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Lončar-Vicković, Sanja; Stober, Dina

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# A CONTRIBUTION TO SETTLEMENT NETWORK ANALYSIS IN BARANYA – A PROJECTION OF SPATIAL DEVELOPMENT POTENTIAL

*Sanja Lončar-Vicković, Dina Stober*

Preliminary notes

In this paper an effort was made to define the actual state of the distribution of social activities in the Croatian part of Baranja in regard to the social functions' development trends and current demo-geographic occurrences. First part of the text studies the relationship between the distribution of social activities and settlements' (administrative units) net in Baranja based on the idea of spatial reflections of legislative settings. The research includes ranking settlements according to their population and according to the provision of social activities, resulting in the density of social activities. The differentiation of ranks following the listed criteria detected problem spots in Baranja's space. In the second part of the text a basis for social activities' growth potential was researched based on natural and structural population migration. Using graphic and tabular descriptions of the administrative units' hierarchy one can transparently distinguish Baranja's two urban focal points (Osijek and Beli Manastir). Results of the research described in the paper present a strong argument for further scientific analysis of the settlement network in Croatian parts of Baranja with the aim of differentiating their specific potential and evaluation of urban and rural "locuses".

**Key words:** *Baranja, rural area, settlement network, scope planning, social functions*

## Proučavanje rasporeda društvenih djelatnosti u Baranji - prilog prostornom planiranju

Prethodno priopćenje

U radu se analizira aktualno stanje prostornog rasporeda društvenih djelatnosti u hrvatskom dijelu Baranje u odnosu na trend razvoja tih djelatnosti i suvremena demogeografska kretanja. Prvi dio rada istražuje vezu distribucije društvenih djelatnosti i hijerarhije naselja na osnovi pretpostavke o relaciji zakonske definicije društvenih djelatnosti i promatranog prostora. Istraživanje je rangiralo administrativne jedinice Baranje prema populacijskom zaleđu i opremljenosti društvenim djelatnostima čiji odnos je izražen gustoćom društvenih djelatnosti. Diferencijacija rangova po ta dva kriterija dovela je do detektiranja problemskih točaka u baranjskom prostoru. U drugom dijelu rada istražena je podloga za projekciju daljnjeg razvoja društvenih djelatnosti temeljenih na pokazateljima prirodnog kretanja i promjena u strukturi stanovništva. Tabličnim i grafičkim prikazom ove hijerarhije općina definiraju se radijusi gravitacije dva urbana žarišta prostora Baranje (Osijek i Beli Manastir). Rezultati istraživanja sugeriraju potrebu daljnje znanstvene analize postojeće mreže naselja hrvatske Baranje s ciljem diferenciranja njihovih pojedinačnih potencijala i valorizaciju ruralnih i urbanih "locusa".

**Ključne riječi:** *Baranja, društvene djelatnosti, mreža naselja, prostorno planiranje, ruralni prostor*

## 1 Introduction Uvod

The process of obtaining independence and establishing sovereignty of the Republic of Croatia, that took place in the nineties of the 20th century, was marked by armed conflicts, hardships and migrations of the population. Thus the development of the Croatian eastern rural region, in spite of nearly twenty years' time distance, is to be regarded in the context of the war events which initiated or accelerated the development processes. The state of emergency included making quick decisions and compromises so that it led to the depopulation of the border or less developed regions and the moving of the population to the outskirts of the large and medium towns of the Republic of Croatia. These processes resulted in the corridor development of urban structures and an irregular development of the whole space [1] by which the underpopulated parts of Croatia remained well preserved and in better condition but not used in an optimal way.

Such spatial changes also took place in the Baranja triangle which became a new Croatian border territory. After the peaceful reintegration and the post-war decade the central space of Baranja became polarized round the Beli Manastir – Bilje communication while the margin parts experienced "socio-demographic depression" [2]. The present paper has investigated the actual situation regarding the distribution of social activities<sup>1</sup> in Baranja in order to determine the imbalance between the number of inhabitants in settlements and the spatial concentration of social activities. The determined actual state has been

superimposed on investigation results of the potentials<sup>2</sup> for further development of social activities and creation of the new ones in the same space.

