

Mitteilungen der Österreichischen Geographischen Gesellschaft,
156. Jg. (Jahresband), Wien 2014, S. 293–310

LANDNUTZUNGSTRENDS IN SÜDOSTEUROPA UND OSTAFRIKA

AGRICULTURE IN A TRANSITIONAL CRISIS PERIOD: CROP PRODUCTION IN THE ADMINISTRATIVE REGION OF BELGRADE FROM 1991 TO 2002¹⁾

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¹⁾ The paper is the result of the research within the project 176017 funded by the Ministry of Education and Science of the Republic of Serbia.

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Zusammenfassung

Landwirtschaft in Zeiten der Transformationskrise: Anbau von Kulturpflanzen in der Verwaltungsregion Belgrad zwischen 1991 und 2002

Die 1990er Jahre waren in Serbien geprägt von einer lang anhaltenden wirtschaftsstrukturellen und politischen Krise. Die Landwirtschaft in Serbien litt in diesem Krisenjahrzehnt an einem konstanten Produktionseinbruch. In den ländlichen Gebieten im Einzugsbereich von Belgrad [Beograd], der Metropole des Landes, war dieser Rückgang besonders deutlich. Klassische Urbanisierungsprozesse spielten hierfür nur eine untergeordnete Rolle. Antriebskraft des Niedergangs war vorwiegend die ökonomische Krise in Verbindung mit der landwirtschaftlichen Spezialisierung dieser Region. Die Ergebnisse dieser Studie zeigen (anhand von Daten zum Anbau von Kulturpflanzen), dass landwirtschaftliche Subsistenzwirtschaft in der Zeit von 1991 bis 2002 im Untersuchungsraum deutlich an Bedeutung gewann und sich zumeist sogar zum vorherrschenden lokalen Wirtschaften entwickelte. Dementsprechend wurde gleichzeitig marktorientierte Agrarproduktion massiv zurückgefahren. Außerdem offenbaren die hier vorgenommenen kleinräumigen statistischen Analysen weitergehende Erkenntnisse zu strukturellen Veränderungen von Landwirtschaft unter lang anhaltenden Krisenbedingungen. So lassen sich bestimmte Nutzpflanzen-Spezialisierungen an einzelnen Orten identifizieren, welche sich – während des generellen Anstiegs landwirtschaftlicher Selbstversorgung – weiterhin ein hohes Maß an marktorientierter Produktion erhalten konnten.

Summary

Serbia's decade of the 1990s was characterised by a long-lasting economic and political crisis. Throughout this period there was a constant decline in agricultural production, throughout Serbia. This downturn was more pronounced in the rural areas around Belgrade [Beograd]. Conventional urbanisation processes played only a supporting role in that development. The key force of the agricultural decline has to be seen in the economic crisis, in conjunction with the agricultural specialisation of this region. Results of this study on crop production (comparing 1991 with 2002 data) show that in the studied area subsistence farming gained significant importance; whereas simultaneously market-oriented production declined significantly. Furthermore, small-scale analyses of this study reveal results of structural changes, apart from the general outcome of rising subsistence. Concentration or specialisation on certain crops in few locations allowed still a high level of market-oriented production, even under these long-lasting crisis conditions.

1 Introduction

During the 1990s the Republic of Serbia endured a transitional phase marked by long-lasting and permanent crisis phenomena characterised by social stratification, a political system that resisted reform, and a deep economic recession. In the early and mid-1990s this period was shaped by external factors, such as the disintegration of Yugoslavia (from 1991 onwards), entanglement in military conflicts, and international economic sanctions. In the late 1990s renewed sanctions and the NATO campaign in the Kosovo conflict (1999) damaged the country's economic and social fabric. Internal factors connected to the reform-blocking and kleptocratic Milošević regime and the democratic revolution of the year 2000 also contributed to the crisis. This period was a step backwards in terms of living standards, employment, productivity and economic efficiency. Agricultural production was significantly reduced, and became additionally limited due to the economic sanctions.

The diverse consequences of this long and severe crisis have not been sufficiently examined. For the primary sector the crisis was manifested by a general decline in the price of agricultural commodities, whose reduction was greater than the devaluation of the final food products. Simultaneously, the level of market uncertainties and business risks increased which negatively affected the inflow of investments. With the reduction of available funds, farmers opted to reduce planting areas and production and to implement a less financially demanding model of an agricultural production. At the same time economic sanctions reduced the overall supply of food and raised the strategic importance of agricultural production for the state which forced farmers to maximise their yields.

