ACTA UNIVERSITATIS CAROLINAE
2003 GEOGRAPHICA, No. 1, PAG. 403–414

# Agricultural production in Bratislava's sub-urban space (Pridunajsko Microregion)

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## Abstract

In this paper an attempt is made analyse of agricultural production in Bratislava's sub-urban space. As the space is localized in southern part of Senec region seems to be the most suitable for. Five municipalities of the southern edge of this region, including Dunajská Lužná, Hamuliakovo, Kalinkovo, Rovinka and Miloslavov have associated into Pridunajsko Microregion, which has represented the intensive use of highly productive agricultural landscape, with all respective features (predominance of artificial eco-systems over natural ones, high share of arable land reaching to 96 per cent, concentration on highly demanding crops, high level of mechanization, utilization of chemicals, irrigation, etc.).

**Key words:** Pridunajsko Microregion, Sub-Urban Space, highly productive agricultural

## Introduction

Research of spatial aspects of agricultural activities in Slovakia is recently acquiring some new dimensions. We are monitoring the most appropriate regions for these structures as well as regions showing not very high suitability for agriculture (so-called less favoured areas). Special attention must be paid to territories with a high concentration of human population in urbanized areas. These territories can either offer favourable or disadvantageous conditions for agricultural activities. In case of the latter ones, it is necessary to invest more capital into basic food production to maintain the elementary food supply for the urbanized area or to use these investments to cover cost of the food's transportation from remote regions. The most favourable variant can occur where good agro-ecological qualities are present in sub-urban areas or even directly in urbanized areas. The latter case is often observable in most Slovak towns and cities located in lowlands and warm basins. Bratislava, the capital of Slovakia has extraordinarily good agro-ecological conditions.

## Study area

According to the recent administrative organization of Slovakia's territory (existing from 1996), the Pridunajsko Microregion lies in the district of Senec in southern part of Bratislava County near the state border with Hungary. The Microregion in-

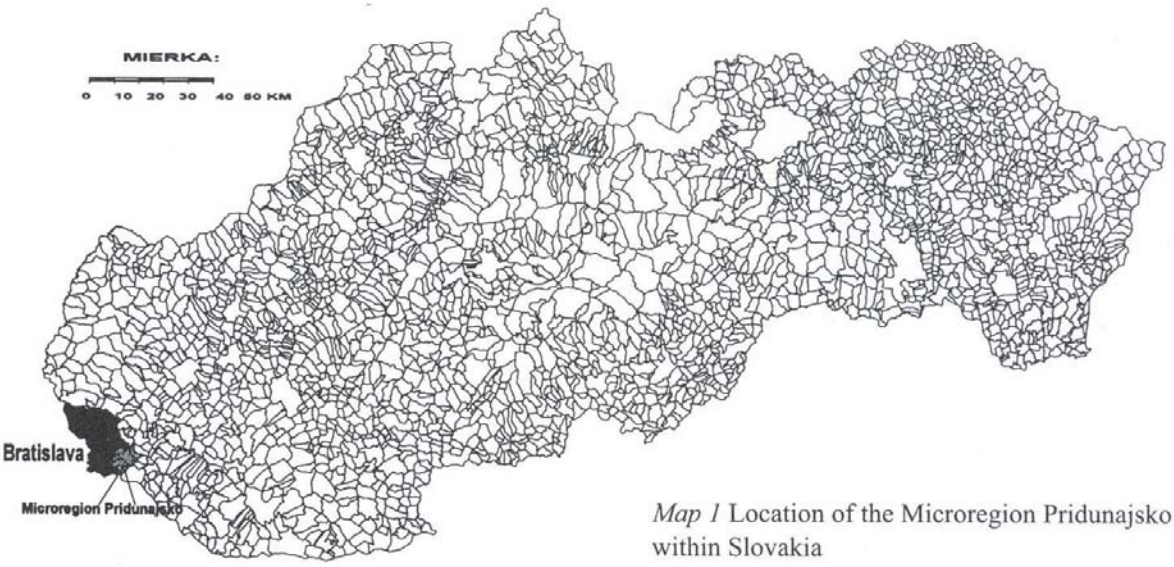
cludes 5 settlements (communities) – Dunajská Lužná, Hamuliakovo, Kalinkovo, Miloslavov, Rovinka – and 7 cadastral areas (the village of Dunajská Lužná embraces 3 cadastral areas: Jánošíková, Nová Lipnica and Nové Košariská). These settlements form a southern spur of the Senec district, with only 2 km long border line separating it from the rest of the Senec region (the total length of the Microregion's border line reaches to 45 km). The Microregion borders the districts of Bratislava II and V in the west and the district of Dunajská Streda (Trnava County) in the east. The researched territory is situated the the Danube basin, on the left side of the river, in an immediate contact on the Gabčíkovo Hydroelectric Power System the Hrušov Water Reservoir protruding to the Microregion's territory. Position of the Microregion in Podunajská Flatland which is one of the most fertile areas of Slovakia seems to be essential from the aspect of this research. A high-quality soil together with favourable climatic conditions have predetermined the agricultural role for this area.

