

## Local changes in the landscape structure of Kurzeme during the 20th century

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### Abstract

This article analyses the factors causing changes in land use in Kurzeme (Courland), the Western part of Latvia, in the 20<sup>th</sup> and 21<sup>st</sup> centuries with the aim of prognosticating of landscape development.

The territory chosen for investigation is the parish of Gudenieki situated on the Western slope of the Western Kursa Uplands. Topographical maps, aerial photos, maps of land use and statistic data have been used to analyse the dynamics of landscape, structuring and factors influencing them. GIS methods have been used for the analysis of data in land use changes.

The research shows that changes in landscape structure are not the same in all regions of Latvia. They depend not only on the natural base, but also on human factors. Under the influence of current social, economic and political processes, Latvia may experience increased marginalization of these uplands, which in turn will favour the formation of a more homogeneous landscape.

**Keywords:** landscape structure, land use, marginalization, factors, parish of Gudenieki.

### Introduction

During the last fifty or sixty years, Europe as well as other parts of the world, have experienced fundamental transformations of landscape structure caused by political and social-economic changes, such as political regime changes, political decisions, development of technologies, demand for food and consumer goods, globalisation, and growth of the world's population. All this has led to intensified human influence upon landscape structure. As a result, existing mosaic type landscapes have been transformed into landscapes of vast monofunctional agricultural lands or forests [Palang et al. 1998]. Landscape polarisation is the result of land intensification and abandonment, exaggerating natural heterogeneity which is caused by the variety of traditional agricultural and environmental factors, such as relief, soils and climate [Fjellstad, Dramstad 1999].

Studies of the situation in the Vidzeme Uplands in Latvia show that changes in land use structure in the 20<sup>th</sup> century are closely linked with natural factors (fertility of the soils, dampness), structural factors (transport infrastructure), political and economic factors (change of political regimes, process of collectivisation, concentration of settlement, drainage of agricultural lands, and the formation of large-scale farms) [Nikodemus *et al.* 2004; Grīne *et al.* 2003]. After the occupation of 1940 the existing mosaic-type structure of rural landscape was obliterated, the boundaries and landmarks of private lands destroyed [Melluma 1994]. After World War II small fields, meadows, and pasture lands situated close to forests, as well as areas with poor roads located far from the centres of collective farms, became excluded from agricultural use and turned into woodland. Thus during the period from 1940 till 1993 the territory of meadows and pasture land has decreased by 853 000 hectares or by 51.5%. This has mainly been the case with forest meadows and meadows and pastures situated far from economic centres and large-scale farms [Pirksts (ed.) 1995]. The extent of woodland and forest territories increased considerably. In 1939 forests occupied 27% of the territory of Latvia, whereas in 1973 forests already covered 37% of the country. In 1990 forests covered 42.6% of the land surface. The increase of woodland has principally affected hilly areas and marginal lands [Melluma 1994]. After the restoration of Latvian independence the ensuing agrarian reform of 1989-1990 changed land ownership. Lands were returned to former owners or divided up between members of collective farms. The formation of small farms unable to compete, lack of sound development, absentee ownership – all these factors favoured the formation of fallow-land and brushland of all the factors influencing land use, the human factor is the most

important [Grīne *et al.* 2003]. The farmer's wish to cultivate his own land – something that he had been forbidden to do for years – and to supply his family with food, is the determinant factor of land use in the Latvian agricultural landscape.

The aim of this article is to analyse factors which have determined land use in Gudenieki parish of the Kuldīga district during the previous century. The results obtained form the basis for forecasting the probable transformations of the landscape when economic factors will determine land use.

