are shaped by economic and geographic factors. The key priorities in the development strategies of the analysed regions include the promotion of tourism based on natural resources and cultural heritage, harnessing the opportunities that arise from the trans-border location of the regions, increasing their attractiveness for investors, environmental protection and development of transport networks.

Having regained its independence in 1990, Lithuania initiated economic and social reforms towards a market-oriented economy. After 50 years of collectivisation, exogenous factors such as land restitution, equipment privatisation and the introduction of new national and EU agricultural policies transformed rural communities. The shift in the socioeconomic context set new directions for development in agricultural areas. With regard to landscape, the current changes in rural areas are influenced by the territorial "heritage" of the Socialist era.

The main driving forces behind the changes in land use structure include spontaneous afforestation in most parts of the country, in particular in regions where agriculture is stagnant due to poor soil quality (Balevičiūtė, Veteikis 2012; Ribokas, Zlatkutė 2009), as well as a general downturn in Lithuanian agriculture. European Union fund programmes have been providing various incentives for Lithuanian farmers since 2004, and signs of stabilisation are visible in the agricultural sector. The number of farms has decreased, and thousands of fields have been abandoned (Ribokas, Milius 2007). A statistical report revealed a gradual decrease in crop acreage from 2.2 million ha in 1990 to 1.4 million ha in 2003 and 1.8 million ha in 2009 (Statistics Lithuania, 2013). Drainage systems dating back to the Soviet era no longer impede the revival of natural swamps that contribute to the biodiversity of meadows and hay fields. Spontaneous afforestation is a continuous process in Lithuania, initiated by political and economic changes.

According to CORINE land cover data for 2006, the agricultural landscape accounts for 61% of the Lithuanian territory (Vaitkuvienė, Dagys 2008). It is

represented by two landscape polarities: natural areas (which, including swamps, account for 33% of the Lithuanian territory) and urbanised areas (3.3%). In Lithuania, the most productive agricultural land occupies clayey plains, lowland clayey plains and delta plains. Those landscapes became available to agriculture relatively late when technological progress enabled the cultivation of heavy clay, supported the modification of soil composition and management of excess water. The remaining types of landscape, including morainic hills and river valleys, play an important role in the country's natural and anthropogenic land cover. They are not only commonly encountered in Lithuania, but they were also the first types of landscape to be cultivated already in the Iron Age (Kavoliūtė 2000).

The analysed counties of Marijampolė and Alytus have unique features, and they differ from each other and from Lithuania as a whole. The Marijampolė County in south-western Lithuania is characterised by a predominance of productive clayey flat land or rolling clayey lowland, whereas hills and lakes are encountered only in the southern part of the county. Marijampolė has one of the lowest percentages of forest cover in the country. According to recent studies (Mačiulytė *et al.* 2012), the agricultural sector in Marijampolė has been visibly revived since Lithuania had regained its independence. The Alytus County is characterised by the highest degree of naturalness in comparison with other parts of the country, and it features mostly unproductive sandy plains, lakes, hills and the prevalence of pine forests. Alytus County has an area of 5 425 km², it is inhabited by around 5% of the Lithuanian population, and its population density is 29 persons per km² (the Lithuanian average is 46 persons). Marijampolė County occupies the area of 4 463 km², it is also inhabited by around 5% of the Lithuanian population and is characterised by population density of 36 persons per km² (Statistics Lithuania, 2013).

THE LAND USE PATTERNS OF AGRICULTURAL LAND AND FORESTS

Maps illustrating the share of agricultural land in 2005 and 2010 (Fig. 4A, 4B) were developed to analyse changes in agricultural land use (Table 1). Greater variations in the share of agricultural land were noted in Lithuanian sites – between intervals I and VII. In Polish sites, the respective variations were determined between intervals I and VI.

Lithuanian sites were characterised by greater dynamics of changes in land use (Fig. 5). The land use structure remained relatively stable (with an upward trend) in only one site (Kazlų Rūdos) which occupied a middle interval. The share of agricultural land decreased in the majority of the analysed sites. A significant increase in the share of farmland (more than 7.5%) was noted only in the border of Kalvarijos municipality. In most Polish counties, the share of agricultural land