This includes for example economico-geographical position, i. e. position of an agricultural unit towards consumers and companies processing agricultural semi-products. From this aspect, location of the researched area is perfect. The Pridunajsko Microregion is situated near the capital city of Bratislava, moreover, it is a part of Bratislava's sub-urban space. Thus, the Microregion represents a part of the Capital's agricultural production base, with a useful closeness of the centre with numerous consumers. The closeness of the consuming market enables to supply products of a short expiry period, as well as products with higher transport requirements, which is supported by a strong demand for fresh agricultural products. The size of the consumers centre allows production of highly specialized agro-products, which could not be successful in small-scale markets.

Transport position is an important aspect. In agricultural sector, transport costs reach the highest levels comparing to other production branches. Fuel consumption is very high mainly in case of large agricultural companies with a vast soil fund. Transport is inevitable as a supply element as well as in connection with consumers. That is why the transport position of an agricultural production company towards major transport communications is a significan economic factor.

In the Pridunajsko Microregion, road transport plays a dominant role. A 1st class road I/63 makes a good connection with Bratislava (towards northwest) as well as with Šamorín, Dunajská Streda and Komárno (towards southeast). In the respective area, I/63 route leads across the villages of Rovinka and Dunajská Lužná. The rest of the Microregion's road network belongs to the 3rd and lower classes of road category. The villages of Kalinkovo and Hamuliakovo are linked with Dunajská Lužná and Šamorín by a 3rd class road, which enables connection to the major I/63 route. In comparison with others, the village of Miloslavov has the worst transport connection, mainly to principal towns and cities (Šamorín, Bratislava).

Railway transport does not have as significant role in the Microregion as the road transport system, which is a consequence of exentricity towards centres of the region. A railway communication connecting Bratislava, Dunajská Streda and Komárno crosses only a north-eastern spur of the researched territory. There are only two railway stations in the Microregion's territory – Alžbetin Dvor and Nové Košariská, the latter one is 1.5 km towards north-east from the residential built-up area.




*Map 1* Location of the Microregion Pridunajsko within Slovakia

River transportation potential has not been used for the agricultural production requirements so far. Southwestern part of the Microregion borders on Slovakia's major water way – the Danube river (with its artificial part – Hrušov Water Reservoir). The closeness of this transport corridor seems to be crucial mainly in international context.

Considering the presence of the above mentioned I/63 route of a supraregional importance with high transport intensity, we should emphasize a new aspect which is the excellent transport position of the Microregion. This position shows new development opportunities that do not necessarily have to bring positive effects for agricultural production. The good transport location creates a potential for development of residential functions, enterprising – mostly in services (board services, accomodation), but also for tourism development, etc.. This can have a very positive effect on agricultural production (increasing number of consumers – residents or visitors arriving here or travelling through this area) as well as a negative impact (a lower quality of agroicultural products as a consequence of environment contamination by transportation exhaust fumes, extraction of agricultural land for other than agricultural purposes, etc.).

