Land evaluation data bank of Slovakia

Bonitačná banka dát o pôdach Slovenska

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Abstract: Precise categorisation and permanent and completed evidence of agricultural land are necessary for rational utilisation of land fund in Slovakia. Current complex evaluation information system is the only system of this category in our country and consists of the following parts: (1) land-cartographic information system, (2) evaluation data bank. Evaluation data bank includes data about all evaluated soil-ecological units in basic classification, according to users, cadastral areas and higher units of administrative state division. Evaluation data bank is open system updated, improved and widened constantly. It is important source of information used for calculation of land fund evaluation, calculation of financial damage, calculation of land tax, setting of land rent level, estimate of orientation prices for purchase or sales of agricultural land. Recently the data from evaluation data bank have been used for setting and specification of criteria for classification of agricultural land and subjects into the less-favoured areas in Slovakia.

Keywords: land evaluation data bank, evaluated soil-ecological unit, cadastral area, agricultural subject, evaluation of agricultural land fund

Abstrakt: Pre racionálne využívanie pôdneho fondu Slovenska je potrebná správna kategorizácia a stála a dokonalá evidencia poľnohospodárskej pôdy. Súčasný komplexný bonitačný informačný systém (BIS), ako jediný svojho druhu u nás, pozostáva z dvoch častí: (1) Pôdno-kartografický informačný systém. (2) Bonitačná banka dát (BBD). Bonitačná banka dát obsahuje údaje o všetkých bonitovaných pôdnoekologických jednotkách v základnom členení podľa užívateľov, katastrálnych území a vyšších jednotiek administratívneho členenia štátu. Počet súborov ako aj ich rozsah nie je uzavretý. BBD je otvorený systém, ktorý sa sústavne dopĺňa, zdokonaľuje, rozširuje a aktualizuje. Je dôležitým zdrojom informácií, ktoré sú využívané na výpočet ocenenia pôdneho fondu, výpočet majetkovej ujmy na chránenom pôdnom fonde, výpočet dane z pozemkov, pre stanovenie výšky nájmu za pôdu a na stanovenie orientačných cien pri kúpe a predaji poľnohospodárskej pôdy. Údaje z BBD sú využívané aj pri tvorbe a upresňovaní kritérií pre zaradenie poľnohospodárskej pôdy a poľnohospodárskych subjektov na území SR do jednotlivých poľnohospodársky znevýhodnených oblastí.

Kľúčové slová: bonitačná banka dát, bonitovaná pôdno-ekologická jednotka, katastrálne územie, poľnohospodársky subjekt, ocenenie poľnohospodárskeho pôdneho fondu

INTRODUCTION

With regard to the utilisation of agricultural land fund, it is the strategic objective of the EU to develop multifunctional agriculture. On one hand, the productive features of competitive agriculture will be taken care of, on the other, such agriculture should also provide for other than production features, such as maintaining the natural quality of individual natural sites, environmental and non-agricultural activities targeted at the sustainable development of rural land.

In order to reasonably utilise the diverse land fund of Slovakia for various prognosis, analyses and accurate application of economic instruments; *correct categorisation is required, plus keeping the permanent and accurate records on agricultural land*, based on the natural, soil and economic criteria.

First land evaluation classifications, and keeping of land records date back to 17th century. The permanent cadastre office was established as early as in 1817. The office divided all the available lands into categories – types of land similar to those used at present. The soils were then evaluated by the net yield. The geodetic representation of land parcels was introduced as a part of the system. At this development stage of land evaluation, the educational properties were not yet used.

In the subsequent stage of development, land evaluation surveys took place in certain areas in Slovakia. These were targeted at gathering information on production rate, basic physical and chemical properties, profile

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structure and water regime of soil and described in maps in the scale of 1 : 75 000. However, the information gathered during these surveys could not become part of the nation-wide land system, because they did not cover the entire territory.