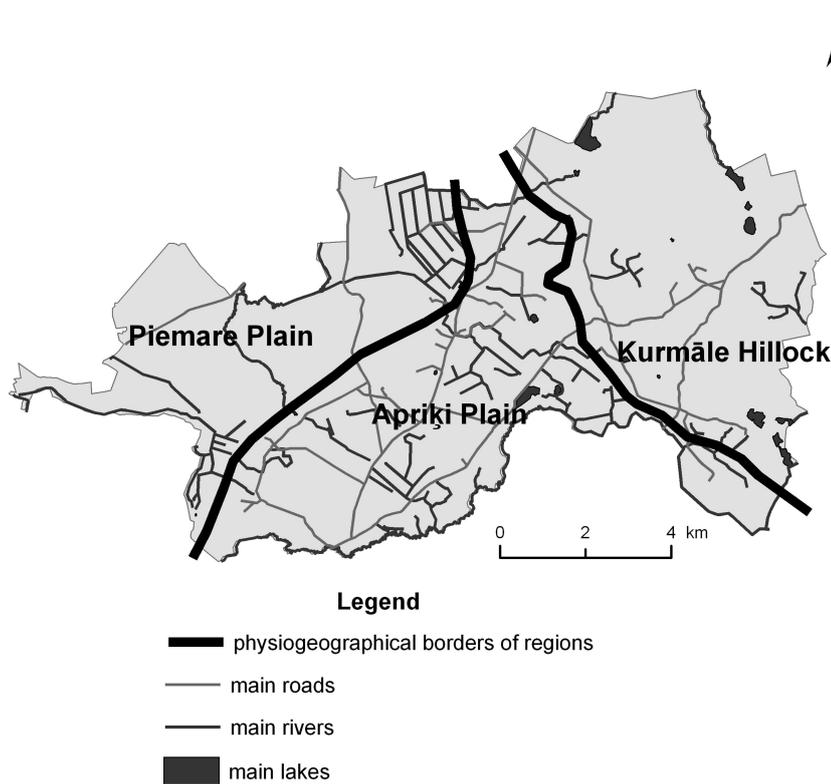
### **Sources and Methods**

Gudenieki parish is situated in Western part of Latvia (Figure 1). The population in 2004 was 882 people. Only 31% of the population lived in villages (Gudenieki, Birži). The parish has one of the greatest densities of population and largest number of detached homesteads in the Kuldīga district [Kūle, Rasa 2001]. The territory under discussion is an outlying district of Kuldīga district, comparatively far from the main highways and economically active centres.

**Figure 1.** Location of the Gudenieki parish

At the beginning of the 21st century Gudenieki parish had one of the lowest indices of development in the Kuldīga district. People's income was low too [Bauere (ed.) 2003]. Agricultural lands occupy 57.5% of the land (or 6468 hectares). Gudenieki parish excels among other parishes of Kuldīga district with the largest amount of arable lands – 75.7% [Nikodemus 2000]. 63.4% of the agricultural lands have been reclaimed by improved drainage.

Natural conditions in the parish are diverse. The eastern part of the parish is occupied by the Kurmāle Hillock (Figure 2). The mosaic type of landscape structure is determined by the undulating relief, loamy and sand-loamy soils, and variation in moisture content. The central part of the parish is occupied by the flat Apriķi Plain where clay soils predominate. The plain has been well – cultivated with arable lands predominating. The western part is occupied by Piemare Plain covered by forests. Here sandy soils predominate.



**Figure 2.** Physical-geographical regions of the Gudenieki parish

### Research methods

In the study of landscape structure dynamics in the parish, topographic maps of 1929 (showing the situation in 1911) and 1960 have been used, as well as the land use plan of 1990. For the mapping of overgrown fields aerial photos of 1998 have been used. The analysis of factors influencing changes in landscape structure is based on statistic data about the territory of Gudenieki parish, namely, the data of the State Archives concerning the population, collective farms, the development of the local administrative system; the land use data of Gudenieki parish and the data from the State Land Service, evaluating the quality of land and maps of the local authorities during the Soviet period.

Spatial processing of the data and analysis of changes in land use has been carried out with the help of GIS software Arc View.