### Land use of study area

The Pridunajsko Microregion is characteristic with its intensively used agricultural landscape, which can be visible in the soil fund structure and its utilization. Agricultural soil covers 73.7 per cent of the Microregion's area, with arable land reaching even to 95.5 per cent. Predominance of unnatural ecosystems, agro-ecosystems, is standard in this type of landscape. Residues of the natural ecosystem cover a small part of the soil fund here with only 2.6 per cent represented by Danube alluvial forests, with the lowest share in the Microregion's soil fund structure. Water surface covers 15 per cent of the Microregion and is concentrated mostly to the south-western part of the area in the Hrušov Water Reservoir being one of the elements of the Gabčíkovo Hydroelectric Power System. Built-up areas and unclassified areas cover only 5.7 and 3 per cent, respectively.

We have introduced a peculiar category of agricultural soil fund structure named *disused land*. Obviously, this type of land is not registered and is usually categorized according to the latest way of use. Creating the landuse map, we have introduced a special category for this type of soil. Historically, this category represented mainly arable land, however, we can find also disused vineyards and some other items in this territory. At any case, this land is a private property. The reasons of this stage can be variable. For example, the land owner gained the soil but due to lack of financial sources he has not been able to run an agricultural production on it. We can also mention an obvious problem concerning unclear property relationship towards the land or a shift to a different way of the soil utilization, etc..

Because of the high quality of the soil in the Microregion (high soil prices) and thanks to a relatively vivid soil market in this area with a strong demand for the land, we can expect that the above-mentioned disused soil will be utilized again in a short time. However, it is difficult to predict the way of the land's utilization. A gradual extraction of the quality soil from agricultural soil fund has been observed here, with significant change of its utilization – mostly towards residential or recreational functions.

### Characteristic of the Pridunajsko Microregion's agricultural enterprises

Úsvit Co-operative Farm in Dunajská Lužná is the largest and most significant agricultural company in the Pridunajsko Microregion, farming over its land (3,889 hectares) in every cadastral unit of the Microregion's territory. This farm runs both plant and animal productions and in comparison with other Microregion's agricultural companies it offers a multifarious variety of products – plant crops and animals. A more detailed characteristic can be found in the other part of the paper (see below in this paper).

There are two more agricultural co-operative farms in the Microregion, which, however, operate only marginally in this territory. They have their home-location in the neighbouring cadastral areas of Šamorín and Podunajské Biskupice (being an administrative part of Bratislava). Modrý Dunaj Co-operative Farm (with its headquarters in Šamorín) cultivates merely one field in the southeastern part of Jánošíková cadastral unit (89.3 hectares). Podunajské Biskupice Co-operative Farm runs an allotment in the northeastern part of Rovinka cadastral unit (15 hectares). This small allotment is a result of incongruity between administrative (cadastral) and natural field borders (the field is separated by a railway line from the remaining part of Rovinka's territory), yet it has been more effective to include these 15 hectares into a large agricultural territory under the Podunajské Biskupice Co-operative Farm operating here. The both above-mentioned companies run only plant production (cereals) in the respective territory.

Agrobio, a. s., Hubice (77.8 hectares in the researched area) and SPŠ Malinovo (95 hectares – educational estate) represent the following agricultural farms operating here (the above-mentioned allotments in the Microregion's territory constitute only a small part of their estates). Both of them run only plant production (cereals, corn and oil-rape).

The remaining agricultural enterprises are solely domestic ones running their production and having their headquarters in the Microregion's territory. These have a narrow specialization of their production: Danubius Frukt s. r. o., Dunajská Lužná (fruit production – 47 hectares), Jutta Jordan s. r. o., Dunajská Lužná (vegetables and potatoes production – 45 hectares), Penta s. r. o., Miloslavov (duck farming and breeding) and HYKO a. s., Rovinka (turkey farming).

Smallholders (SHs) in the Microregion focus mostly on plant crops, while animal production has merely additional function here (only one of the surveyed small farmers focuses on animal husbandry). Production allotments of the small farmers' estates cover areas of a different scale, from 118 hectares (SH 9 in Tvrdošovce) to only 10 hectares (which was one of the criteria for selection of the small farmers into the survey). The local smallholders (SHs 1–5) work usually on smaller areas of private estates (up to 20 hectares), while those from Šamorín and Tvrdošovce outside the Pridunajsko Microregion (SHs 6 – 9) operate on much larger areas. An interesting fact is that there is no local smallholder in the Microregion hiring larger land areas from the locals. Some larger land fields (over 10 hectares) have been hired by smallholders from Šamorín and Tvrdošovce, this is why the most powerful small farmers operating on the Microregion's arable land are non-locals.