1945 saw the launch of the general land evaluation survey of Slovakia, which has gradually developed into the so-called geonomic soil survey. However, this survey was too general (4 probes per one cadastral area). For several decades, the information gathered by the survey was used to split the land into regions and to centrally control the agricultural production.

The origins of modern soil science and up-to-date and complex land information system date back to 1959–1960 which saw the launch of *detailed and complex land survey of agricultural lands*. The survey took place until 1970, by using common methodology, and it consisted of mapping all the agricultural lands (except the land in intravilans) in the scale of 1 : 10 000. The information so gathered, especially the information from land maps acquired during the complex land evaluation survey, became the basis for mapping the soil-ecological units within the entire acreage of agricultural land in Slovakia. At the same time, the research of land production and cost parameters took place. The harvests and inputs were monitored over a number of years, within a dense network of homogenous (in terms of soil quality and environment) land tracts, representing all the important soil-ecological units. Since 1980, the result of this work became the basis for building the soil science sub-system of the Automated Land Information System, and later on, for building the *land evaluation information system and prices of agricultural land.*

The current *complex land evaluation information system (LEIS)* is one-of-a-kind system in Slovakia, and consists of two parts:

• *Land-cartographic system* to be further divided into:
– physical collection of maps of evaluated soil ecological units in the scale of 1 : 5 000;
– collection of maps of evaluated soil ecological units in digital format.

The maps have been prepared and administered by the Research Institute of Soil Science and Land Protection in Bratislava.

• *The evaluation data bank (EDB)* created and administered by the Research Institute of Agriculture and Food Economics in Bratislava; consists of basic data and data processing software to create output reports, surveys, scenario planning, etc.

EVALUATION DATA BANK

Input data

The input data in EDB are registered, and updated in the following categories:
– register of evaluated soil-ecological units
– register of agricultural subjects
– codes of territorial units
– economic information file.

Register of evaluated soil-ecological units

It is the most important information file in EDB. This file contains the results of site evaluation survey, whereby the total acreage of the agricultural land was divided into specific evaluated soil ecological units (ESEU). The basic unit of registration is the cadastral area, and the register also includes information on affiliation of each ESEU with the specific agricultural subject. ESEU data is structured into a data sentence which provides information on the climate, soil type, granularity, topography, soil depth, and contents of soil skeleton. In addition, the data on the representation and acreage of individual crops is stored with the register. Thus, the register makes it possible to prepare overviews and characteristics of the land fund by all of the above specifications, such as granularity, topography, acreage of vineyards, hop gardens, etc. and combinations thereof.

This is the largest file in EDB, and it is constantly updated. As of June 2002, the register contained 100 598 data sentences, with 2 364 303 hectares of agricultural land (AgL) registered in Slovakia. Of that, arable (ArL) land acreage amounted to 1 457 960 hectares; acreage of permanent grass covers (PGC) amounted to 867 557 hectares, vineyard acreage to 21 117 hectares, 14 086 hectares of intensive and 2 333 hectares of extensive orchards; and 1 250 hectares of hop gardens.

Register of agricultural subjects

Register of agricultural subjects is a list of land farming businesses – agricultural and other co-operatives, joint stock and limited liability companies, and private farmers. The register of subjects contains user's identification code, which consists of subject's region and district code, corporate organisation code and three-digit code which identifies the enterprise. In addition, the register contains names of individual subjects, and their Business Identification Numbers (BIN). Also, the current acreage of agricultural land owned by the subject is registered here, as well as the average price of agricultural land and classification of the land price group. This data is registered in the original format, and the new data are added after update is completed. Other registered data include the year and serial number of the session of the interdepartmental Commission which approved the calculation of land price and classification of the subject in the land price group, reasons for calculation – whether this is an updated, newly established, or revised subject, address and contact information for the subject. The data can be processed by using any selected method of grouping (district, region, corporate organisation, size of subject, land price group).

The register is constantly updated over the year and new data is added, and by the end of each calendar year, the data is stored and archived.