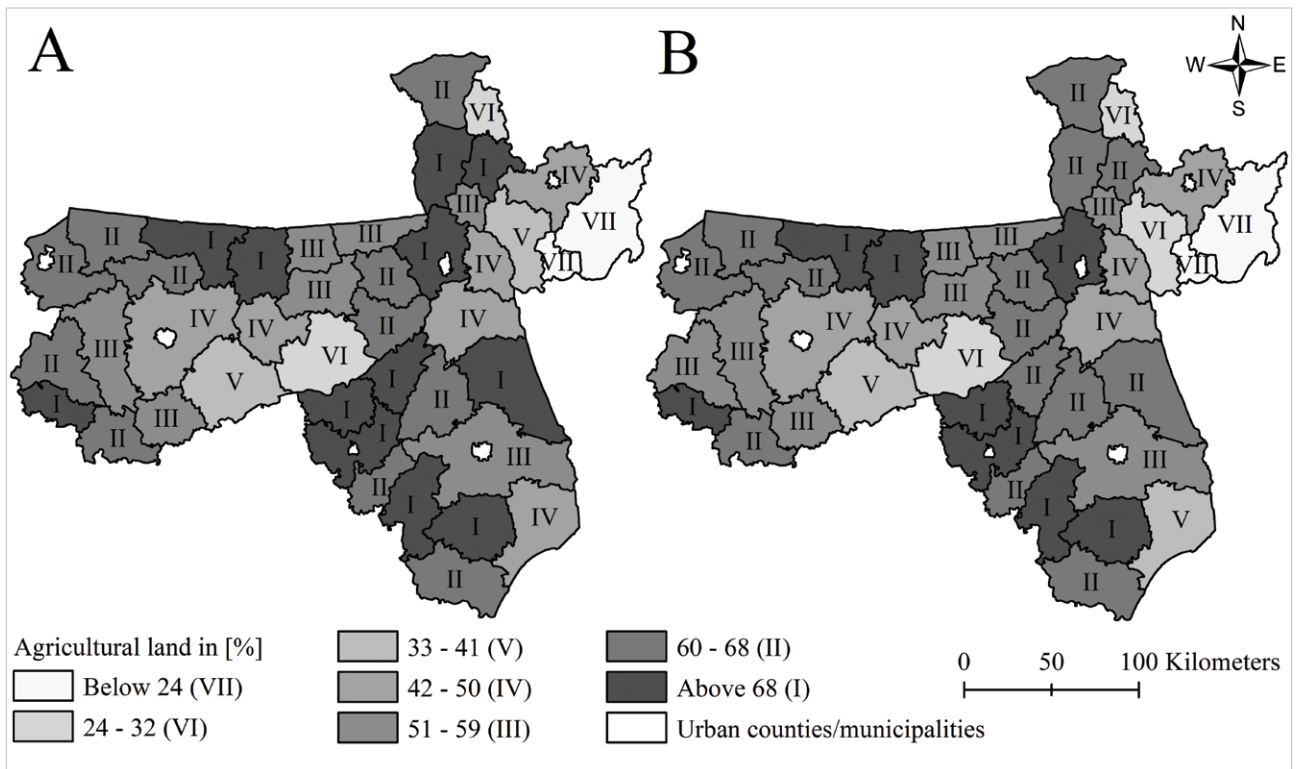


Fig. 4 Share of agricultural land in the total area of Polish counties and Lithuanian municipalities in 2005 (A) and 2010 (B). Compiled by A. Senetra, 2013.