*The Úsvit Co-operative Farm, Dunajská Lužná seems to hold a unique position in* the Pridunajsko Microregion. As already mentioned, it operates in all cadatstral units on 3,889 hectares (75.6 per cent of the Microregion's agricultural land). Excluding the two companies operating only marginally here, we can consider the Úsvit Co-operative Farm as the only agricultural farm in the Microregion. This enterprise has existed since 1972, when five original small farms active in this territory merged into a large farm, and has kept this unique position in the region untill 1993, when several new private agricultural enterprises arose here. However, small companies can hardly compete with the large co-operative farms with advantage of a large-scale production, well-experienced technologies, high initial investments and some more advantages. A good way out of this stage is to focus on new, special products and thus avoid the competition with the large-scale production of the co-operative farm manufacturing routine products in big volumes. It seems that the local small farmers have realized this fact, which is shown by the specific structure of their production. Four more prospering agricultural companies have specialized in one product type, with successes on inland as well as foreign markets. On the contrary, the local small producers who have persisted in production of traditional crops express their dissatisfaction with their results on agricultural products' markets (in competition with large-scale producers) and they hold this production as additional only. Exclusively agricultural production has been observed only in case of the smallholders registered outside the Microregion (SH 6 to 9).

#### Orientation and production of the Pridunajsko Microregion's agricultural companies

Orientation of the Microregion's agricultural production results from the geographical position of the researched territory. The Pridunajsko Microregion lies in Podunajská Flatland, which is most intensively utilized agricultural land in Slovakia. Within the

structure of agricultural producers, there are only two ones (HYKO a. s., Rovinka and Penta s. r. o., Miloslavov) dealing with animal production and one running both plant and animal production (the Úsvit Co-operative Farm). The remaining producers focus on plant production exclusively. Within the group of the surveyed SHs, a predominance of plant production has been observed (animal husbandry for self-consumption only). SH 10 in Miloslavov is an exception with goat breeding.

The orientation of the Microregion onto plant crops production is given by the position in Podunajská Flatland being one of the most fertile territories of Slovakia. The Microregions's agricultural soil fund belongs to so-called corn/sugar beet production type which represents the highest quality from the aspect of the soil fertility, although agronomic value of the soil is permanently diminished by insufficient humidity. It is a warm region with blacklands, where moisture demands in the growing season can be fulfilled only in case of cereals. This is the reason why wheat and barley cover almost 50 per cent of the Microregion's arable land area.

Agricultural companies of the Pridunajsko Microregion dealing with plant production are the following: Úsvit Co-operative Farm, Dunajská Lužná, Modrý Dunaj Co-operative Farm, Šamorín, Podunajské Biskupice Co-operative Farm, Danubius Frukt s. r. o., Dunajská Lužná, Jutta Jordan s. r. o., Dunajská Lužná, Agro-Bio a. s., Hubice, SPŠ Malinovo and nine of the ten surveyed smallholders.

The variety of crops and number of species produced by particular enterprises differs. The most various production supply is offered by the Úsvit Co-operative Farm thanks to the size of the land it cultivates. Production of this company includes the following nine crops: wheat, corn (grain and ensilage corn), barley, oil-rape, alfalfa, sugar-beet, soya, fodders and sunflower.

The remaining agricultural companies in the Pridunajsko Microregion produce one or two sorts of plant crops. There are two main reasons of this. First, the production is narrowly specialized, such as in case of Danubius Frukt s. r. o., Dunajská Lužná, producing only fruits (mostly apples, pears and cherries) and Jutta Jordan s. r. o., Dunajská Lužná with vegetable-growing (root and stalk vegetable) and production of potatoes. Second, there are several companies acting only marginally in the Microregion's territory – with only one or two allotments here, thus the number of cultivars grown here is small. For these enterprises, the production gained in the Microregion represents only a small part of their total production volume. This concerns the following companies: Modrý Dunaj Co-operative Farm, Šamorín and Podunajské Biskupce Co-operative Farm (cultivating wheat in the Microregion), SPŠ Malinovo (wheat and corn) and Agro-Bio a. s., Hubice (wheat and oil-rape).