### Results and Discussion

Despite the differences in relief and soils, agricultural lands predominated in the whole territory of Gudenieki parish at the beginning of the 20<sup>th</sup> century. This factor accounts for the dominant open type of cultural landscape (Figure 3a). Larger tracts of forests were situated in the outlying territories of the parish in damper places with less fertile soils. Small patches of forests were found in both plain and hilly parts of the parish. The structure of settlement depended on the natural conditions, road infrastructure, and the placement of manor houses. Owing to more fertile soils, the Apriķi Plain had a denser network of detached farmsteads, in comparison with Kurmāle Hillock downs and the Piemare Plain.

Detached farmsteads were not erected in the vicinity of manor houses (Figure 3a). The Adze Manor house, with its surrounding farmsteads, is rather an exception. Manor houses in the territory of Latvia appeared in the 13<sup>th</sup> century. Later in the 14<sup>th</sup> century they developed as centres of agricultural production. The manor houses were usually surrounded by large cultivated fields. Land owned by peasants was situated in the periphery, where natural conditions were poorer [Potapova 1977]. The placement of manor house lands in the 14<sup>th</sup>-17<sup>th</sup> centuries influenced the distribution of detached farmsteads in Gudenieki parish at the beginning of the previous century.



**Figure 3.** Land use in the Gudenieki parish in the 20<sup>th</sup> century: a) at the beginning of the century; b) in the middle of century; c) at the beginning of the 90ties

During the 20's and 30's of the previous century, the years of Latvia's independence, the density of farmsteads and the number of population in the parishes increased (Figure 3a). In 1935 the population in Gudenieki parish and Basi parish (today they both are included in Gudenieki parish) was 2551 people (Figure 4).

The example of Gudenieki parish shows a landscape which was typical of Latvia before World War II. It was characterised by open agrarian landscapes and closed forest landscapes, with a mosaic type of structure that included fields, grasslands, forests, rivers, lakes, and farmsteads [Melluma 1994] that had been preserved till the 60s of the 20<sup>th</sup> century.

The structure of land use has not experienced major changes. As it used to be earlier, arable land, natural meadows and pasture land dominate (Table 1). Changes in these landscape elements determine the design of the landscape. It is also an important factor for the existence of plant and animal species diversity. The prevalence of agricultural lands in Gudenieki parish in the 30's of the 20<sup>th</sup> century was determined by relatively fertile soils, network of good roads, and a high density of detached farmsteads.

Table 1  
Structure of land use in the territory of Gudenieki parish in 1935 and 2004

Land use type	Area in hectares	
	1935	2004
Arable lands	4443	4896
Meadows	2666	1572
Pasture land	2501	
Forests	1086	3286
Fens	372	370
Other land use	702	1106
Total	117 70	112 30

The population in the parish shrank drastically after deportations which followed the occupation (215 people were deported in 1941 and 1949) and as a result of World War II (Figure 4). The first radical changes in the structure of land use appeared after World War II. The flat Western area with moist natural meadows and pasture land had turned into an overgrown area with patches of woodland, while the undulating Eastern part, with patches of new forests, formed a mosaic-type of landscape (Figure 3b). Between 1950 and 1960 large territories of agricultural lands were fallowed and they became overgrown with bush. During this period primary landscape succession biotopes characteristic of Latvia began to appear on the Apriķi Plain, which is situated on a layer of glaciolimnic clay. The predominant biotopes include the pine-tree (*Pinus sylvestris*), the birch (*Betula pendula*), the juniper (*Juniperus communis*), and the heather (*Calluna vulgaris*). During subsequent years junipers spread over the meadows, forming biotopes where *Calluna vulgaris*, *Carex pilulifera*, and *Nordus stricta* predominate. In 1994 territories with the above-mentioned species of flora were made into restricted zones. After World War II a vast tract of forest developed in Piemare Plain. The above-mentioned tendencies in land use have continued (Figure 3c, Figure 7).