This study examines the characteristics and structural changes in agricultural crop production from 1991 to 2002. The research area is composed of the rural settlements in the administrative region of Belgrade [Beograd]. The study provides new insights on agricultural developments in the context of European post-Socialism. This study suggests that severe crisis conditions affected agricultural production more than rural-urban land-use conflicts. Our results indicate that specific outcomes of agricultural changes reflect structural and territorial changes in crop production during the most catastrophic period in contemporary Serbian history.

The following manuscript is organised into several sections. Section 2 will provide a short overview of the agricultural developments statistically interpreted in this study. After defining the theoretical and methodological approach (Section 3), we identify structures or specialisations of crop production (Section 4). After clarifying the amount and distribution of proportional structural change on the local level (Section 5), we provide a statistics-based typology of structural developments in crop production (Section 6 and 7). Finally, in Section 8, we conclude with a conceptualisation of Belgrade's peri-agriculture during the crisis period from 1991 to 2002.

2 The transitional context of the agricultural crisis

Political and economic transition led to agricultural crisis in all post-Socialist countries of Europe. Typical limiting factors for agricultural production in post-Socialist countries included: the lack of human capital in rural areas and the inability to manage new economic concepts (GALLERANI et al. 2004); changes in property rights which caused significant structural shifts (HORSKÁ et al. 2004); price liberalisations which resulted in significant drops of agricultural profits (ROZZELE & SWINNEN 2004); and insufficient investments resulting from the drop of personal income (RADIONOVA 2004). Ownership transformations caused land speculation, which resulted in land use conflicts and a fragmentation of the agricultural land. Additionally, this led to an even more pronounced shrinking of planting areas and lowered the intensity of crop production (see: LERMAN 2001; GORTON & DAVIDOVA 2004; BAŃSKI 2008).

Thus, it is not surprising that the disintegration of Yugoslavia (Socialist Federative Republic of Yugoslavia [Socijalistička federativna republika Jugoslavija, SFRJ]) led to an agricultural crisis in Serbia, despite the fact that Yugoslavia already followed strong market-orientated policies (“market-Socialism”). Moreover, private agricultural activity and individual non-nationalised farming had always been dominant in Yugoslavia, not only according to the number of agricultural business entities, but also in the share of privately used fields (e.g. BÜSCHENFELD 1981). In contrast to Yugoslavia, all other Communist countries in Southeast Europe pursued a policy of abandoning small traditional villages in favour of larger agro-industrial towns (JORDAN 2009). Nevertheless, despite this specific Yugoslavian heritage, the transitional agricultural crisis was more turbulent and destructive in Serbia than anywhere else. The overall decline of agricultural production in the 1990s and the dramatic decline of prices and disposable incomes significantly increased the share of subsistence production in all regions of the country. Moreover, the lack of resources and equipment often left the farmers with no other choice (see: KOSTOV & LINGARD 2004; ADŽIĆ 2008).

In the first few years of the crisis, economic sanctions forced the Serbian government to continue to subsidise agricultural production in an attempt to maintain food security (TOMIĆ et al. 2010). As the crisis continued, government support decreased as did possibility of market-oriented production (ŠEVARLIĆ & TOMIĆ 2009). Resources, such as seeds, mineral fertilisers, pesticides and fuel were either no longer available or sold for exorbitant prices (BÜSCHENFELD 1999; BABIĆ 2001). Private farmers drastically reduced their already low market deliveries and focused instead on subsistence production, which resulted in a 46% decrease in crop production from 1991 to 2002.

According to Serbian authors, the extensive decline in agricultural production can be also traced to the misguided development strategies of the early 1980s (GRČIĆ 1985; ĐURIĆ 1989), and the complete lack of development strategies and a functional legal framework during the 1990s (JAĆIMOVIĆ & POPOVIĆ 1993; ĐORĐEVIĆ & DABOVIĆ 2009). Other scholars assert that the SFRJ was less resilient to changes in market conditions because of policies related to agricultural specialisation (ILIĆ 1985; NEDOVIĆ 1986; ISAKOVIĆ & ŠEVARLIĆ 1996).

3 Theoretical and methodological approaches

There is a long historical debate about the interrelation between cities and agricultural production: from von THÜNEN (*Isolated state*), through the theory of transit zones of George WEHRWEIN (1942), concepts of developmental trajectories of suburban agriculture by D. THOMAS (1974), to the theoretical models of contemporary perceptions of land valuation (ANTROP 2000) and debates on the role of agriculture and small-scale farming as public goods which contribute to the revitalisation of the rural economy (HAZELL et al. 2010; FAZZI 2010; HUBBARD & GORTON 2011; McDONAGH 2012). The British urban geographer David THOMAS (1974) paid special attention on determining rural-urban zones and the “agricultural belt”²⁾ where the agricultural sector has a weak position and arable fields are gradually fragmented by urban land use.

