UNIVERZITA KONŠTANTÍNA FILOZOFA V NITRE

DEMETRA
Assessment of recent changes and trends in agricultural landscape of Slovakia

Visegrad Fund

Changes in the use of agricultural land and soil quality properties in the conditions of the submountain countryside land (cadastral area of Malá Lehota)

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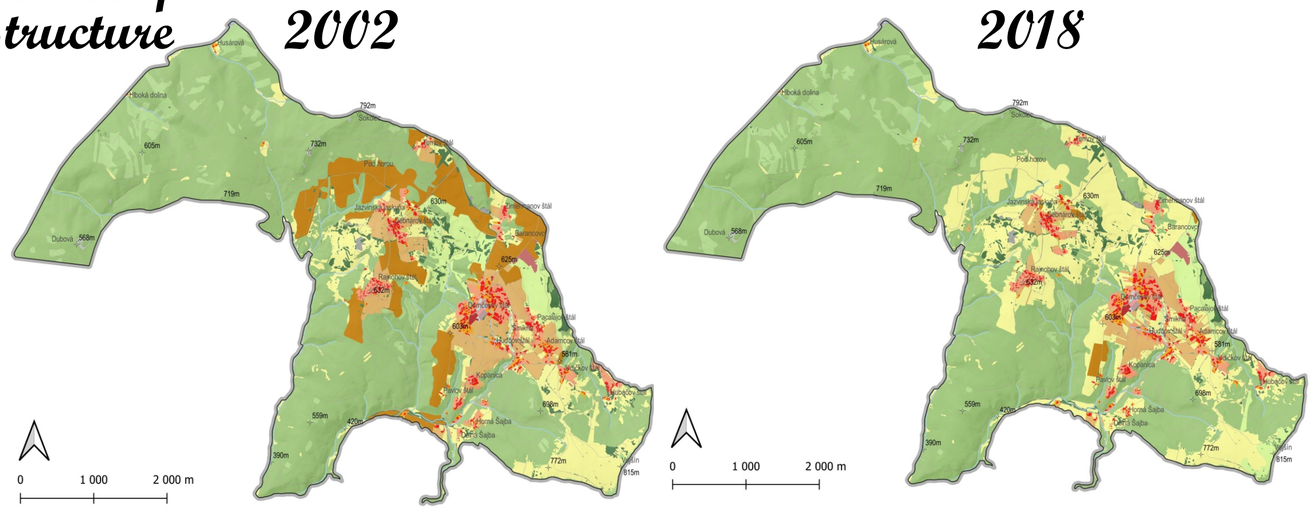
For the last two decades is one of the trends of land use changes in Slovakia soil sealing and gradual loss of agricultural land. Within agricultural land, we are seeing a significant process of land abandonment. In the period 2002-2018, in Slovak republis, the share of fallow land increased from 0.26% to 3.38%. A characteristic feature of these land use changes is the process of extensification of agricultural land. This is especially evident in areas with lower soil production capacity. These areas occur mainly in the conditions of the rural settlement of the Slovak part of the Carpathians. Land use changes represent a qualitative change in the form of land use. Arable land often turns into permanent grassland or being abandoned. In this paper, we focused on land use changes in the period 2002 – 2018. The time period captures changes in the conditions of accession and the first years of Slovakia's membership in the EU.

The aim of the paper is to confirm the relationship between the processes of change in the use of agricultural land and selected properties of soil quality (humus horizon thickness, soil depth, soil types). We follow the hypothesis that changes in use correlate with the qualitative soil properties.