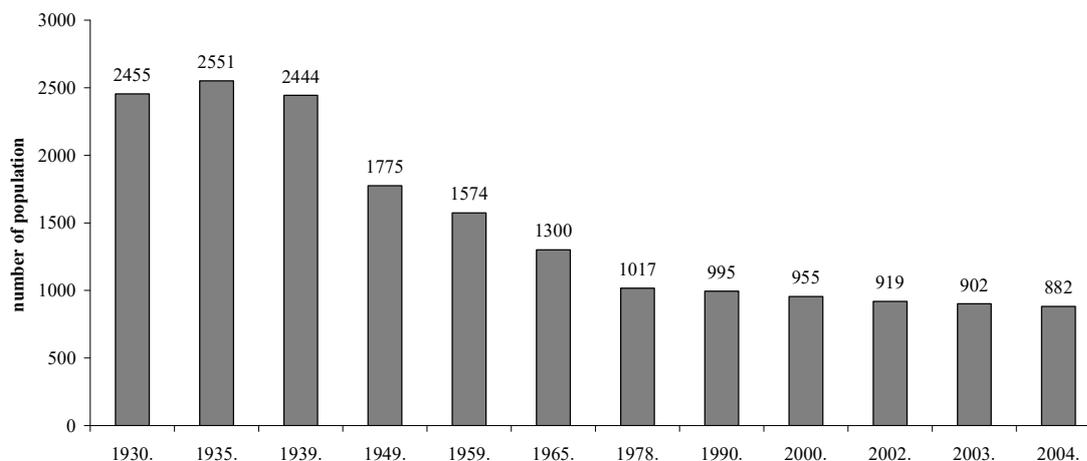
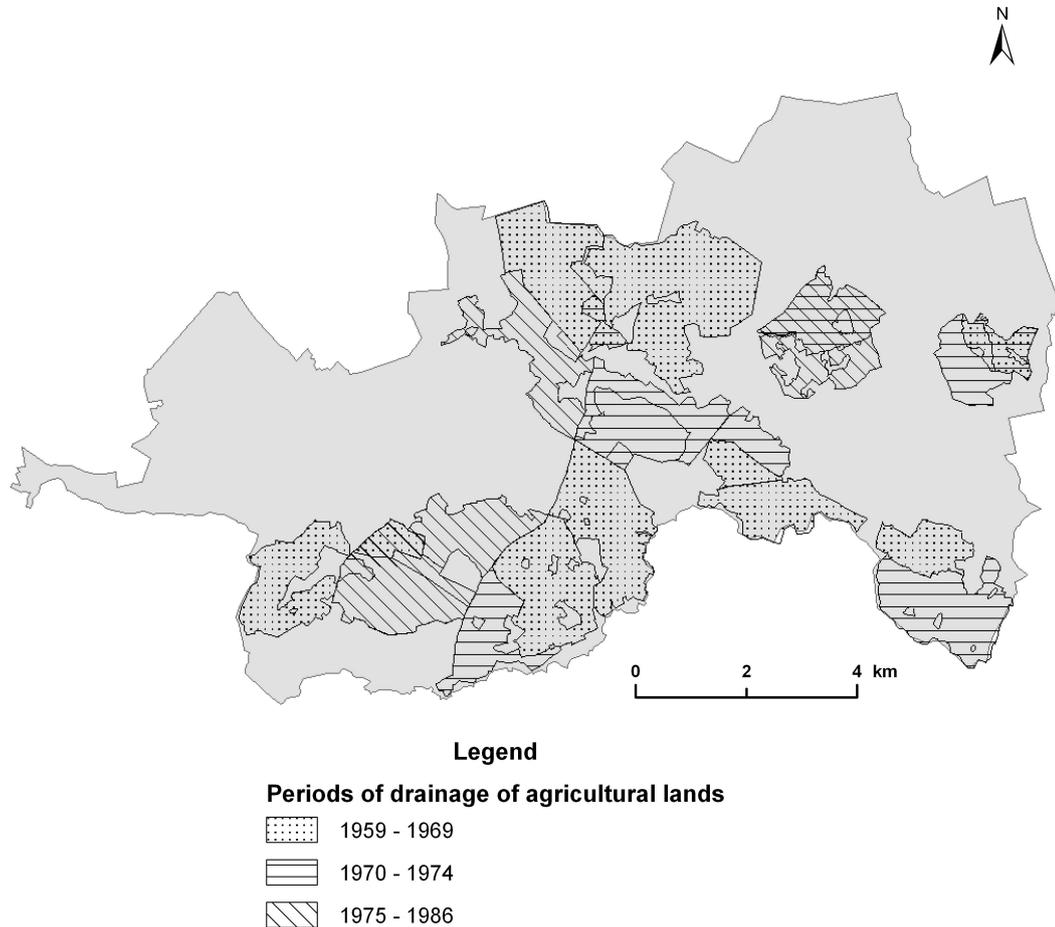