Modern theoretical approaches try less to define certain zones and emphasise the spatial organisation of agriculture around big cities and focus on rural-urban relations, in particular rural-urban conflicts. WOOD & HANDLEY (2001) conclude that the effect of “urban pressure” on agricultural land can lead to dysfunctions in the use of arable land. Mark ANTROP (2004) considers that in peri-urban agricultural areas this urban pressure is evident in two processes: *polarisation* (intensification), and *diffusion* (fragmentation) of land use. According to this thinking, the transformation of agricultural land is a result of the differences between rural and urban lifestyles, and spatial organisation (ANTROP 2000; HØJRINK 2002).

Unlike THOMAS (1974), the focus of this research is on an agricultural belt, which traditionally had, and still has, a relatively strong position in the urban-rural struggle over distribution. Nevertheless, during the 1990s agriculture in this belt underwent major changes, which have shaped the structure of production to the present day. Our primary hypothesis is that the structural changes of that period can be first and foremost attributed to processes which are connected to the geo-political crisis and not to rural-urban conflicts. Our conceptual approach regards these changes as processes of either polarisation or diffusion (see: ANTROP 2004).

Before identifying such changes, the structural realities have to be clear. In accordance with classical methodologies of geographical research, agricultural typologies are based on internal characteristics (JAĆIMOVIC 1976; KOSTROWICKI 1991), not on (environmental or economic) external conditions. KOSTROWICKI & SZYRMER (1991) define three main categories of internal characteristics of agricultural production: ownership (as well as social) structure, organisational-technical features and the structure of production. This study focuses on the structure of crop production, which can be regarded as the internal characteristic which is the most dependent on land use changes.

Agricultural census data from the years 1991 and 2002 allow us to analyse crop production developments during the crisis period of the 1990s. The analysis is based on the yields and cultivated area of twelve different crops at the settlements scale. The examination area is limited to the rural settlements in the administrative region

²⁾ Developing his concept of the „agricultural belt“, THOMAS (1974) is referring on MYERS & BEEGLE (1947), MCKAIN & BURNIGHT (1953) and their different perceptions on peri-urban zones.

of Belgrade.³⁾ Small administrative units provide the best perspectives on changes in the region. This small-scale approach follows KOSTROWICKI & SZYRMER (1991), who suggest developing spatial agricultural typologies on the smallest possible scale; on the settlement level or even plots level. In accordance with this suggestion, defining the agricultural belt of Belgrade is possible only on the settlement level.

By using a combination of statistical methods (successive coefficients and shift-share analyses) we can describe a large number of small-scale qualitative and quantitative developments. The method of successive coefficients is used for defining basic structures of production and for the analysis of qualitative structural changes. Successive coefficients ($n/6$) are a mathematical model for matrix calculations about the ratio between variables; in the present case between the major groups of crop production.⁴⁾ In the pre-selected study area the major groups of crops are: cereals, industrial crops, vegetable crops, fruits and fodder crops.⁵⁾ The volume of production of these crop groups (variables) are classified into the matrix. The six largest scores in the matrix indicate the dominant structure of certain crops. In accordance with this methodological approach, production of agricultural plants is presented with six basic categories (see Fig. 1), which offers a clear picture of the spatial distribution of the crop production structure.

The disadvantage of the successive coefficients method is that it does not show relative or absolute quantitative differences. Therefore, it is not possible to determine the extent and intensity of production changes. A closer look at the configuration of crop production can be achieved by comparing the results of the successive coefficients method with shift-share analyses. Shift-share analysis, in spite of its rudimentary character, has had remarkable success among the specialists of regional economics (RANDALL 1973).⁶⁾ This is due to the fact that the statistical information required is very elementary and the analytical possibilities that it offers are quite large. This is especially true for this study as statistical information at the settlement level is deficient. The method of shift-share analysis provides insights into changing production outputs and shifting structural and spatial distributions in crop production. It can reveal small-scale (local) development trajectories in comparison to general (regional or national) trends. Thus, shift share analyses are used here to precisely determine the scope of proportional changes of different crop production sectors in a settlement in regard to all other rural settlements in the administrative region of Belgrade.

³⁾ The region of Belgrade is comprised of 17 municipalities with a total of 166 settlements (138 villages); giving home to approximately 1.6 million inhabitants. The village of Sakulja in the municipality of Lazarevac is displaced since 1984.

⁴⁾ For detailed methodological explanations see: KOSTROWICKI & SZYRMER (1991); for application of the method in crops production see: SIBINOVIC & LAZIC (2013).