The cadastral area of Malá Lehota is an area with a late onset of collectivization and the remaining individual management in the conditions of the submountain landscape with scattered settlements. According to the regional geomorphological division of Slovakia (Mazúr, Lukniš (1978), the geomorphological unit consists of Tribeč (subunit Rázdiel) and Pohronský Inovec (subunit Lehotská planina, Vojšín). The altitude ranges from 300 to 900 m a. s. l. The slopes reach values from 0 ° to 52 °. Slopes with W, NW and SW exposure predominate, which are represented in almost 50% of the territory. The soils of the initial, Cambian and Rendzin soils are represented from the soils, medium-heavy soils are represented (loam and loamy-sand). The area belongs to a moderately warm climate area. Average annual temperature 6.5 - 8.0 ° C. The average annual precipitation is in the range of 760 - 880 mm.

landscape structure



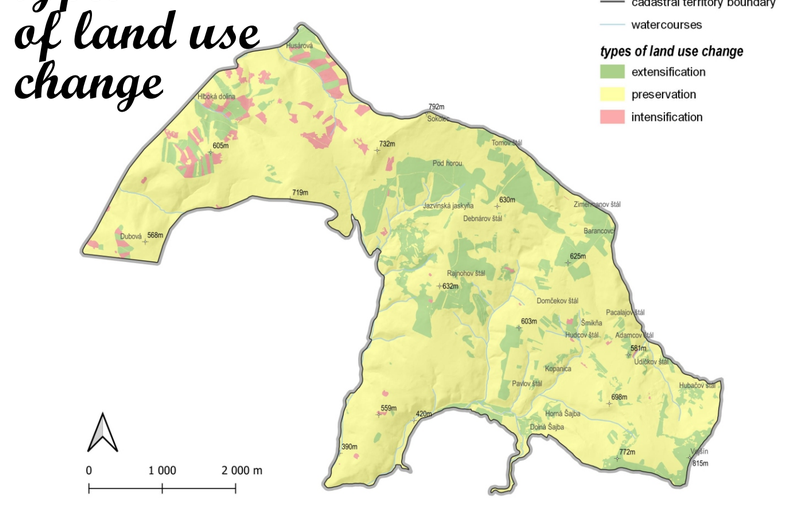
groups of landscape structure elements		2002		2018	
		ha	%	ha	%
forests	1111,1121,1122,1131	1322,77	58,50	1333,00	59,00
transitional woodland/shrubs	121X, 1222,1240	101,74	4,50	101,35	4,48
non-forest woody vegetation	1311,132X, 133X 133X	54,19	2,40	50,46	2,23
meadows	2211, 2212, 2213	223,50	9,88	493,30	21,81
pastures	2221,2222,2223	80,32	3,55	51,11	2,26
large-scale arable land	3111	213,78	9,45	11,03	0,49
small-scale arable land	3112	116,65	5,16	70,55	3,12
gardens	3211	14,48	0,64	14,40	0,64
fruit orchards	3313	3,29	0,15	3,29	0,15
mosaics of agricultural crops	3410	46,45	2,05	45,51	2,01
rocks and raw soil outcrops	41XX, 42XX	5,08	0,22	5,08	0,22
water	5231	0,16	0,01	0,16	0,01
settlements and builtup areas	6XXX	78,86	3,49	79,86	3,53
		2261,28	**100**	**2261,28**	**100**

The analysis of the landscape structure was performed on the basis of aerial photographs from 2002 and 2018. By vectorization of spatial data in the GIS environment, reference maps with spatial units were created, which were included in further evaluations.

Changes in land use were evalued in the period of 2002 and 2018. These changes were understood as processes that indicate the emergence, extinction, or. preservation of a group of land use elements. The process expressed the type of land use change, which made place in the area: intensification, preservation or extensification.

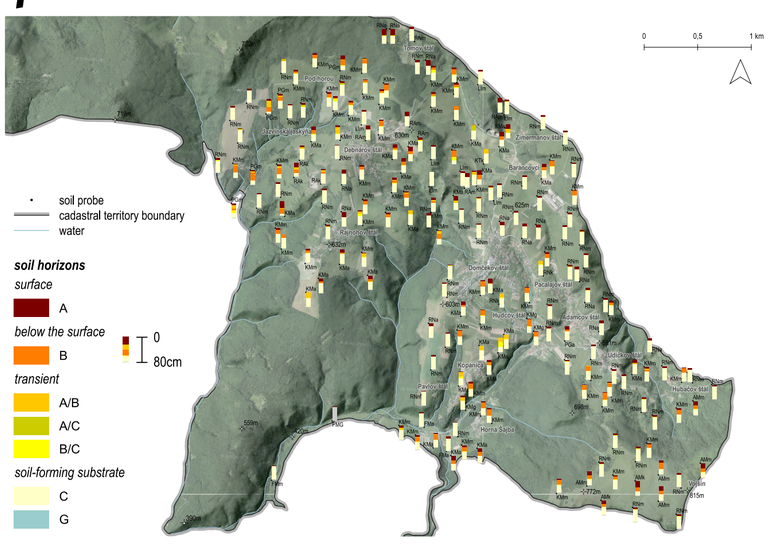
During the years 2002 - 2018, there were significant changes in the groups of the landscape structure elements in meadows, the area of which increased significantly. Decreases were seen in the group of large-scale, small-scale arable land and pastures. This is related to the abandonment of the area, the stagnation of crop production and the breeding of cattle. Arable land is gradually turning into meadows. Many pastures are gradually overgrown. Preservation, extensification and intensification processes have been identified during land use change.