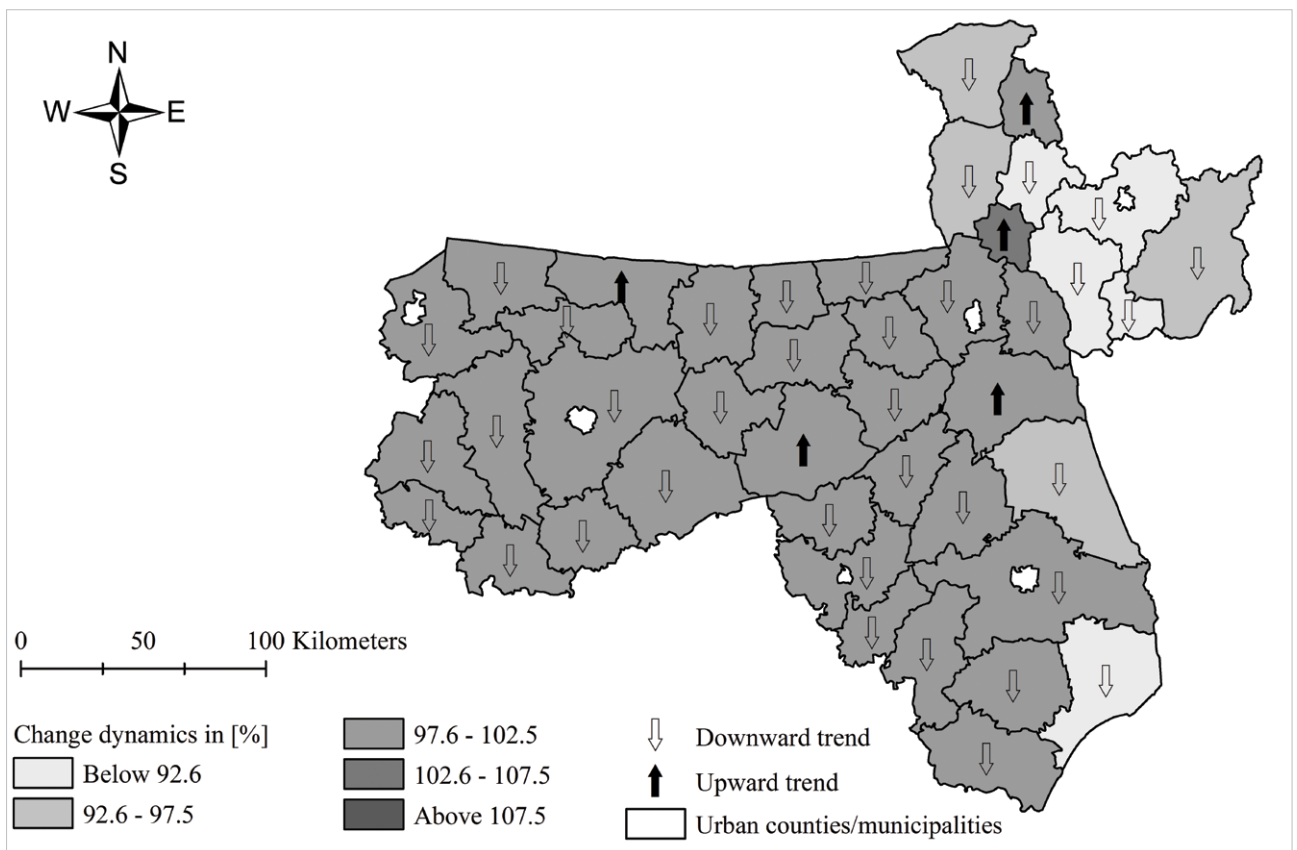


Fig. 5 Dynamics of changes in agricultural land use in 2005–2010 (2005=100%). Compiled by M. Wasilewicz-Pszczółkowska, 2013.