⁵⁾ According to agricultural census data (SORS, 1991/2002), the most-produced crops in the rural areas of the region of Belgrade are corn, wheat, apples, plums, grapes, beans, potatoes, sugar beet and sunflower; the last to mention is clover as a sole fodder crop.

⁶⁾ The method of shift-share analysis had been developed in the 1930s and has been constantly used in regional economics. For a more detailed explanation about the method of shift-share analysis see: ESTEBAN-MARQUILLAS (1972) and KLEMMER (1973); for more applications of this method see: GRCIĆ & RATKAJ (2006) and GÖLER et al. (2007); for methodological criticism of shift-share analyses see: DARRYL et al. (1989).

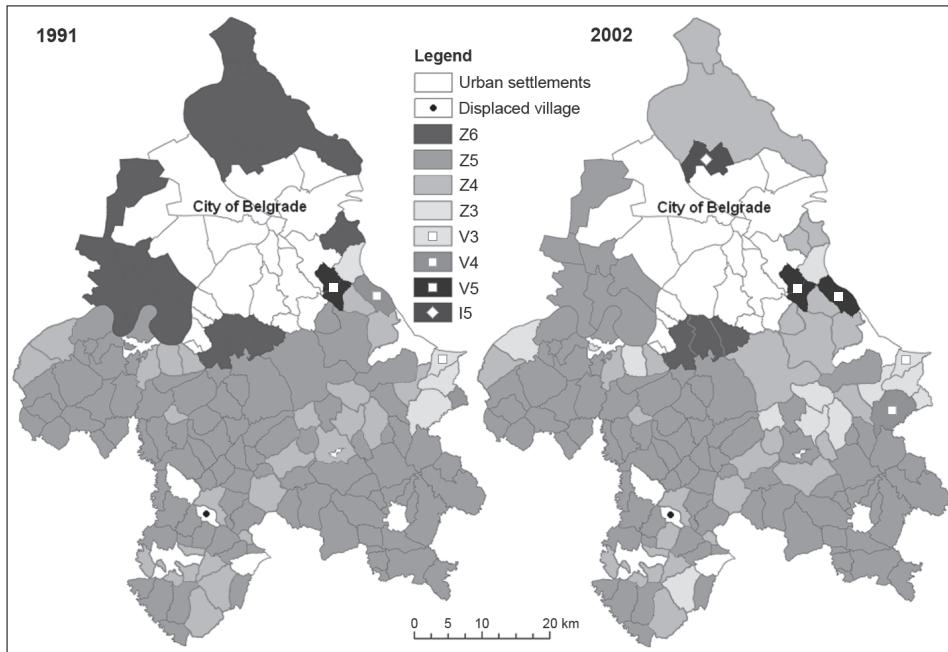


Fig. 1: Crop production structures in rural areas of the district of Belgrade in 1991 and 2002; (Z – cereals, I – industrial crops, V – fruit, 6 – absolutely, 5 – dominant, 4 – mostly, 3 – uniform structure)

4 Structures of crop production

Structures (or directions) of crop production have been detected through the method of successive coefficients. Such structures represent the basic orientation of farmers towards the planting of certain crops. The dynamics of change in the structures of crop production hints at the agricultural trajectories or trends of the most intense changes in agricultural land use and agricultural production.

Data from 1991, as well as 2002, indicate that the most common type of peri-agricultural production around Belgrade was that of a *dominant cereal direction* (Z5, see Fig. 1). 89 of 138 settlements are attributed to that direction in the base year of 1991. This predominance of cereals can be explained by two reasons: first, the growing wheat and corn represents the traditional regional pattern of subsistence production, livestock feeding, and the local market; and second and more importantly, the region is marked by an economic supply model, established by the Yugoslav system, which consists of strong linkages between individual producers and the bread and baking industry of Belgrade.

For some villages around the urban fringe of Belgrade even an *absolute cereal direction* (Z6) was characteristic in 1991. In this case individual farmers co-operated with the Belgrade Agricultural Cooperative (PKB), which supported and organised the participation of local farmers in market-oriented agricultural production. Federal plans and development strategies in former Yugoslavia stressed the importance of the gravitational influence of Belgrade as a large agricultural market. The state demanded that the rural areas around Belgrade contribute to specialised and market-oriented agricultural production (ĐURIĆ 1962). State incentives directed farmers in this area to serve the needs of the urban food industry. During the crisis period, those farmers faced serious sales problems, due to the reduction of milling and baking industries. This fact is evident in a declining absolute cereal direction. Only three settlements retained an absolute cereal specialisation. Many former Z6-settlements changed with the share of fodder crops to a dominant and mostly cereal direction (Z6 → Z5 or Z4). The absolute cereal direction changed to *dominant industrial crop direction* (I5) in only one settlement – Kovilovo. In this settlement this change can be regarded as an attempt to restart agro-industrial relationships. In that specific case, the location near the industrial zone of Belgrade must be regarded as a strategic advantage.