The Microregion's smallholders grow no more than three of the crop sorts. An interesting point is that the small farmers operating on smaller land areas (SHs 1, 4 and 5) offer a more various spectrum of crops, while those with larger areas focus on merely one crop usually (SHs 7, 8 and 9, SH 6 is exceptional with 3 crops). The smallholders in the Pridunajsko Microregion focus generally on cereals most of all (wheat, corn, barley and oats).

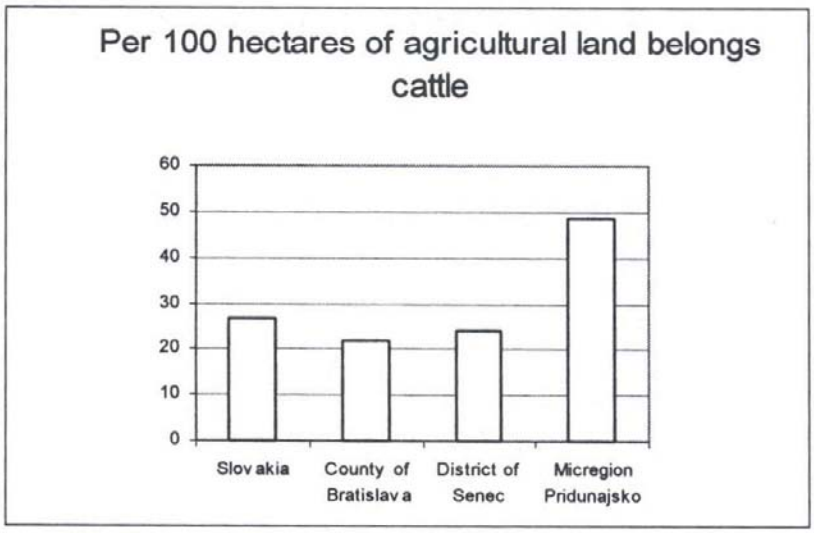



*Fig. 1*

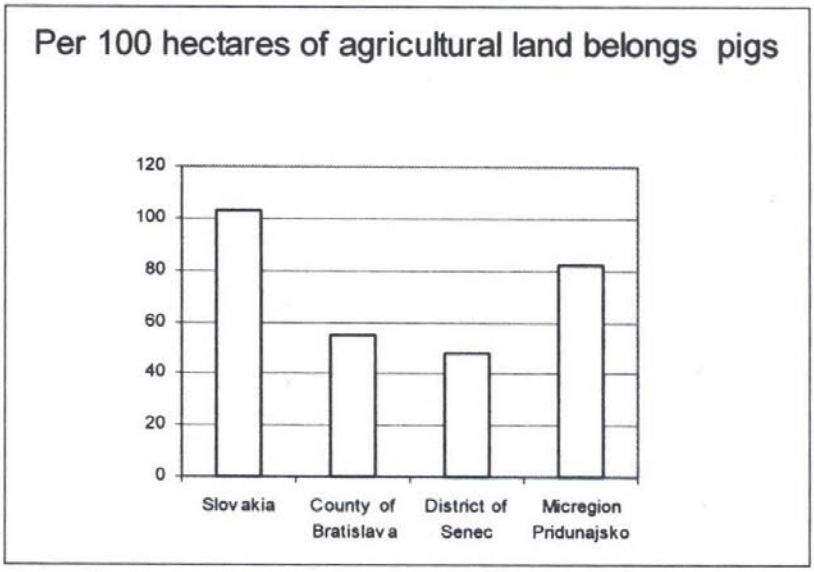



*Fig. 2*

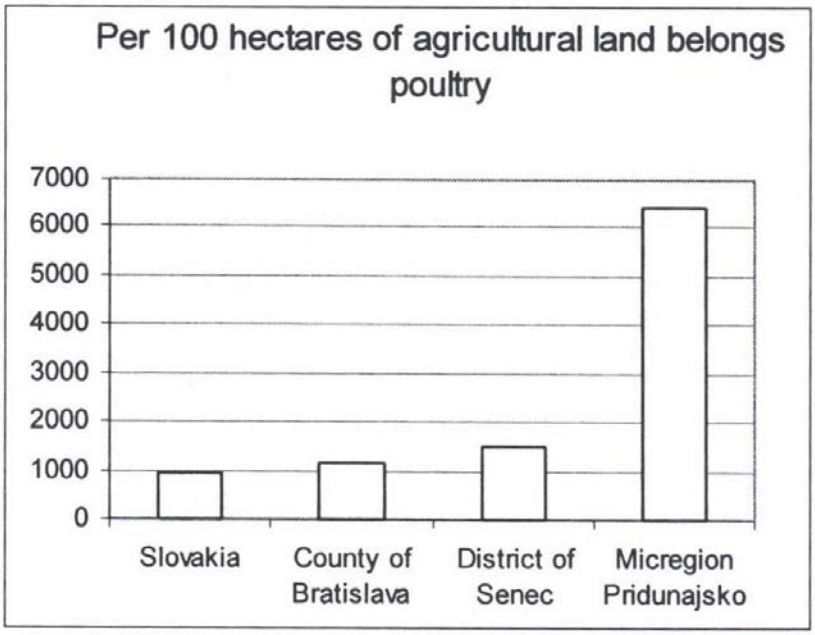



*Fig. 3*

### SWOT analysis of the Pridunajsko Microregion and its opportunities in the development of agriculture

To conclude the survey of the Microregion's agricultural production and rural landscape in general, we have used the SWOT analysis. It is an effective method allowing evaluation of internal and external characteristics, comparing strengths, weaknesses, opportunities and threats of the region.

**Strengths**

- A high quality agricultural land potential, together with favourable climatic conditions have predetermined the territory of the Pridunajsko Microregion for agricultural production with a minimum water soil erosion threat.
- The high agricultural land potential is utilized intensively and as very positive can be considered orientation of the agro-production (both plant as well as animal production), supported by good preconditions of the territory.
- The Microregion's Agricultural companies achieve high per-hectare yields of crops, thanks to the above-mentioned preconditions.
- With restitutions and return of the land back to its original owners, the soil fund configuration changes, a certain positive come-back to original landscape structure has been observed.