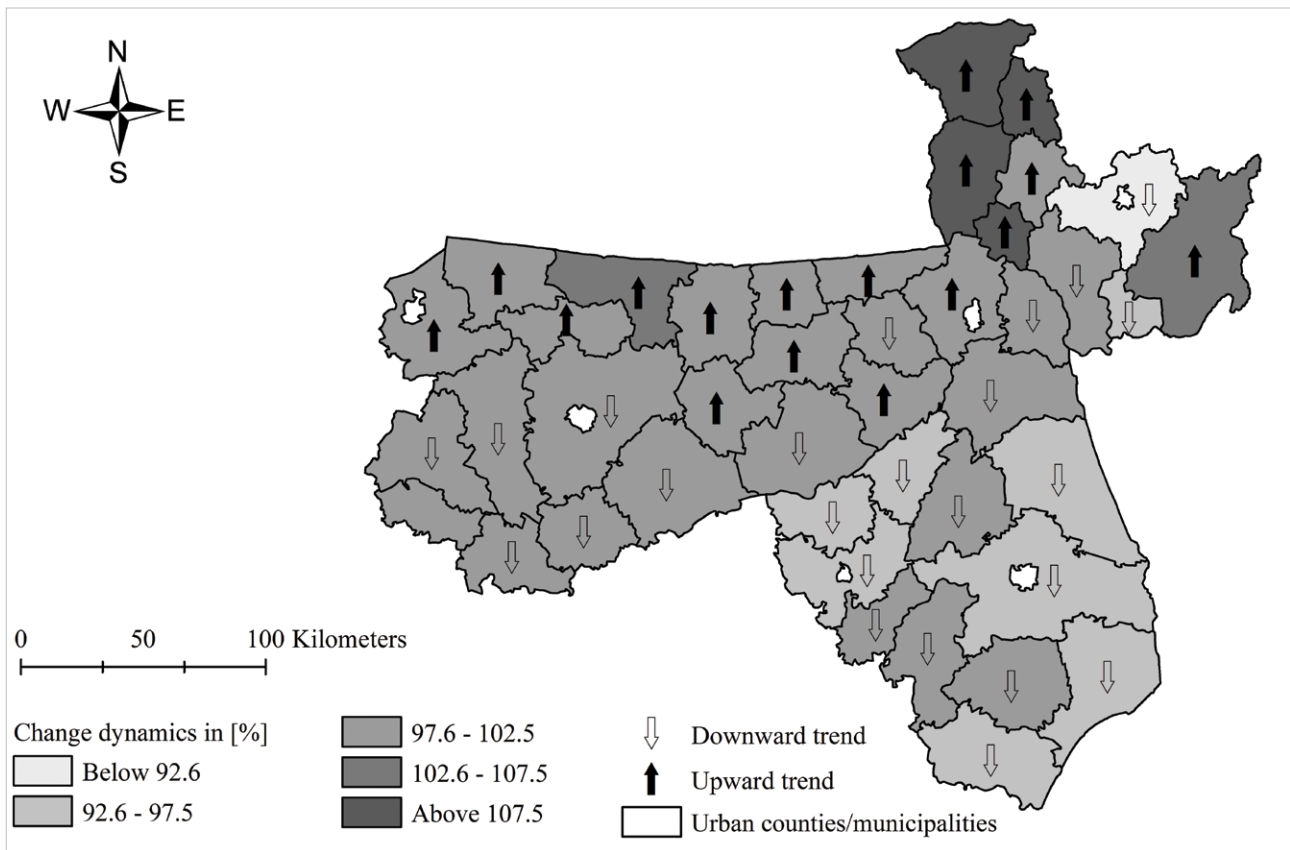


Fig. 6 Dynamics of changes in arable land use in 2005–2010 (2005=100%). Compiled by M. Wasilewicz-Pszczółkowska, 2013.

remained fairly stable since 2005 with a downward trend. A significant drop relative to 2005 data was reported in the counties of Hajnówka (Polish: hajnowski) and Sokółka (Polish: sokólski). In Hajnówka (Polish: hajnowski), the observed decrease exceeded 7.5%, and it corresponded to the Lithuanian average.

The dynamics of changes in arable land use (Fig. 6), and the dynamics of changes in meadow and pasture use (Fig. 7) show that Lithuanian sites are characterised by greater dynamics of changes in land use, in particular in meadows and pastures whose share decreased by more than 7.5% in all municipalities. The share of arable land increased significantly in five municipalities (mostly in Marijampole County), decreased in two municipalities and remained stable in two municipalities. The observed changes were less pronounced in Polish sites, in particular the changes in arable land use in the Warmia and Mazury voivodship. A decrease in the share of arable land was noted in the Podlasie voivodship, and a minor increase was reported only in the county of Suwałki (Polish: suwalski). The share of meadows and pastures increased in seven counties and decreased in seven counties of the Podlasie voivodship. A drop in the share of meadows and pastures was also observed in most counties of the Warmia and Mazury voivodship (excluding the Pisz county – Polish: piski), but it was less significant than in Lithuanian sites.

The decrease noted in Poland could be attributed to various factors. Due to unprecedented levels of human

activity, 419 ha of land in the Podlasie voivodship and 1068 ha in the Warmia and Mazury voivodship was zoned for non-agricultural use in 2005–2010. Former agricultural land was most often zoned for residential and industrial development (422 ha for residential and 276 ha for industrial development in Warmia and Mazury; 175 ha for residential and 61 ha for industrial development in Podlasie). The analysed period was also characterised by an increase in conservation areas that are subject to stringent planning restrictions (increase by 561.7 ha in Podlasie and 7,353.3 ha in Warmia and Mazury) (Polish Central Statistical Office, 2013). The observed changes were also driven by local environmental conditions. In the analysed regions, soil fertility is relatively low, which justifies the introduction of afforestation schemes (the National Afforestation Programme covers land belonging to the lowest quality classes). In 2005–2010, high levels of rural to urban migration (annual average of 1500–2000 people in Podlasie and 2200–3100 people in Warmia and Mazury) contributed to negative population growth and the progressing decrease in the number of farms (from 111,205 in 2005 to 104,020 in 2010 in Podlasie, and from 71,207 in 2005 to 65,150 in 2010 in Warmia and Mazury) (Polish Central Statistical Office, 2013). Production ceased in many agricultural estates, in particular small farms, and in line with Eurostat's methodology, their holdings were zoned for non-agricultural use (Polish Central Statistical Office, 2013).

The above processes in Lithuania can be attributed mainly to a very high rate of rural to urban migration

Table 1 Share of agricultural land in the total area in Polish and Lithuanian sites grouped into intervals in 2005 and 2010. Compiled by D.Veteikis and M. Wasilewicz-Pszczółkowska, 2013.