Besides locational implications, environmental factors have to be considered. Perishable vegetables, which are extremely sensitive to market changes, are mostly located on the alluvial plains and river terraces of the Sava and Danube [Dunav] rivers in the northwestern part of the region. Cereals and industrial crops, which are more dependent on the market and subsidies, are strongly dominant on the loess terraces and loess plateau in the central and northern part of the examination area. The surfaces of the Šumadija hills, and especially the hilly area in the eastern part of the region, are traditional, specialised and market-oriented fruit growing areas (LUTOVAC 1963; JAĆIMOVIC & POPOVIĆ 1993).

A high degree of resistance to the transformation of the structure of crop production is characteristic for several villages in the far east of the region, where fruit directions of plant production are recorded (V5, V4, V3). The structural comparison of 1991 with 2002 shows, that the market-orientation of fruits is more preserved than that of cereals. Fruit production was able to adapt to constant market needs and profited from strong transportation connections with Belgrade. In contrast, locations with a predominant cereal structure (Z5) had a much more intense structural change. The traditional, almost exclusively market-oriented production of wheat or corn was not able to adapt during the crisis. In Socialist-Yugoslavian times the PKB directed the production and processing of cereals, industrial crops and dairy cattle breeding in the alluvial plain of the Danube (Pančevački rit), and fruit plantations in the eastern Grocka municipality. This form of corporate agriculture is strongly dependent on organisation, modernisation and investments, in accordance with the agricultural policy of the state. The disintegration of Yugoslavia and the international economic sanctions significantly affected the operations of large production networks such as PKB, due to restrictions on imports of raw materials and loss of internal as well as foreign markets.

5 Proportional changes in the distribution of crop production

The shift-share analysis provides more specific insights into these dynamic changes of crop production. In accordance with the results of the previous methodological procedure (successive coefficients), the following shift share analyses are based on the hypothesis that the presented structural changes in crop production are related to the inadequate treatment of investment intensive crops, or to constant crisis-driven changes on the market. The aims of shift-share analyses are now to consider the *intensity* and *typology* of previously defined structural changes and to put them in context of actual production decline.

The total amount of crop production in all rural settlements of the Belgrade region declined from 2,802,723 grain units⁷⁾ (gu) in 1991 to only 1,520,332 gu in 2002. The *absolute change* of crop production ($AC_j = -1,282,391$ gu) represents a total value of production cuts as of 46%. The most intensive decline in crop production was recorded in villages with an absolute and dominant cereal direction (see Fig. 1, Z6 and Z5).

For the given period of decline (1991–2002), the proportional changes in crop production can be divided into three components: *structural*, *differential* (spatial) and *net relative changes*.

$$\text{The structural (proportional) effect of crop production } S_j = \sum_{i=1}^n E_{ij}^0 \left(\frac{T_i^1}{T_i^0} - \frac{T_i^0}{T_i^1} \right)$$

represents the structural change of each settlement regarding a single crop group according to the overall structural change. The value of the structural effect indicates the extent to which the change was the result of an unfavourable structure of crop production at the beginning of the period studied. A positive value of structural component ($S_j > 0$) represents specialised crop production with competitive advantages while a negative value ($S_j < 0$) represents non-specialisation (see Fig. 2). The latter contributed in the respective identified settlements to a more pronounced production decline.

The magnitude of the structural component does not show large variations between the localities. This can be attributed to the fact that the structural crisis in crop production was general and present almost everywhere. For a more precise analysis of the consequences of the overall production decline, it is necessary to include the impact of the differential (spatial) effect.

$$\text{The differential effect of crop production } C_j = \sum_{i=1}^n E_{ij}^0 \left(\frac{E_{ij}^1}{E_{ij}^0} - \frac{T_i^1}{T_i^0} \right)$$

represents the sum of differences between the changes of crop production in each settlement, and proportional changes in a single crop group according to overall structural change. Thus, the differential effect (C_j) reveals these changes in crop production which are dependent on location. However, in the 1990s free market conditions did not exist in Serbia. Therefore, the values of the differential component in rural settlements cannot

⁷⁾ A grain unit (gu) is the reference value of agricultural products. Conversion of different crops has been done by standard coefficients – 1gu=100kg of wheat (see: KOSTROWICKI & SZYRMER 1991; TODOROVIĆ 2002).