- A partial transition of arable land utilization towards perennial cultures (orchards) can be considered as a positive tendency. A variety of the soil fund utilization increases, the territory witnesses a growth of landscape green areas of non-forest wood vegetation. Despite of a low variety of species, the orchard monocultures play an important role mostly in summer seasons (production of oxygen, air rejuvenation, dust and noise absorbation, etc.).
- Animal production intensity decrease and termination of production activities of several agricultural farms has brought positive effects for the Microregion's environment.
- A good geographical position of the Microregion in Bratislava's hinterland indicates remarkable market possibilities with excellent sale of agro-products.
- Orientation of some of the small private enterprises on special agro-products (such as fruits, vegetables, mushrooms, goat milk and cheese production, etc.) seems to have been a good solution, which is well shown by their success on the inland as well as foreign markets and keeping this position for several years already.
- The Úsvit Co-operative Farm, Dunajská Lužná is a dominant Microregion's agricultural enterprise with very good results mostly in plant production (extraordinary per-hectare yields in comparison with district, county and Slovak average values).

**Weaknesses**

- In consequence of intensive agricultural activities and process of immense land merging, large stretches of arable land (over 100 hectares in some cases) were created in this region, which has brought a rapid decrease of forest land area and extinction of primary vegetation cover and functional landscape green (which separated small land fields before merging). Thus, the landscape is endangered by wind erosion and other negative factors.