Intervals	POLAND						LITHUANIA					
	Number of counties		Agricultural land [ha]		Agricultural land [%]		Number of municipalities		Agricultural land [ha]		Agricultural land [%]	
	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010
VII	0	0	0	0	0,0	0,0	2	2	40808	38271	9,4	9,4
VI	1	1	54678	55249	2,1	2,2	1	2	14265	54791	3,3	13,5
V	1	2	76088	138928	3,0	5,5	1	0	47763	0	11,0	0,0
IV	5	4	374346	302216	14,6	11,9	1	1	69725	61240	16,0	15,1
III	6	7	449590	525236	17,5	20,7	1	1	23934	25565	5,5	6,3
II	10	11	709123	823827	27,6	32,5	1	3	96819	225893	22,2	55,7
I	10	8	901860	688927	35,2	27,2	2	0	142343	0	32,7	0,0
Total	33	33	2565685	2534383	100,0	100,0	9	9	435657	405760	100,0	100,0

Table 2 Share of forest land in the total area in Polish and Lithuanian sites grouped into intervals in 2005 and 2010. Compiled by D.Veteikis and M. Wasilewicz-Pszczółkowska, 2013.

Intervals	POLAND						LITHUANIA					
	Number of counties		Forest land [ha]		Forest land [%]		Number of municipalities		Forest land [ha]		Forest land [%]	
	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010
VII	9	7	196499	166563	14,5	12,1	2	2	17285	17329	4,6	4,6
VI	13	13	398984	371529	29,5	26,9	3	3	99050	99050	26,1	26,1
V	4	5	143787	184874	10,6	13,4	1	1	45684	45684	12,0	12,0
IV	3	4	263671	303735	19,5	22,0	0	0	0	0	0,0	0,0
III	4	4	350174	353933	25,9	25,6	0	0	0	0	0,0	0,0
II	0	0	0	0	0,0	0,0	1	1	32967	33023	8,7	8,7
I	0	0	0	0	0,0	0,0	2	2	184681	184681	48,6	48,6
Total	33	33	1353114	1380634	100,0	100,0	9	9	379666	379766	100,0	100,0

(annual average of 1500-2500 people in 2005-2009 and 5300 people in 2010 in Alytus County; 1500-4000 people in Marijampolė County) (Statistics Lithuania, 2013). The EU initiative that garnered the highest level of support among rural inhabitants was the Early Retirement scheme introduced as part of the Rural Development Programme for 2004-2006 (42.8% of potential applicants). Population ageing also leads to a dramatic drop in rural populations and the disappearance of family farms (Kavoliūtė 2012). The noted increase in arable acreage can be attributed to the highest share of subsidies in added value created by wheat and rapeseed producers, and the lowest share of subsidies in added value created by dairy farms and plant growers. In 2003-2005, Lithuanian farms multiplied their capital by participating in EU aid programmes and national investment support schemes. Initially, that capital was not fully utilised due to insufficient arable acreage (Melnikienė, Kriščiukaitienė 2008). The area of set-aside land continued to decrease (from 3,948 ha in 2005 to 1,936 in 2007 in Alytus County, and from 2,148 ha in 2005 to 435 ha in 2007 in Marijampolė County). A

steady decrease in Lithuania's cattle population led to a drop in grassland area (from around 43,000 head in 2005 to around 38,000 in 2010 in Alytus County, and from 89,000 in 2005 to 85,000 in 2010 in Marijampolė County). The decrease in livestock production lowers the demand for feed. Drainage systems are largely outdated or damaged (Results of the Agricultural Census of the Republic of Lithuania 2010 by county and municipality, 2013), which could additionally decrease grassland area.

The observed changes in land-use patterns are also significantly driven by rapid urbanisation. The steady decline in agricultural areas can be attributed mainly to housing construction, in particular in suburban districts and in areas of high recreational value, and the development of transport infrastructure. This process is accompanied by a growing share of developed land.

Lithuanian sites were characterised by high dynamics of changes in forest cover in 2005-2010 (Fig. 8A, 8B). Forest cover was determined below 22% in two municipalities and above 61% in two municipalities, reaching the minimum and maximum values on the