## 2 Social activities – definition, spatial planning element Društvene djelatnosti – definicija, element prostornog planiranja

The definition of social activities is inseparable from the relevant social culture. In the Physical Development Strategy of the Republic of Croatia they are described as "superstructure of a region [...]". Social activities are the result of complex processes occurring in a certain space and they belong to a group of central service functions. They reflect social system, territorial and administrative structure and government policy of the country. They raise the educational, cultural and scientific level and medical culture of the population in the area that gravitates to them and that they influence. They contribute to the enhancement of social care so as to eliminate the existing social problems and differences. They make sure sports activities and technical culture are carried out without problems, they

<sup>1</sup> Categories of social activities are defined according to the Republic of Croatia Spatial Development Strategy and Programme [3].

<sup>2</sup> Data obtained on the basis of the censuses 1991 and 2001 statistical data. The potential for further development and creation of new social activities is projected on the basis of dynamic indicators/indexes: vitality index, age index, number of inhabitants' change index, relative density of inhabitants' change index, number of illiterates' index, people without educational background index, highly educated people index, number of farmers' index and active population index.

provide recreation and holidays for the population and make provisions for the other numerous long-term aims" [3]. In the Physical Development Strategy of the Republic of Croatia the social activities are divided into the following groups: administration, judiciary, non-governmental organizations, political parties and other organizations, religious congregations, education, higher education and science, culture, health service, social care and sports [3]. In the Residents and Settlements chapter<sup>3</sup> of the Physical Planning System of the Republic of Croatia [4], each of the groups is precisely defined and the line of development of each one within the Republic of Croatia is given. In terms of these definitions a list of activities has been drawn for which data relating to their number and location in the period from 2006 to 2008 have been collected. The sources of the processed data were:

- The 2001 census [5];
- The 2007 Annual report of the County [6];
- The 2006 Spatial Plan of the Osijek-Baranja County [7] and
- The Internet pages of the Central State Administration Office Public Registers [8].

The actuality of the data is guaranteed in the domain updated through the internet institutions such as the Registry while the population number data are statistical and taken from the 2001 census. The research does not include open public spaces like squares, sports grounds, parks, etc. which, by their nature, have a social function<sup>4</sup>.

Physical planning tries to control and produce organised space by transparent mechanisms. In the process the transparency of locating social activities is only partial. Social activities are partly located through established standards (e.g. number of dentists or nurses per 1000 inhabitants, number of children for day nurseries, primary schools etc.). Some systems are regulated by supply and demand i.e. by the market (private schools and polyclinics) while others are the products of interest groups and are related to the development of society (organizations, political parties, religious congregations etc.). If due to an organic growth of structures or population masses in a certain space a need is created for a social activity it will most probably be satisfied. A more intriguing fact is when the reverse of this happens, when a function is „introduced“ with no need expressed due to the gravitation of inhabitants. Speaking about functions for reasons of principle, the location of some higher rank urban function can serve as a mechanism for improving the development of a certain region and giving it a more important function in relation to its population background [9]. The role of the state apparatus is inevitable in this matter and it is a decisive subject. The influence of authorities can be seen through the possibility of carrying out decisions connected with the location of certain types and levels of education, establishment of medical and cultural centers. These are some of the ways to stimulate the development of a smaller town as opposed to the location of economic subjects whose management policy is connected with property relations. Upgrading a local town artificially by establishing in it the functions of a higher rank brings about the improvement of its social structure, growth of consumption and change in its structure. This in turn attracts new population and therefore new service activities too [10]. The development of a given space can be directed to a certain degree by pointing out some purpose (by a decision) but the continuation of this activity cannot be guaranteed.

Previous to the planning and locating of activities in a certain space an insight into the existing system of the settlement must be provided. The system, network and hierarchy of activities are directly connected with the system, network and hierarchy of the settlement in such a way that they are mutually conditioned and developed. The existence of social activities in a settlement defines the central space of the settlement and determines its position in the hierarchy. It is the presence of a function only that is most often marked, not its proportion (for instance number of students in a school, members of the library etc.). As also mentioned during the investigation of the social and technical infrastructure for the overall Croatian rural space [11], incorporation of spatial dimension i.e. spatial distance of the centre, traffic provisions etc. would contribute to the research but as these standards and availability of data are very demanding, for the moment they must be omitted. In this paper an effort was made to include the spatial dimension of the activities' distribution in such a way that the activities were divided into classes determined by spatial distance and multiplied by the index as an indicator.