types of land use change

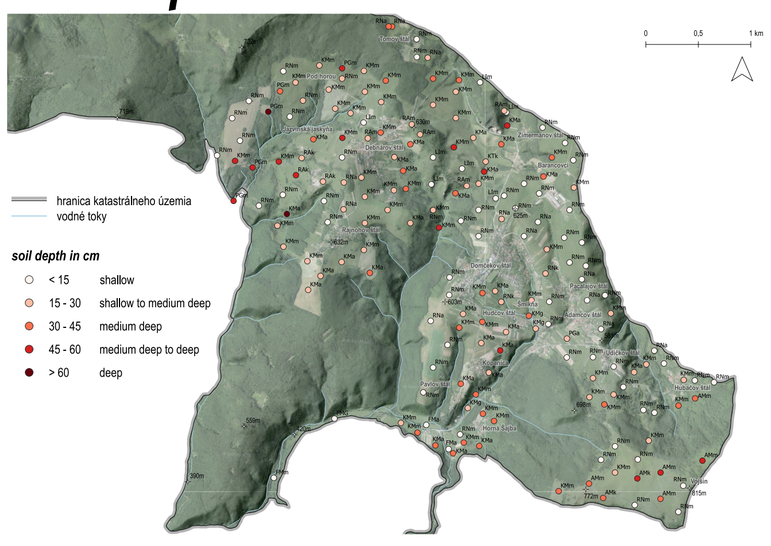


types of land use change	ha	%
intensification	69,70	3,08
extensification	415,99	18,40
preservation	1775,59	78,52
	2261,28	100,00