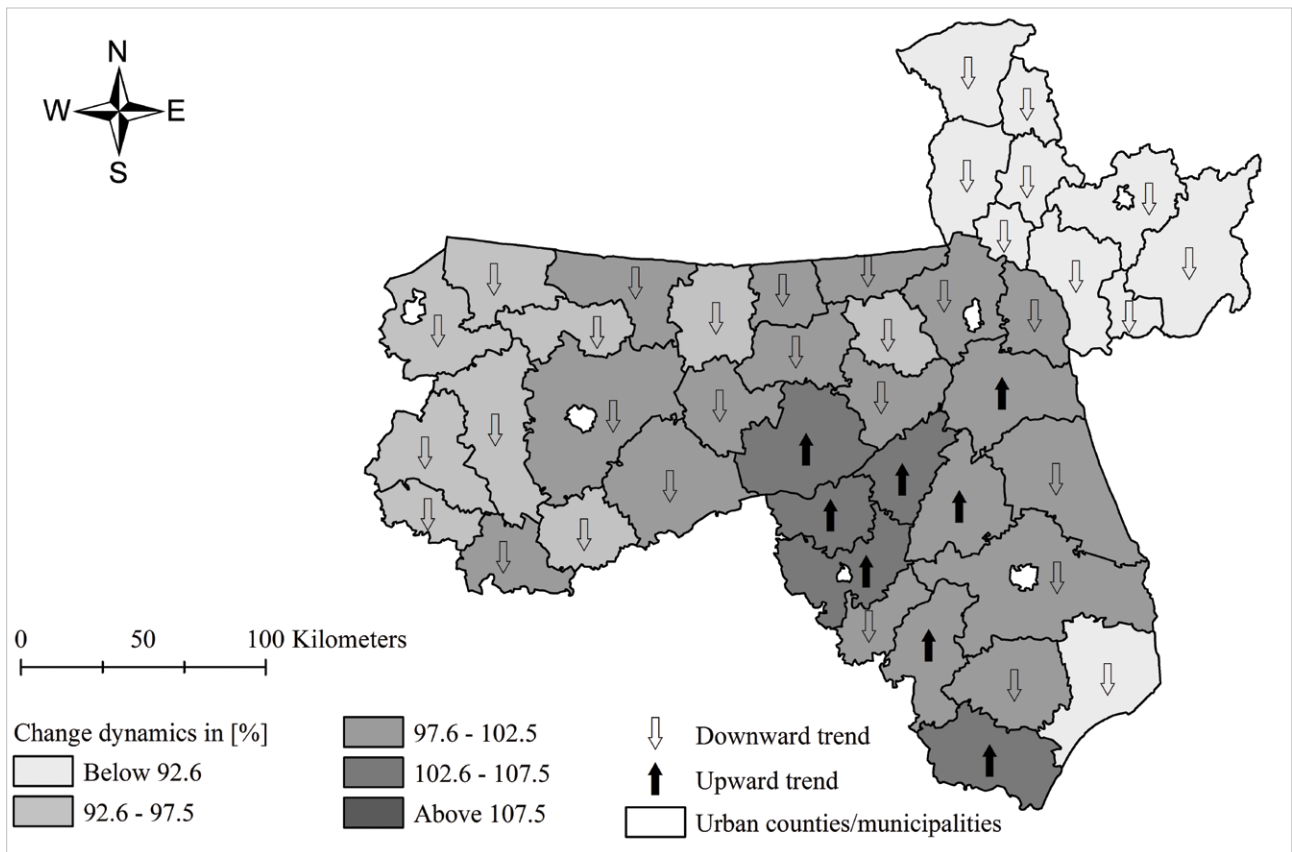


Fig. 7 Dynamics of changes in land use in meadows and pastures in 2005–2010 (2005=100%). Compiled by M. Wasilewicz-Pszczółkowska, 2013.