Figure 4. Changes in the population numbers in Gudenieki parish during the 20th-21st centuries

As a result of settlement centralisation during the Soviet period five villages have appeared in the territory of the parish, namely Ludženieki (with 61 inhabitants – data of 1989),

Gudenieki (197 inhabitants), Gudenieki Manor (25 inhabitants) Birži (101 inhabitants), Basi (21 inhabitants). The territories of the villages are in close connection with previous manor-houses (Basi, Gudenieki Manor, Birzi). Due to the centralisation of the settlement and drainage of agricultural lands the number of detached farmsteads has shrunk (Figure 3c). Natural transformation of agricultural lands into woodland and disappearance of detached farmsteads are closely linked with drainage of agricultural lands in the 60's of the 20<sup>th</sup> century (Figure 5).

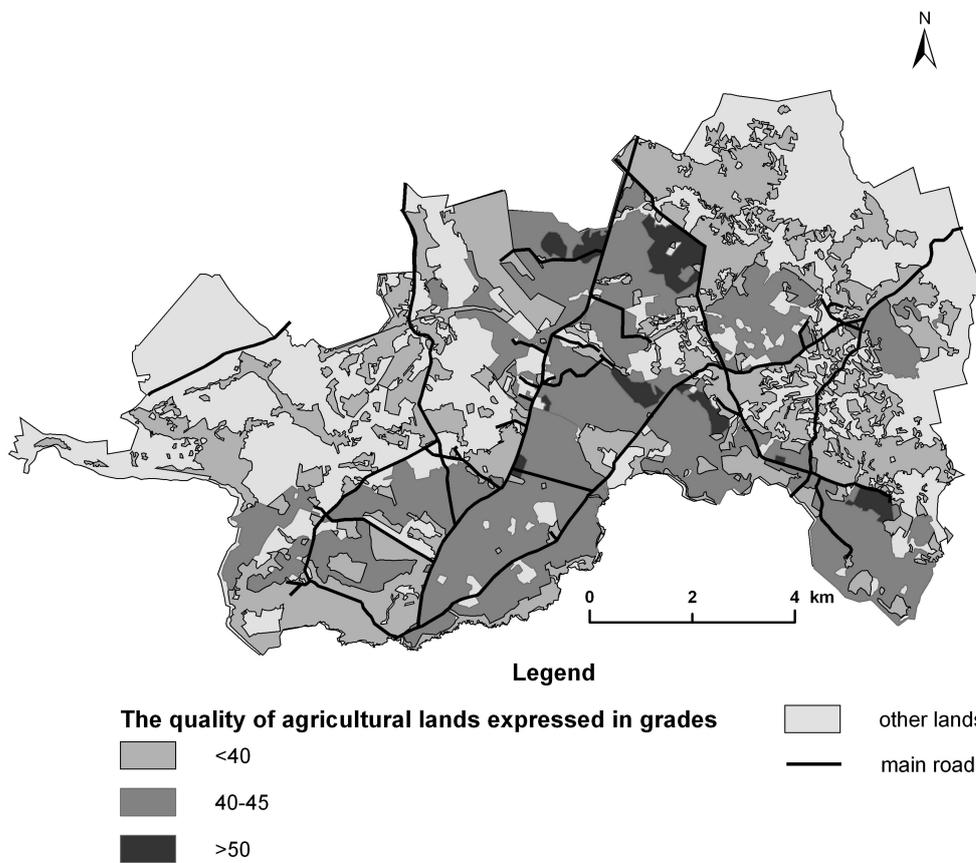


**Figure 5.** Drainage of agricultural lands in the Gudenieki parish

The map of land quality (Figure 6) shows that the most fertile agricultural lands in Gudenieki parish are situated in the centre of the parish, where large tracts of arable lands were developed for collective farms.