- The above-named immense arable land concentration is seen as a very negative factor, too. Small fields have been identified mostly around residential areas of the settlements. Large land concentration is visible mainly in western and southern parts of the Microregion.
- The intensive agricultural activities brought ecologically unstable monocultures poor in species and prone to biological balance violation (some 70 per cent of the Microregion's arable land are covered by the following three dominant crops: wheat, corn and barley).
- There is a strong soil exhaustion due to the intensive agricultural production (loss of air and nutrients, which do not succeed to restore naturally, thus chemical fertilizers must be used) changing physical properties of the soil (utilization of heavy mechanization).
- Use of chemicals in agricultural activities brings negative impacts on plant and animal species and nearby natural protected areas being in a direct contact with the cultivated areas.
- In summer seasons, the agricultural production impacts the Microregion's environment by a large-scaled dustiness, noise, etc.
- Position of animal farms near residential areas bothers with a heavy stink, danger of infections and, in some cases, makes a barrier effect for growing residential areas (such as Rovinka). Buildings of the animal farms are run-down usually, which lowers an aesthetic value of the landscape.
- Low diversity of the landuse structure seems to be an unpropitious factor here (for instance, 97 per cent of Nová Lipnica cadastral unit area bear two functions only: agricultural land and built-up area), together with low diversity of arable land utilization (a high soil cultivation rate).
- Unclear soil property relationships explain why a lot of soil fields stay neglected. Disused high quality agricultural land leads to an economic loss and a damage of the soil, too.
- The major smallholders (SHs) that hire and use the Microregion's land are not locals, which causes outflow of the profits, unemployment of the local residents, etc. On the other hand, local SHs run only small farms, offerring almost no job opportunities (so-called self-help enterprises) and their agricultural production has only a supplementary role.
- Policy of low endowment into agro-production of SHs (often caused by a low awareness of endowment possibilities) and problems connected with the lack of financial sources – low mechanization rate, insufficient storage facilities, high input costs (one of the disadvantages of small-scale production) and low purchase prices, etc.
- Orientation of the SHs on common products (cereals) seems to be inappropriate, as they cannot compete with a large-scale production of the Úsvit Co-operative Farm on local markets of agro-products.
- Local agricultural products processing companies are missing in the Microregion, co-operation between particular agricultural enterprises is insufficient, there are no inter-company co-operation links, etc..

**Opportunities**

- The researched territory has good pre-conditions for enterprising in agricultural activities (which is shown by the selected indicators used to compare with higher territorial units) as well as excellent environment for location of some new agricultural enterprises.
- There is a reserve for further agricultural enterprising represented by the "free" land, which was given back to original owners in the process of property restitution, however, many of them have had no interest in agricultural activities (change of life-style, a hard work connected with the soil cultivation). Thus, much of the soil fund has been hired by the Úsvit Co-operative Farm but part of it still stays uncultivated).
- The position nearby Bratislava as a major trade centre with a high purchase power of the residents enables to run production of the special agro-products (even for more "choosy customers").
- Good transport position of the Microregion gives possibilities to attract new customers for the local agricultural production, mainly that of smallholders (advertisments along the main routes, etc.).
- Absence of local industry processing agricultural semi-products (mills, bakeries, milk processing, packing-plants, health food producers – such as soya products, etc.) represents a potential for development of this sort of enterprising in the Microregion with a possibility to use Microregion's free labour force.
- With population increase in the Microregion, we can expect increasing demand for food, which makes opportunities for SHs to supply the local markets (finalization of the agricultural production is inevitable here).
- Disused agricultural land fund gives new opportunities for its utilization (e. g. Rovinka's urban plan proposes relocation of the agricultural farm neighbouring the residential area into disused vineyards of HYKO a. s. company).
- Development of agrotourism and rural tourism can bring possibilities of some further development of the local agricultural production and use of the local labour force. The Microregion has excellent conditions for these activities.
- Alternative agricultural production represents a good way of more ecological and sustainable production based on the soil.
- Agricultural production waste brings some more opportunities, since it can be used as an alternative energy source. This might by exerted as a complementary source of heating in agricultural farms as well as for cereals dehydration, but also in other economic activities.