### 3

#### Settlement system in the space of Baranja

##### Sustav naselja u prostoru Baranje

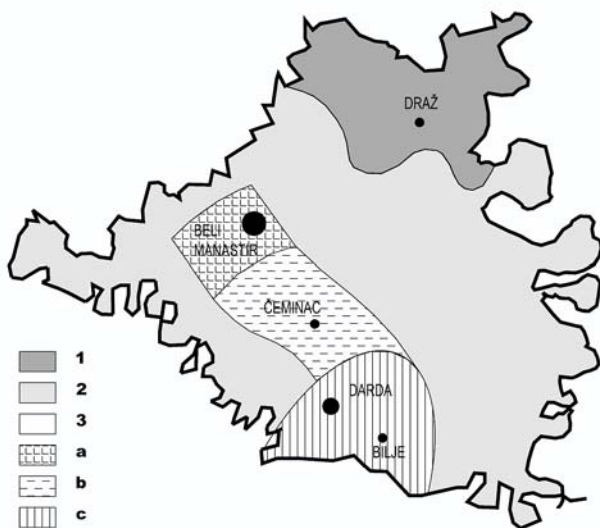
In the past Baranja formed part of various political integrations which set the guidelines for development in alternate directions: north-south and east-west. A positive outcome of this is a complete but multi-layered development of the Baranja net of settlements. The actual system of settlements of the mentioned space is defined by the Spatial Plan of the Osijek-Baranja County of the year 2006 which was in line with the typification given by the Physical Development Strategy of the Republic of Croatia. Thus the settlements are classified into categories: town, transitional-more urbanized settlement, transitional-less urbanized settlement and other settlements. The classifying criteria include quantitative and qualitative demographic indicators<sup>5</sup>. The space of Baranja, rural in character (settlements up to 2000 inhabitants are prevalent, population density is 37,2 inhabitants per square metre versus 78,5 in Croatia, proportion of agricultural population is 9,3 % versus 5,5 % in Croatia) has one urban settlement (*Beli Manastir*), two transitional- more urbanized settlements (*Bilje* and *Darda*) and eight less urbanized settlements (*Čeminac*, *Branjin Vrh*, *Kneževi Vinogradi*, *Petlovac*, *Zmajevac*, *Batina*, *Karanac*). The Osijek-Baranja county Spatial Plan gives an additional classification of settlements, adding development qualities. The Baranja settlements are classified into five out of all together nine categories of the system of settlements and development centres. The fact that not one settlement was included into the category of regional centre and district centre and that there are seven settlements in each of the bigger local centre and local centre categories is evidence of the settlement net homogeneity in which less urbanized settlements are predominant.

<sup>3</sup> Articles 2-22 to 2-27.

<sup>4</sup> We are aware that such social generators need also be included as they are equal elements in planning but their concentration is quantitatively expressed by space parameters and also per capita shares.

<sup>5</sup> Total number of the settlement inhabitants, proportion of agricultural population in total population, proportion of working places with regard to active population and proportion of households without farms.

On such spatial background the polarization occurs over the traffic (road and railway) corridor Bilje-Beli Manastir. The study [12] supports the fact that the settlements conveniently situated at or near communication lines have over time become centres for more and more intensive exchange of goods and services and have acquired ever more important and numerous functions. The polarization covers both the population category and the spatial elements such as the housing and infrastructure construction visible in space. The following Baranja settlements are in this space: *Beli Manastir*, economic and population centre, marked by the plan as a regional, medium developing centre and *Darda*, historically important secondary centre of Baranja, defined as a smaller, less developed regional centre. In the lowest hierarchical rank of this space are the settlements *Čeminac* and *Bilje*, defined by the plan as bigger local, less developed centres. Bilje gravitates to the town of Osijek and views itself in this role more than as belonging to the Baranja space. The fact that 3,79 % of the County settlements are in the mentioned space with 40,52 % of the population living there speaks a lot about the population pattern in the urbanization axis. The rest of the "triangle" is experiencing "socio-demographic depression" [2] (Figure1). The Baranja space does not have extreme deformation of the net<sup>6</sup> since it is supported by the towns of Osijek and Beli Manastir, but in the situation of corridor development, depopulation and deformation of the remaining space net take place. In the expected scenario of the space urbanization following the existing trend the space would concentrate around several big places and the agricultural hinterland would become poor. In general smaller places stagnate demographically and rural centres regress. Such a trend brings about great differences in the provision of central functions [9].