The quality of land (fertility of the soil, relief, moisture, size, and configuration of the fields), distributions of the centres of economic activities (villages and large-scale farms) have promoted landscape marginalization during the Soviet period. As it has been pointed out by Brouwer *et al.*, marginalization of the landscape is possible on various geographical levels – regional, local, single farm [Brouwer *et al.* 1996]. As studies of Latvian uplands show (Western Kursa Uplands in Gudenieki parish and Vidzeme Uplands in Taurene parish [Grīne *et al.* 2003], during Soviet times Latvia experienced landscape marginalization on the local level. The process was caused by both natural factors (the quality of land) and state policy (carrying out the process of concentrating settlement). In Nordic countries marginalization takes place in semi-open mosaic type landscapes as they gradually change into forest landscapes [Ihse 1995], whereas in Latvia, during the Soviet period, marginalization occurred in open landscapes of agricultural lands when they changed into forest landscapes instead of natural pastures and meadows or mosaic-type landscapes (in undulating areas). Therefore landscape transformations in Latvia during the Soviet period cannot be approached unequivocally. On the one hand, it is homogenisation of the landscape, when vast homogeneous territories of agricultural lands or

forests have appeared. On the other hand, it is heterogenisation, resulting in the appearance of mosaic-type landscape in undulating areas.