**Threats**

- Agricultural type of landscape belongs to ecologically very unstable landscapes (monocultures with low diversity of structures and species), which causes a low resistance of the landscape against outer environmental impacts.
- In consequence of dry climate, strong windiness and spatial structure of the agricultural soil fund (large fields of arable land with a lack of ecostabilizers, linear vegetation strips, windbreaks, etc.) the Microregion's territory suffers from wind erosion. This is even worsened by how the arable land is utilized – the soil surface is seasonally without vegetation and thus uncovered.

- Since the researched territory lies in the area of the richest underground water source in Slovakia – on Žitný Island, the intensive agricultural production threatens the quality of the underground water.
- Industrial oil-plant Slovnaft, a. s., Bratislava and a nearby solid-waste incineration plant bring threats on the quality of agricultural products, with the north-western direction of winds carrying emisions over the Microregion.
- Location of some technical infrastructural elements (e. g. sewage disposal plants) directly into the agricultural landscape with no protection belts causes huge demages on crops (for instances concentration of rats), threats of the constitution of the crops and infections.
- Position in Bratislava's hinterland, together with the ongoing processes of suburbanization in Slovakia, causes occupying the high quality agricultural soil fund by intensive residential areas construction.
- Space demands and consequential changes of agricultural soil utilization are caused by attractivity of the Microregion for different activities (suburban recreation, industrial parks, services, etc.).
- Urban population (with no interest in agricultural sector activities) inflow into the researched area together with the tendency of agrictultural employment decrease (as a consequence of low payment level in this sector) bring a threat of labour force insufficiency and a problem of labour force reproduction in this sector.
- Insufficient endowment policy and support of the SHs in the sector of agricultural production threatens a sound trade competition, supports large and powerfull enterprises and causes decline of small ones.

#### Conclusion

Research of spatial aspects of agricultural activities in Slovakia is recently acquiring some new dimensions. We are monitoring the most appropriate regions for these structures as well as regions showing not very high suitability for agriculture (so-called less favoured areas). Special attention must be paid to territories with a high concentration of human population in urbanized areas. These territories can either offer favourable or disadvantageous conditions for agricultural activities. In case of the latter ones, it is necessary to invest more capital into basic food production to maintain the elementary food supply for the urbanized area or to use these investments to cover cost of the food's transportation from remote regions. The most favourable variant can occur where good agro-ecological qualities are present in sub-urban areas or even directly in urbanized areas. The latter case is often observable in most Slovak towns and cities located in lowlands and warm basins. Bratislava, the capital of Slovakia has extraordinarily good agro-ecological conditions.

The city of Bratislava is located at margins of two neighboring lowlands. Southern spurs of Záhorská Lowland encroach upon western parts of the city, while the city's southern, eastern and north-eastern parts lie on western spurs of Podunajská Lowland. East part of Bratislava's sub-urban zone localized in southern part of Senec region seems to be the most suitable for agricultural production. Five municipalities of the southern edge of this region, including Dunajská Lužná, Hamuliakovo, Kalinkovo,

Rovinka and Miloslavov have associated into Pridunajsko Microregion with integrated problem resolving and united agricultural co-operative farm.

The Pridunajsko Microregion represents a territory with an intensive use of highly productive agricultural landscape, with all respective features (predominance of artificial eco-systems over natural ones, high share of arable land reaching to 96 per cent, concentration on highly demanding crops, high level of mechanization, utilization of chemicals, irrigation, etc.). Cereals (wheat and barley most of all) and corn have the most significant position in the microregion. Per-hectare yields of the local agricultural companies reach the highest positions within the region and county.

Apart from the production, the agricultural activities play also an important landscape-creating role, which should be even strengthened in the region. Non-forest wood vegetation must be reinforced here (to liven up the landscape structure and to rise up the area's ecological stability). Exploitation of the high-quality soil for other than agricultural purposes should be avoided. A wider variety of the local agricultural production would bring positive changes as well. Agrotourism and rural tourism represent a new progressive orientation of the local agricultural companies (improvement of their budget, opportunities for local residents, increasing attractivity of the area), together with bio-production and production of ecological food as well as processing and finalization of the local agricultural products.


#### Acknowledgement

The author would like to thank to the grant Agency of the Slovak Republic for financial support under the grant number 1/0008/03.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