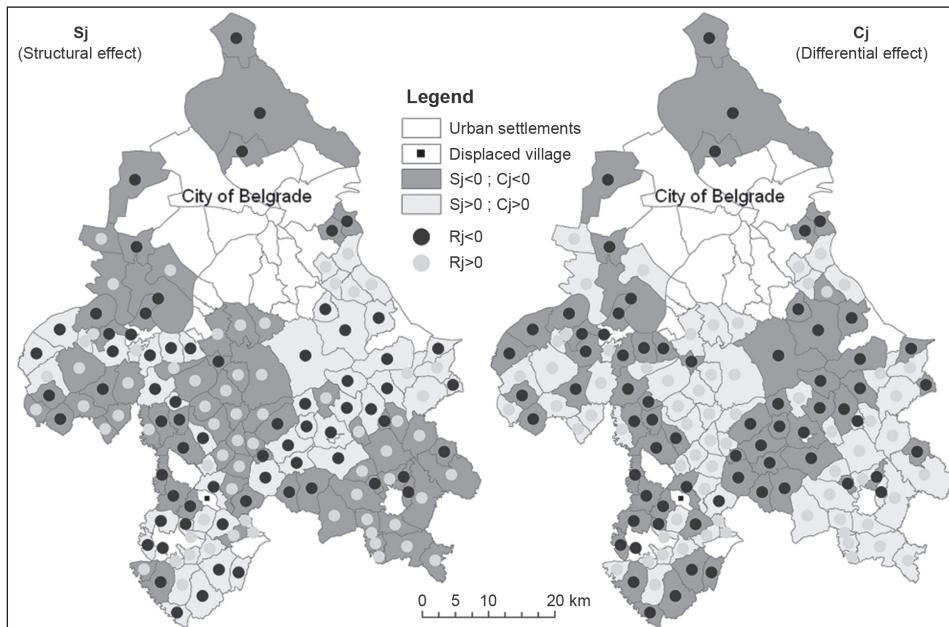


Fig. 2: The ratio of structural effect (S_j) and differential effect (C_j) related to net relative change (R_j)

be explained by favourable or unfavourable locations and comparative advantages in competition with other markets.

The net relative change in crop production $R_j = E_j^1 - E_j^0 \left(\frac{T^1}{T^0} \right)$ represents the

differences between crop production in rural settlements in 2002 and a hypothetical crop production that would have evolved if the production in 1991 of the specific location was changed in proportion to the overall changes of the examination area. Net relative change can also mathematically be expressed as the sum of the structural and the differential effect of crop production, which provides insights into the intensity and extent of their influences.

A positive net relative change was recorded in 68 settlements. These data show that agriculture in some rural settlements was more resilient to the crisis. The overall differential effect in the studied area has a strengthening influence of 0.5 on the net relative change. On the other hand, the value of the structural effect has a mitigating influence of -0.4 on the net relative change. Hence, the immense net relative change and overall decline in crop production was mostly connected to the differential effect. Restructuring measures (structural effects) were not able to amortise the high level of reduction, which leads to the conclusion that the structural components of crop production did not have a significant impact on defining the proportional changes.

The values of net relative changes in crop production are directly correlated with the differential effects in almost all rural settlements. Negative values of differential effects are mostly recorded in those rural settlements which also had negative net relative changes in crop production (see Fig. 2).

The relationship between structural and spatial effects also corresponds to changes of the size of planting areas (SIBINOVIC 2012). The differentiation of the examined localities, however, is due to different crop yields during an overall decline in prices. In the beginning of the crisis period, areas with cereals (mostly wheat and corn fields) were planted on 60% of the total agricultural land, fodder crops on 18% and vegetables on about 15%. This structure was shaped by favourable environmental conditions, production costs, market predispositions and policies of subsidies and repurchases. Moreover, this area has traditionally been known for high cereal production which affects the routine procedures and individual decision making of individual farmers (SIBINOVIC 2012).

On the other hand, during the 1990s the pressure of urbanisation on agricultural land decreased in the peri-urban fringe, in contrast to regular expectations of metropolitan developments. Deindustrialisation and decline of the overall economy in the metropolitan area of Belgrade reduced labour and migration and, furthermore, brought to a halt residential building, construction of roads and factories, and urban expansion in general (GRCIĆ & RATKAJ 2006). Thus, in the case of the administrative Region of Belgrade in the 1990s, agricultural decline has to be attributed to phenomena of the economic crisis and not to the pressure of encroaching urban sprawl.

6 Typology of development directions in crop production

Shifts and development direction of crop production in the examination area vary in local intensity and spatial extent. The intensity of the developments varies with the local structure of crop production. (They are most intensive in cereal production.) However, spatial extents of shifts are associated with the differential effects. In accordance with these basic characteristics, extracted from shift-share analysis, it is possible to define specific types of crop-production developments.