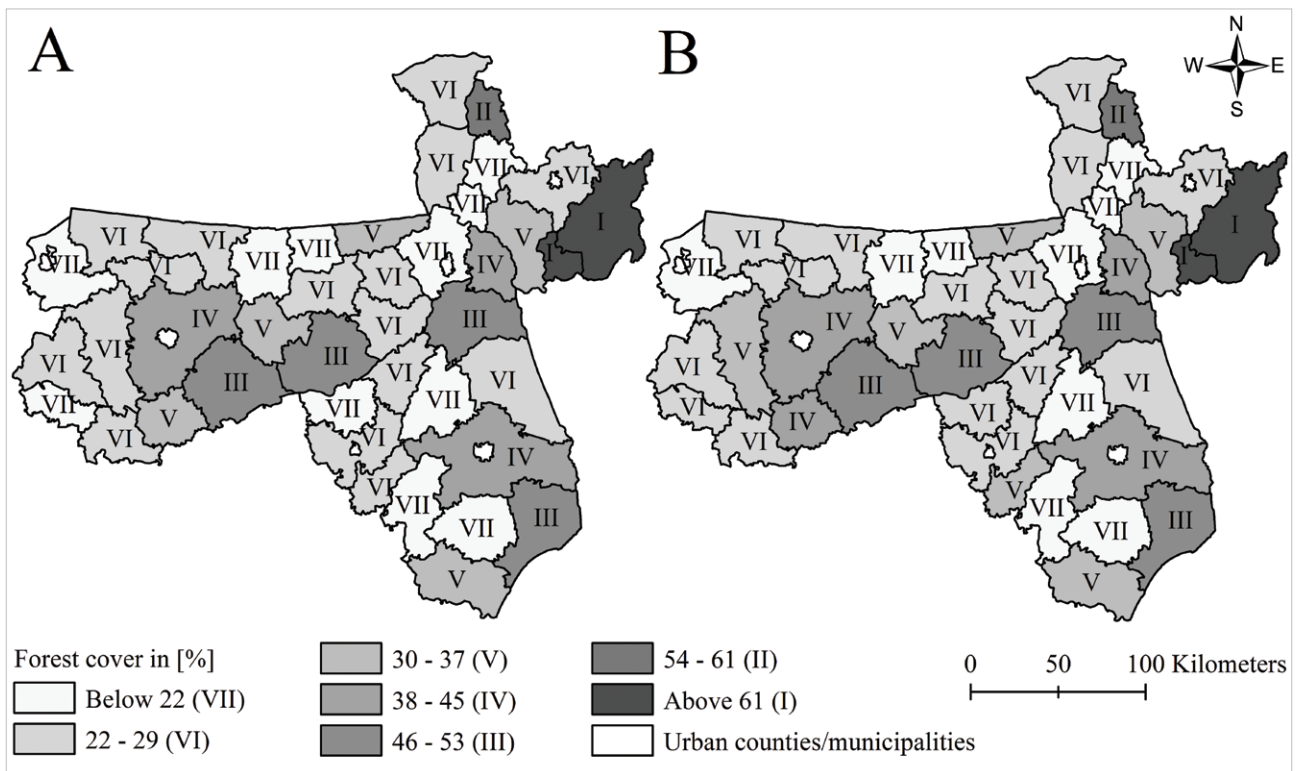


Fig. 8 Forest cover in 2005 (A) and 2010 (B). Compiled by A. Senetra, 2013.

applied interval scale (Tab. 2). Significantly smaller variations were reported in Polish sites. The highest forest cover was classified in interval III in four counties, and the lowest forest cover was determined below 22%.

In the analysed period, forest cover remained fairly stable in seven Lithuanian municipalities (Fig. 9). A minor upward trend was reported only in the municipalities of Kalvarijos and Kazlų Rūdos. Polish sites were characterised by greater dynamics of changes in forest cover which increased by more than 7.5% in the counties of Bartoszyce and Nowe Miasto (Polish: bartoszycki, nowomiejski) and by more than 5% in nine counties. A minor decrease in forest cover was noted only in the county of Augustów (Polish: augustowski).

The observed processes were largely induced with the help of EU funds allocated under Measure 5 of the Rural Development Programme for 2007-2013 – “Afforestation of agricultural land and other land”, the National Afforestation Programme of 1993 and grants from the Forest Fund, Regional Funds for Environmental Protection and Water Economy and the central budget. The availability of land is also an important consideration. The analysed regions are characterised by low soil quality and unsupportive conditions for agricultural production, which could also lead to the conversion of arable land (permanent meadows and pastures were excluded from afforestation schemes) into forests. In 2005-2010, around 14,500 ha of land in the Podlasie Voivodship and around 38,000 ha in the Warmia and Mazury Voivodship was designated for afforestation. At the same time, the area of fallow land decreased by 4609 ha in Podlasie and 775 ha in

Warmia and Mazury. The share of set-aside land also decreased in both regions (by around 190 ha in Podlasie and 13,000 ha in Warmia and Mazury) (Polish Central Statistical Office, 2013). In Lithuanian sites, the changes in forest cover were far less extensive. The main contributors were spontaneous afforestation (overgrowth of trees in unused fields) and planned afforestation schemes. The area of regenerated and planted State forests is estimated at 10,000-11,000 ha annually (Statistics Lithuania, 2013). Spontaneous afforestation thrives in areas characterised by low quality soils, which explains the high proportion of fallow land. The low productivity of less fertile soils contributed to an increase in fallow acreage and the renaturalisation of rural landscapes. Very few afforestation schemes relying on structural funds were initiated.

CONCLUSIONS

Polish sites are characterised by significantly greater dynamics of changes in forest cover, and the above can be attributed to the implementation of the National Programme for Increasing Forest Cover. In Lithuanian sites, the changes in forest cover are far less extensive.