Codes for territorial units

The agricultural land is registered in EDB by cadastral areas. This is due to the fact that the land acreage in the cadastral area is relatively stable, and varies mostly in case of land occupation. The fluctuations in the land acreage of individual agricultural subjects mostly take place due to the exchange of land among the subjects, allocation of land to private farmers and reorganisation of co-operatives, whereby the big co-operatives tend to dissolve. Besides, the cadastral area is one of the basic identification territorial units in the real estate register.

The original "kuze_reg" code file consisted of the title of cadastral area, 9-digit local evaluation code of the cadastral area, which identified both the region and district, where the cadastral area was located. In order to simplify and accelerate the calculations and creation of output reports, new codes were added, such as 6-digit code of cadastral area which allowed to link EDB to the geodetic database; and in 2001, the codes and names of communities were added to the code file, because the community was determined as the basic territorial unit in the new classification of the territory of the Slovak Republic for the purpose of supporting less favoured areas.

Additional code files in this block are used to designate the data groupings and outputs on the district and region level.

Economic information data bank

Contains data on economic features of ESEU. These include: production parameter file, type structure file, and land price file.

Production parameter file represents data on the normative production in t. ha^{-1} for wheat, rye, barley, oat, grain maize, sugar-beet, potatoes, silage maize, multi-annual feeding crops and permanent grass covers. This data was determined for all the ESEUs, where the growing of the above crops is economically viable. The data result from the economic evaluation survey and from the co-operation with specialised plant production research facilities. The ESEU production parameters result from the calculations based on the HPJ normative; after adjustment to indices which express the impact of certain natural factors on the crop yield (for example, the same granularity in diverse climatic regions has a different impact – sandy soil in dry climate has an adverse effect, while the same granularity proves beneficial in humid climate; similarly the topography, soil depth, and contents of the soil skeleton).

The type valuation structure file represents the basis for pricing of crop production. The type valuation structures (25 TVS) represent the proportion (expressed in per cent) of wheat, barley, oat, rye, grain maize, sugar-beet, silage maize, potatoes, and multi-annual feeding crops grown at the arable land. These were created from the results of analysis of relationships among the crops and agro ecological conditions for their growing. The type structures are used to evaluate the plant production and to determine the model structure of crop areas. In fact, the structures reflect the principles of streamlined technology and environmentally and economically balanced crop growing technology.

The land evaluation files contain price lists for arable land and permanent grass covers prepared for 5-digit and extended 7-digit ESEUs used in the calculation of average and total price of agricultural land, production-economic evaluation of 7-digit ESEUs used in the calculation of pecuniary loss in protected areas, yield rate of ESEUs – to determine and compute the rate of land lease (required for the legislative regulations which are underway and relate to the long-term lease of agricultural land).

Utilisation of EDB data base

EDB data is processed in an interactive environment in a database system, by means of structured query language INFORMIX-SQL and INFORMIX-4GL language, especially designed for the development of database applications.

a) Evaluation of agricultural land fund

At present, in order to establish the amount of subsidies to support farming in mountain and other agriculturally less favoured areas, it appears necessary that the agricultural subjects are assigned to the land price groups, according to the average price of agricultural land used by the subject. The output report was created for this purpose – a sample is shown in Table 1.

According to the Methodical instruction for submission and processing applications filed by the land farming subjects with the aim to change the land price; and issued by the Ministry of Agriculture of the Slovak Republic effective from 1 January 1998, the subjects request changes in the land price due to change in the used acreage (increase, decrease), due to change in the land use (grassing, ploughing); and due to land revaluation. The calculation of land price is also requested by the newly emerged subjects.

As shown Table 2, since 1995 the number of subjects requesting calculation of land price was growing (emerging private farmers, restructured cooperatives) reached maximum in 2000, and remained at roughly the same level in the last two years.