The ratio of the absolute values of the structural effect (S_j) and the differential effect (C_j) to the net relative change (R_j) defines four basic direction/types of developments in crop production: *progressive, stagnant, regressive and dominant regressive* types. In the next phase of analysis, the locational ratio between the total net relative change and the total value of crop production of the base year 1991 associates each settlements with one of these types. All four types can be divided into those where structural and those where differential effects had a larger impact on defining the developmental direction of the type. The spatial distribution of different types (see Fig. 3) of development directions indicates fragmentation or diffusion in crop production during the period studied.

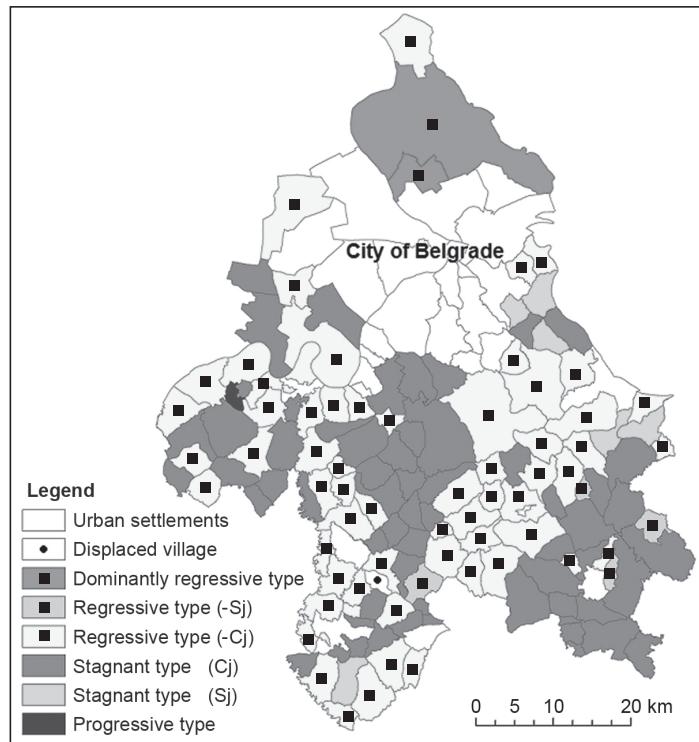


Fig. 3: Types of development directions of crop production from 1991 to 2002

The progressive type ($R_j > 45.76$) is identified in only one rural settlement – Ratari – which is characterised by the smallest relative production decline, the largest percentage of the differential effect and highest net relative changes. The village of Ratari shows a stable dominant grain direction (Z5) with a share of fodder crops. Total crop production in this village was 8.293gu in 1991, which is much lower than the regional settlement average. This low initial level of production on relatively small cultivation areas has to be seen as the reason why this settlement did not suffer from structural deteriorations.

The stagnant type of development is identified in 67 settlements mostly clustered in the central part of the region. Most of these rural settlements did not shift their dominant direction of cereals during the period studied, which is explained by a high level of production stability and dominant positive differential effects (C_j). A dominant positive structural effect (S_j) (among the stagnant type) is noted in only a few settlements. In five of these six locations fruit directions are dominant (see Fig. 1) and the structure does not indicate a shift to subsistence. This close linkage of the dominant positive structural effect with fruit production is regarded as the statistical proof that traditional specialised and market-oriented fruit production was maintained. The production of

fruits, especially apples, grapes and plums, was sustainable and profitable due to high market demand and continuing supply chains to PKB even during the crisis period.

The regressive type is characteristic for 68 rural settlements and is distributed throughout the study area. The dominant negative structural effect ($-S_j$) is recorded in only four *regressive-type* settlements. This fact is explained by the consistent dominant cereal direction of crop production (Z5) with a share of fodder crops, while dominant negative differential effects ($-C_j$) have been represented in all other rural settlements of that type. These data confirm the greater importance of differential effects on the relative shifts in crop production, and also indicate that the analysed developments in crop production are, as already mentioned, not connected with a structural reorganisation of agriculture, but with uncontrolled transformation.

The dominantly regressive type ($R_j < -45.76$) was observed only in the rural settlements of Kovilovo and Padinska Skela, in the north of the region. These settlements had the highest negative differential effects during the studied period, which can be traced back to their high negative values of net relative change. This result is directly connected with the company crisis of the agriculture combine Belgrade, PKB, which had the largest production capacities located on the territory of the previously mentioned rural settlements (Section 3).