**Figure 1** Spatial differentiation schema of the Baranja actual demographic features by Pavo Šašlina (1 - more depopulated space, 2 - socio-demographic depression space, 3 - potential development axis of Baranja, a - population focus, b - the Osijek gravitation area, c - linking space for a possible quicker revitalization)

Source: Hrvatski geografski glasnik, Demographic development of Baranja 1991.-2001., 2005.:91 [13]

**Slika 1.** Prikaz prostorne diferencijacije suvremenih demografskih značajki Baranje autora Pave Šašlina: 1. prostor jače depopulacije, 2. prostor socio-demografske depresije, 3. potencijalna baranjska razvojna osovina (a - populacijsko žarište, b - gravitacijsko područje Osijeka, c - spojni prostor moguće brže revitalizacije)

Izvor: Hrvatski geografski glasnik, Demogeografski razvoj Baranje 1991.-2001., 2005.:91 [13]

## 4

### Research into distribution of social activities in Baranja

#### Istraživanje rasporeda društvenih djelatnosti na području Baranje

In addition to the expected consequences due to polarization and urbanization, the high percentage of illiterate population in relation to the total national indicators was an incentive to study social activities in Baranja. The previous research [11] reports about positive situation in the Osijek- Baranja County which was the county with the best educational infrastructure in 1991. Although the authors connect this phenomenon with the morphological characteristics of villages of this region and call them "big villages", in further research the size of a settlement (number of inhabitants) is connected with the concentration of social and technical infrastructure which testifies to the opposite (although expected) assumption. According to the 2001 census [5] in the Baranja districts there were 3,2 percent illiterates and 4,5 percent of the population without educational background. This is worse than the Croatian average which is 1,9 % illiterate population and 2,9 % without educational background. In the last ten years Baranja has not come any closer to the Croatian average, on the contrary, the gap has become even wider [2]. The aim of this research is to determine the distribution of social services and point to the potential for their further development and establishment since, according to the authors of the completed research [11], the development of a depressive rural area crucially depends on keeping up the educational infrastructure.

The task of the research was to check the following hypotheses:

- Social infrastructure is most intensive in regional centres and
- Traffic provisions have a positive impact on concentration of social activities.

The list of social activities drawn up according to the Physical Development Program and Strategy of the Republic of Croatia, encompasses ten activities: administration, judiciary, non-governmental organizations, political parties and other organizations, religious congregations, education, higher education and science, culture, medical services, social welfare and sports. Initial source for data collection was the 2006 Spatial Plan of the Osijek Baranja County [7]. It was updated by the County Annual Report of 2007 – The County in numbers, 2007. The data for cultural and sports organizations and associations were supplied from the Register of Associations of the Central Government Administration Office, with free Internet access. Religious associations are entered in the Register of Religious Congregations which was used in the research as a source of data for all religious associations except for the Catholic ones which are evidenced in the Catholic Church register of legal persons.

In subsequent procedures the criterion of availability i.e. of spatial distribution was added to the collected data.

<sup>6</sup> The extreme deformation of the net is explained by A. Marinović-Uzelac as a decline from an ideal hierarchy system. There is an over-fragmentation of the system with no differentiation and with mostly small towns and settlements without any special gravitation or more important functions [10].



Thus the activities are divided into:

- *activities of basic supply* (needed frequency—daily, availability radius 300-1000 m),
- *activities of medium level* (weekly need, radius 1 to 30 km),
- *activities of high level* (occasional, monthly need, radius 30 to 60 km).

The division partly follows the classification of the Physical Plan of the Republic of Croatia – year 1986<sup>7</sup>. The difference is in an additional classification of the lowest element in the PPSRH system of settlements defined as a local centre with 500-5000 inhabitants. In the actual analysis it is divided into two categories. As we are analysing the social activities on the transitional point of the Baranja space urban-rural net, we have divided the first category mentioned as local centre (with up to 10 km radius according to PPSRH) to one with the radius up to 1 km for daily needs and the other with the radius from 1 to 30 km for weekly need.

The activities are divided into groups:

- I daily need,  $r=300-1000$  m: municipal branch office, primary school, day nursery, cultural centre, library, cultural associations, surgery, sports associations, religious congregation;
- II weekly need,  $r=1-40$  km: municipality seat, secondary school, primary school, day nursery, cultural centre, cinema, library, theatre, cultural associations, medical centre, social welfare centre, home for abandoned children, old people's home, sports associations, religious congregation;
- III occasional (monthly) need  $r>40$  km: municipality seat, city administration, law courts, prison, higher education, secondary education, primary school, day nursery, cultural centre, cinema, library, theatre, cultural associations, medical centre, social welfare centre, home for abandoned children, old people's home, sports associations, religious congregation.