We have prepared an overview of average prices of agricultural land, arable land, and permanent grass covers by individual regions in the Slovak Republic, as of 31 December 2001; based on the evaluation data for agricultural subjects and cadastral areas.

b) The calculation of pecuniary loss in the special farming system for the agricultural land fund

In order to calculate the pecuniary loss, we have established the yield rate for the evaluated soil-ecological units, as a product of normative harvests in the respective type pricing structure, and realisation prices, i.e. the average value of individual agricultural commodities sold by the agricultural producers in the Slovak Republic. The monthly sales statistics for agricultural products

Table 1. Calculation of land price for the agricultural subject, using 7-digit ESEU

ESEU	Acreage in hectares			Total price AgL	Average price in SKK/hectare		
	AgL	ArL	PGC	SKK	AgL	ArL	PGC
0289212	4.00	4.00	0.00	26 000	6 500	6 500	5 000
0712013	40.00	40.00	0.00	1 472 000	36 800	36 800	27 600
0712033	8.00	8.00	0.00	277 600	34 700	34 700	26 000
0757202	9.00	9.00	0.00	238 500	26 500	26 500	19 900
0772243	33.00	33.00	0.00	643 500	19 500	19 500	14 600
0772442	34.00	34.00	0.00	527 000	15 500	15 500	11 600
0772443	32.00	29.00	3.00	484 300	15 134	15 500	11 600
0787242	3.00	3.00	0.00	57 000	19 000	19 000	14 300
0787412	10.00	10.00	0.00	185 000	18 500	18 500	13 900
0789212	5.87	5.87	0.00	38 155	6 500	6 500	5 000
0789512	13.00	9.00	4.00	78 500	6 038	6 500	5 000
0790462	40.14	15.00	25.14	338 550	8 434	10 000	7 500
0871442	22.00	2.00	20.00	331 000	15 045	19 500	14 600
0887212	13.00	13.00	0.00	214 500	16 500	16 500	12 400
0890462	15.00	5.00	10.00	125 000	8 333	10 000	7 500
0892682	79.00	34.00	45.00	446 000	5 646	6 500	5 000
0892882	28.00	8.00	20.00	152 000	5 429	6 500	5 000
Cadastral area	389.01	261.87	127.14	5 634 605	14 484	17 945	7 357
0789412	9.07	9.07	0.00	58 955	6 500	6 500	5 000
Cadastral area	9.07	9.07	0.00	58 955	6 500	6 500	0
SUBJECT	398.08	270.94	127.14	5 693 560	14 303	17 562	7 357

AgL = agricultural land, ArL = arable land

from primary production and quarterly sales statistics for plant products from primary production, as well as the statistics for grains, leguminous vegetables and oil seed crops were used as the primary data source to determine the realisation prices. The above statistics show the revenues (excl. VAT) in SKK and sales in kg for each commodity. The average value of sales was computed from this data; as a ratio of earnings and sales in the natural form of agricultural products.

Table 2. Overview of subjects, with calculation of the land fund evaluation in the past 7 years

Year	Subject			Total
	updated	newly established	revised	
1995	104	104	30	238
1996	176	145	16	337
1997	198	165	16	379
1998	337	466	10	813
1999	567	482	13	1 062
2000	637	574	9	1 220
2001	695	327	34	1 056
by 30 June 2002	342	159	7	508

Table 3 shows the sample calculation of pecuniary loss for an agricultural subject.

Table 3. Calculation of pecuniary loss in protected land fund
User: Agricultural subject
Level of protection: PHO, class 2 – internal

ESEU	Acreage of AgL	Production-economic evaluation	Pecuniary loss
Cadastral area	(hectares)	(SKK/hectare)	(SKK)
0789212	3.59	10 426	11 229
0792682	0.47	5 824	821
0871442	8.18	8 788	21 566
0892682	26.14	5 658	44 370
0892882	20.87	3 112	19 484
Name of cadastral area	59.25	1 645	97 470
0289212	4.00	10 327	12 392
0787422	3.50	8 080	8 484
Name of cadastral area	7.50	2 784	20 876
Agricultural subject	66.75	1 773	118 346