Summing up, this research has identified a certain amount of resilience to the overall decline of agricultural production in settlements with relatively stable structures of crop production. Data analysis reveals two groups: (a) a stagnant type of settlements with market-oriented fruit production (only a few villages), and (b) a stagnant type of settlements which adapted to the crisis with a subsistence production structure (most settlements).

7 Predominant type of production

The rural settlements with the highest crop production during the period studied are mostly located in the southeastern part of the administrative region of Belgrade. Out of the six settlements with the highest production (see Tab. 1), only Grabovac is located in the west of the research area. Common to all these settlements are their rather good transport connections to Belgrade and smaller local markets (highway E-75), as well as a stable structure of crop production (dominant cereal direction Z5).

All of these settlements are characterised by a positive differential effect that produced a positive net relative change (stagnant type C_j). On the other hand, the average of crop production decline in those settlements (-40.6%) has been more intensive than the average decrease of planting areas (-12.4%), due to the reduced crop yields and lack of investment. During the transitional crisis period, the agricultural market of Belgrade became smaller and weaker. Individual farmers had to struggle more for their presence on the market. Under such circumstances, the settlements mentioned had several advantages comparing to the others: good transport connections with the urban

Settlement	Crop production (gu)			Sj%	Cj%	Rj%	Crop direction		Fields (hectares)		Index of change (%)	
	1991	2002	1991				1991	2002	1991	2002	Crops	Fields
	Velika Krsna	81,725	48,853	-1,28	6,82	5,53	Z5	Z5	2,567	2,219	-40,22	-13,55
Kovačevac	65,204	39,924	-1,27	8,26	6,98	Z5	Z5	2,046	1,817	-38,77	-11,21	
Grabovac	63,825	35,274	-0,22	1,24	1,02	Z5	Z5	1,838	1,635	-44,73	-11,05	
Velika Ivanča	55,435	32,673	-1,29	5,99	4,69	Z5	Z5	1,742	1,487	-41,06	-14,63	
Jagnjilo	49,179	31,357	-1,25	10,76	9,51	Z5	Z5	1,541	1,427	-36,24	-7,43	
Vlaška	49,427	28,519	-1,31	4,77	3,46	Z5	Z5	1,554	1,294	-42,30	-16,76	

Tab. 1: Rural settlements with the highest crop production in the administrative region of Belgrade from 1991 to 2002

centre, larger fields, sufficient agricultural workforce and intensive animal husbandry (see: TODOROVIĆ 2002). The latter increased farmers' needs for crop production and amortised the transformation from market-oriented production to semi-subsistence and subsistence farming.

Due to these relative benefits of the settlements mentioned, decline in crop production was lower for about 6% compared to the regional average, and the dominant cereal direction (Z5) became sustainable in such conditions of a fragile economy. In accordance with KOSTOV & LINGARD (2004), the subsistence agriculture in these villages played a stabilising role and had beneficial impacts on crop production, when most of their products were redundant at the market.

8 Conclusion

Typically, in post-Socialist transitions there is a decrease in agricultural production and an increase in the share of market-oriented production of agricultural commodities. Our study shows that the peri-agricultural region of Belgrade suffered, as expected, from a sharp decrease in agricultural production. The decline, however, is not the result of urbanisation, but rather due to external and internal political and systemic economic changes. Defying transitional expectations, the proportion of market-oriented production did not grow in the Serbian case. Quite the contrary, non-market-oriented production – subsistence farming – became dominant. This is firstly due to the already high level of free market production of the Socialist Federal Republic of Yugoslavia, and secondly reflects the fundamental crisis of the state.

In the examination area the most intense structural shifts and sharpest relative crop-production declines did not occur in the direct urban fringe or the directly surrounding agricultural belt. This supports the finding that these developments are not significantly connected with typical rural-urban conflicts, but rather connected with long-term economic recession. The forms of diffusion of land use (according to AN-

TROP 2004) identified in this study are not caused by urbanisation processes, but are predominantly the result of a non-profitable agriculture at that time.

The results of these small-scale analyses support the general conclusion that subsistence production became dominant in the 1990s. But even under such enduring crisis conditions, in some locations examined subsistence farming did not become the major form of agriculture. The stability of such places, with regard to production structures, investments and crop yields, is linked with their specialisation. They are located in the agricultural zone in the eastern part of the study area, specialised and characterised by market-oriented fruit production. The most deteriorating structural effects, however, have been found in the group of cereals, traditionally the most market-oriented crop.

According to this case study, it is reasonable to expect a strong process of self-regulation in agricultural production in long-term economic crises. Restructuring of individual farming under such conditions cannot have the intention to increase crop yields, but to decrease agricultural production inputs.

9 References

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