A drop in the percentage share of agricultural acreage noted in both Polish and Lithuanian sites. The combined decrease in two Polish voivodships reached 0.70 % and in Lithuanian counties – 3.02 %. The Polish voivodships were also marked by a drop in the percentage share of arable land (0.41%), meadows and pastures (0.23%). In Lithuanian counties, the share

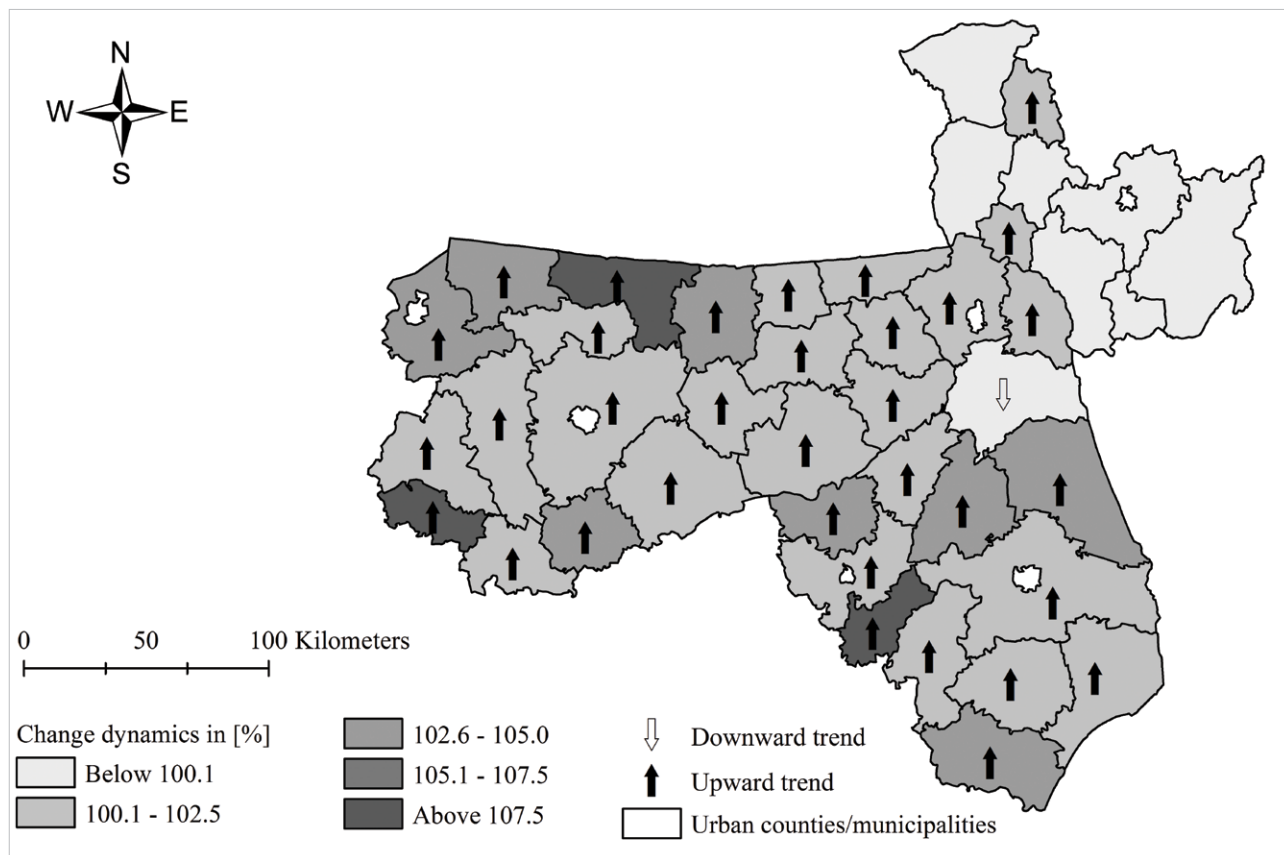


Fig. 9 Dynamics of changes in forest cover in 2005–2010 (2005=100%). Compiled by M. Wasilewicz-Pszczółkowska, 2013.

of arable land increased by 1.70%, whereas the share of meadows and pastures decreased by 4.65%, which could be indicative of changes in the agricultural production profile.

The observed changes in land-use patterns are also significantly driven by rapid urbanisation. The steady decline in agricultural areas can be attributed mainly to housing construction, in particular in suburban districts and in areas of high recreational value, and the development of transport infrastructure. This process is accompanied by a growing share of developed land. The observed trends and dynamics of changes in the land use patterns of agricultural land and forests were also analysed based on statistical data pertaining to developed land. The total share of developed land in Lithuanian counties increased by 3.28% in the analysed period, and it was higher in comparison with Polish regions where it was determined at 3.17%. The above findings are surprising because the analysed Polish regions have been included in the “Development of Eastern Poland” Operational Programme which promotes the growth of lagging regions through urban development and the construction of transport infrastructure. Lithuanian sites are characterised by greater dynamics of changes in agricultural land, whereas more distinct changes in forest cover are observed in Polish regions.

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