AgL = agricultural land, ArL = arable land

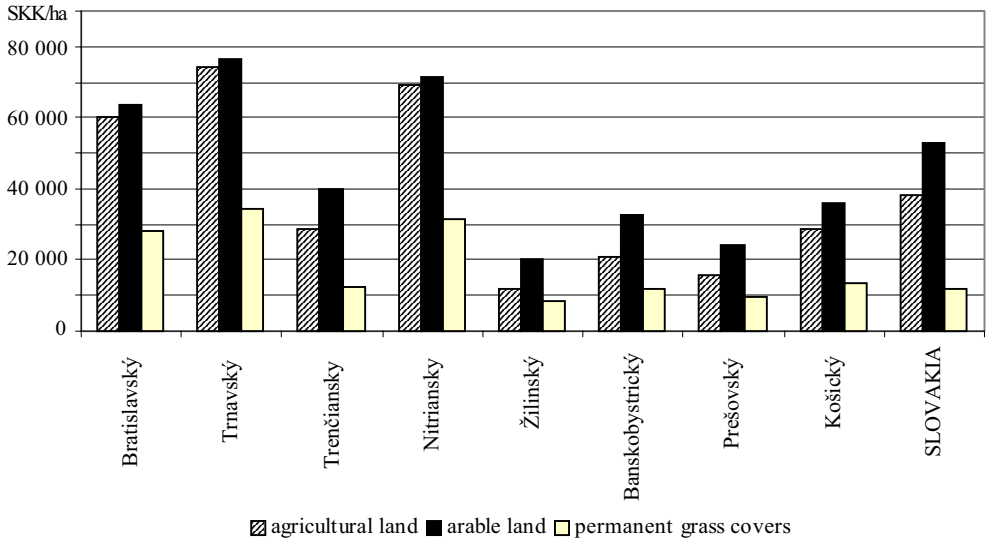

Figure 1. Average land price in the regions of the Slovak Republic, as of December 31, 2001

c) Characteristic features of the land fund

The information on the evaluated soil-ecological units makes it possible to create the basic agri-environmental characteristics of agricultural business, administrative unit, and, similarly, it allows classification by the agricultural land, arable land, permanent grass covers, hop farms, vineyards, orchards; and breakdown by:

– soil granularity (light, medium, heavy, and very heavy);
– topography (lowland, rolling plain, easy, medium grade, violent descent, scarp, and sheer);
– soil skeleton contents (no skeleton, poor, medium and heavy skeleton);
– soil depth (deep, medium depth, and shallow soils);
– slope aspect ratio (no aspect ratio, southern, northern, and joint eastern and western aspect ratio);
– elevation above sea level;
– climate;
– main land units.

We have also used this data to select the criteria and determine specific less favoured areas, pursuant to the EC Council Regulation No 1257/1999, Article 20.

Additional options of EDB utilisation

– calculation of land tax;
– determine the amount of rent for the agricultural land;
– determine indicative sales and purchase prices for the agricultural land.

CONCLUSION

The evaluation data bank, as part of the land evaluation information system, contains the data on the entire territory of Slovakia. It contains data on all the evaluated soil-ecological units, in the essential breakdown by users (agricultural subjects), by cadastral areas and by higher state administration units. The evaluation data is arranged into several files by subject matter. The number and extent of files is not complete. EDB is an opened system, which is constantly updated, perfected and expanded. It has become an important source of information, which is used *to calculate the value of land fund* used by the individual agricultural subjects. The purpose of such calculation is to determine the amount of subsidies to support farming in mountain and other agriculturally less favoured areas by land price groups and land types. Furthermore, EDB data are used to *calculate the pecuniary loss* in the special system of agricultural land fund; to calculate *the land tax*, *to determine the amount of rent* for the land, to *establish indicative sale and purchase prices for the agricultural land*. This data is also used to *prepare comprehensive quantifications* for the needs of MA SR and other agricultural organisations. The data was recently to implement the EU reform steps *– to establish and specify criteria and, subsequently, to quantify the classification of agricultural land and agricultural subjects on the territory of Slovak Republic into the agriculturally less favoured areas*, and to locate key issues of concern.

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