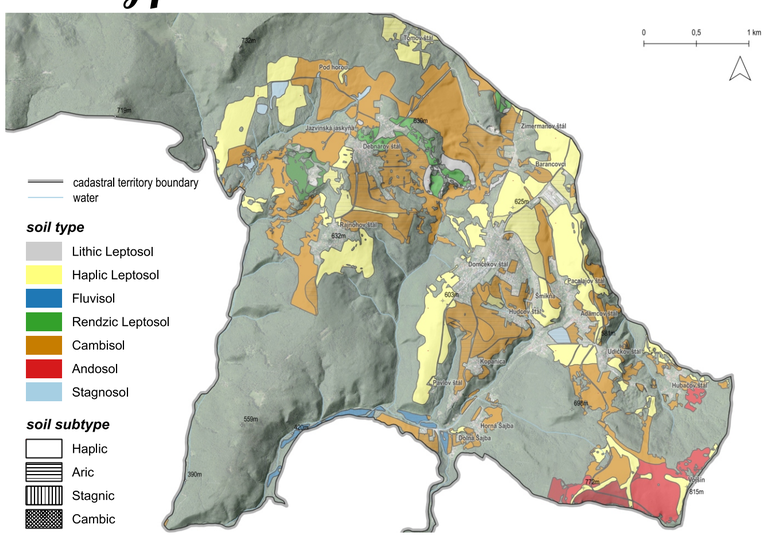
identification of soil horizons



soil depth



soil types

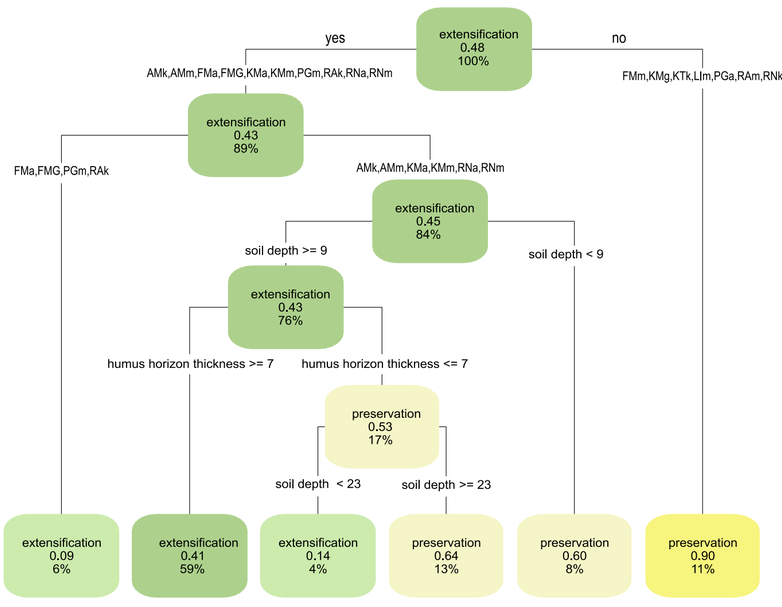


Qualitative properties of the soil - the thickness of the humus horizon, depth of the soil and soil types were processed for agricultural land on the basis of a field survey. The location of soil probes was determined on the basis of a regular network of points with a spacing of 250 m, while the location of some probes was specified according to the conditions of relief and land use. Probe holes were drilled at variable depths (2-80 cm, always at least to the soil-forming substrate) and soil horizons and their selected properties were identified, followed by soil types, subtypes, soil species, depth and soil skeleton. The depth of the soil ranged from 2 to 70 cm. Shallow to medium deep soils predominated. According to the evaluation of the pedological survey, the following soil groups are represented: initial soil group (Fluvisol , Skeletic Leptosol, Lithic Leptosol), cambic soil group (Cambisol), rendzina soil group (Rendzic Leptosol), hygromorphic soil group (Stagnosol), cultivation soil group (Anthrosol), group Andean soils (Andosol).

The preservation process took place on shallow to medium-deep soils, which are mainly used as meadows. They are accessible and located near the village center and around the individual settlements. The extensification process took place mainly on medium to deep soils in the entire cadastral area. These are areas gradually overgrown with vegetation, on which succession processes are applied and mowed meadows . In the past, they were managed with varying intensity. The reasons for abandonment are various - natural-production factors, socio-economic-demographic factors, ownership relations and their arrangement, the use of economic instruments, which are indirectly reflected in the care of the landscape and its use.

Potential impact of soil characteristics (soil subtype, soil depth, humus horizon thickness) on types of land use change

The evaluation of the relationship included processes of change that express preservation and extensification. Intensification processes have not been evaluated. They were represented only 3% and took place mainly in the group of forest elements.



preservation

	soil subtype	impact of soil characteristics on land use change
regardless of soil depth and humus thickness	Fluvisol (Ochric), Stagnic Cambisol, Anthrosol (Dystric) Lithic Leptosol, Stagnosol (Aric) Rendzic Skeletic Leptosol Cambic Skeletic Leptosol	90%
soil depth < 9 cm, humus thickness regardless	Skeletic Leptosol (Aric) Skeletic Leptosol	60%
soil depth > 9 cm, humus thickness regardless < 7 cm	Skeletic Leptosol (Aric), Cambic Skeletic Leptosol	64%

extenzification

	soil subtype	impact of soil characteristics on land use change
regardless of soil depth and humus thickness	Fluvisol (Aric), Gleyic Fluvisol, Fragic Stagnosol,Rendzic Leptosol (Aric)	9%
soil depth > 9 cm, humus thickness regardless >7 cm	Haplic Cambisol, Andosol (Aric) Haplic Andosol, Cambisol (Aric)	41%
soil depth > 9 cm, humus thickness regardless < 7 cm	Haplic Cambisol, Cambisol (Aric), Stagnic Cambisol	14%