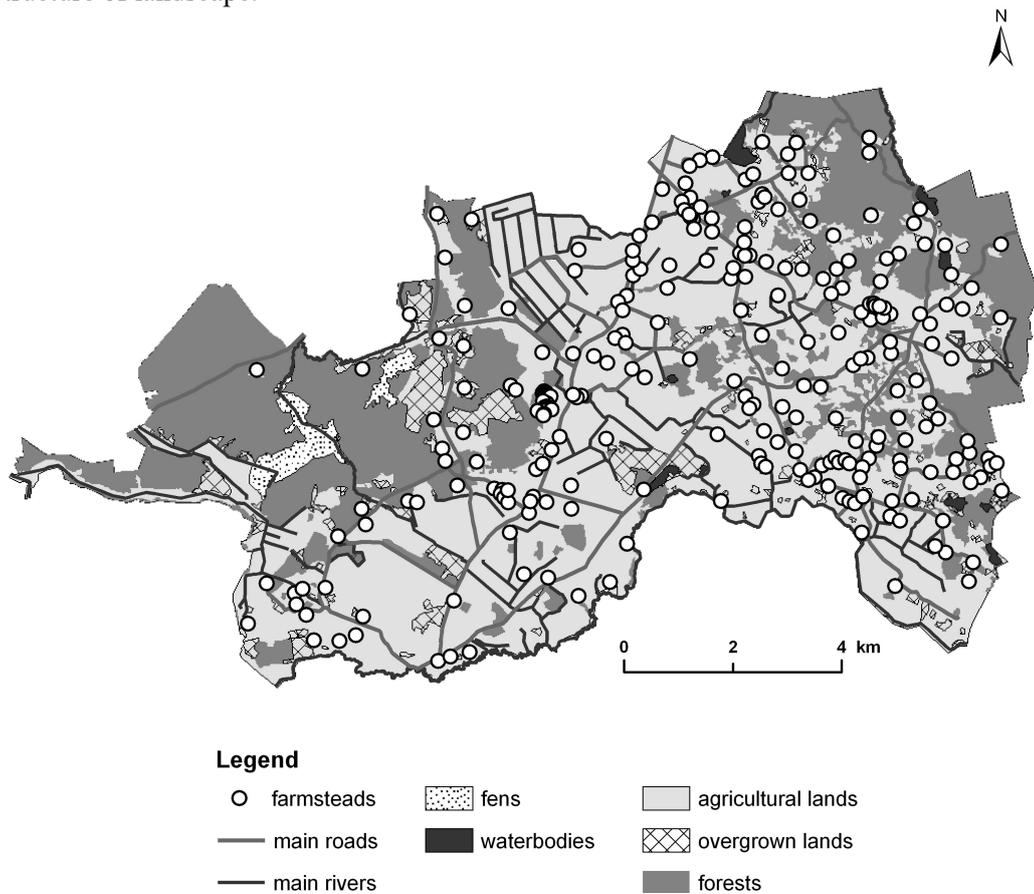


**Figure 6.** Map of land quality in the Gudenieki parish

Explorations of Vidzeme Uplands [Nikodemus *et al.* 2004; Grīne *et al.* 2003] and studies of tendencies in land use in Gudenieki parish show that great transformations in landscape structure have taken place after the restoration of Latvia's independence. The transformations mainly affect agricultural lands laid fallow and gradually turning into brushland. At the present time agricultural lands with managed drainage are used intensively. They occupy the greatest part of the territory of the parish. Extensive tracts of agricultural lands are cultivated by Danish farmers. They are better provided with agricultural machinery and the latest technologies than local farmers. The territory farmed by Danes constitutes 1941 hectares or 17% of all agricultural land in the parish. The undrained meadows and pastures gradually turn into brushland (Figure 7). Disappearance of wetlands and grasslands has resulted in deterioration of the environmental structure of the landscape, which in its turn is a threat to the biological diversity of the landscape [Poudevigne *et al.* 1997]. As studies in Latvia show, transformation of agricultural lands, including meadows and pastures, into woodland, affects not only the visual quality of the landscape but also its biological diversity [Priednieks *et al.* 1999]. In the above-mentioned restricted area in Gudenieki parish junipers give way to brushland.

When comparing changes in the mosaic-type landscape in the Taurene parish of Vidzeme Uplands [Grīne *et al.* 2003] and in Gudenieki parish of Rietumkursu Uplands, one can see that, despite similar relief, the process of overgrowing with brush is less intensive in Gudenieki parish than in Taurene parish. Partly it is due to the fact that, as mentioned before, a large part of agricultural land is cultivated by Danish farmers. Moreover, Kurzeme has long-standing farming traditions. During the period of the First Independent State of Latvia Kurzeme had a greater number of large scale farms (with over 50 hectares) than Vidzeme, a factor economically and psychologically favouring agricultural land use. It proves the earlier expressed assumption [Nikodemus *et al.* 2004; Grīne *et al.* 2003] that at the turn of the

20<sup>th</sup> century human factors play an essential role in the development and transformations of the structure of landscape.



**Figure 7.** Land use in the Gudenieki parish at the end of the 90ties of the 20<sup>th</sup> century

### Conclusion

One can agree with the view held by Latvian scholars that in the middle of the 19<sup>th</sup> century the borders of larger tracts of forest and forest areas became distinct [Melluma, Leinerte 1992]. However, in the 20<sup>th</sup> century, as a result of landscape marginalization, uplands of Latvia experienced essential transformations of the landscape into a mosaic-type of landscape characterized by mixed agricultural and forest lands. However, large scale drainage projects produced large, open agricultural landscapes in Latvian uplands. As a result of landscape succession, in some deserted agricultural lands peculiar biotopes, unusual for the particular environment, have developed, such meadows and forests with junipers. They characterise a definite stage of landscape succession. To preserve them special methods of cultivation should be applied.

Moreover, consolidation of agricultural lands and drainage projects resulted in the formation of open agricultural landscapes. After the restoration of Latvian independence much agricultural land was fallowed and gradually allowed to turn into brushland. Transformations of the landscape occur differently in the various regions of Latvia. They are caused by natural conditions and human factors. It is likely that after joining the European Union, competition and other economic factors marginalization of uplands will be intensified in Latvia, which will favour landscape homogenisation.

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