Individual values of the given categories are modified by the coefficient  $k$  in the following way: the predominantly daily need activities were multiplied by the coefficient value  $k=1$ , the predominantly weekly need activities by the coefficient value  $k=2$ , and the predominantly monthly need activities by the coefficient value  $k=3$ . Thus the hierarchy of activities was set up relative to the importance in space and the design of the settlement system. By the first category a bigger local or a local centre is defined, by the other a smaller regional and by the third a regional centre. This procedure gives a clearer insight into the possibility of departure from the number of expected activities<sup>8</sup>.

Table 1 gives a complex display of mutual ranking of the Baranja municipalities. Rank A (column 3) shows the rank of a particular municipality in Baranja per number of inhabitants, Rank B (column 5) shows the rank of a municipality per social activities while Rank C (column 7) shows the difference in the values of Rank A and Rank B per particular municipality<sup>9</sup>. Column 6 gives the list of municipalities ranked according to the values of Rank C.

The Rank C value represents the Ranks A and B difference in values, shown in Table 1 (column 7). The numerical range of these values is +18 do -21. The difference negative sign shows higher concentration of activities while the positive sign shows the lack of social activities with regard to the population background. The largest settlements (Beli Manastir, Darda, Bilje, Kneževi

Vinogradi, Popovac) do not show the imbalance between the population size and the provision of social activities while the settlements with the widest discrepancy between the population background and provision of social activities are in the group with up to 1500 inhabitants (the largest is Jagodnjak with 1469 inhabitants).

According to the already mentioned statement that urbanization causes imbalance in provision of central functions it can be concluded that a quarter of all functions, 26,3 %, is in the largest settlement – Beli Manastir. This proves that *the regional centre "has taken" most of the social infrastructure* but that *this is not at odds with its size i.e. number of inhabitants*.

If the settlements whose differentiation<sup>10</sup> is  $\pm 5$  are separated from Table 1 and detected in space, it can be concluded that the Table upper part contains the settlements which are in the space that is experiencing regression, outside the polarization corridor. The situation is reverse with the lower part of the list; the separated settlements are within the main road and rail corridor. When considering the correlation of the two spatial factors (number of inhabitants and provision of social activities) it can be concluded that *the settlements outside the polarization corridor are saturated with social activities while the settlements within the rail and road corridor are in need for them*.

The aim of the subsequent research was to additionally confirm the observed situation but by other parameters. In Table 2 *the density of social activities* in the Baranja municipalities is defined as the rate of social activity with regard to the area of the municipalities and the number of inhabitants in the whole municipality. Examining the columns 5 and 6 in which the values of the given densities per area and per inhabitant are shown, a difference can be noticed which can be related to the urbanization level of particular districts. Thus the widest gap can be perceived in the municipality of Darda with a high density of activities per squared kilometre and a low one in relation to the number of inhabitants. Similar results can be obtained for the municipality of Bilje. It can be concluded that the network of settlements in these municipalities is worse than expected when related to the number of inhabitants in the municipality, that the provision of activities is inadequate, that the importance of the central settlement is made evident and that the natural elements like agricultural resources, waterways etc. affect the network pattern<sup>11</sup>. The reverse can be seen on the example of the municipality of Čeminac whose density of social activities with regard to its

<sup>7</sup> According to the Physical Plan of the Republic of Croatia for the year 1986 the categories had the following radii: Centre of the Republic  $r=300-400$  km; centre of macro-region  $r=100-200$  km; centre of region  $r=50-80$  km; more important municipality centre  $r=30-60$  km; other municipality centres  $r=10-40$  km; local centre  $r<10$  km.

<sup>8</sup> Kneževo had a secondary school and a faculty at some time past while today only the Belje Ltd. Archives are kept there.

<sup>9</sup> In the first three columns the Baranja municipalities are ranked per number of inhabitants; column 1 gives the list of all municipalities in Baranja, column 2 gives the number of inhabitants per municipalities according to the 2001 census, column 3 gives the rank of a particular municipality in Baranja per number of inhabitants. Column 4 gives the number of social activities modified (multiplied) by the coefficient  $k$  according to the respective availability group while column 5 gives the rank of a municipality in view of the number in column 4. Column 6 gives the list of municipalities ranked according to the values in Rank C; these values are shown in column 7 in ascending order.

<sup>10</sup> Column 7 in Table 1.

<sup>11</sup> In the municipality of Bilje the Nature Park Kopački rit with the area of 177,0 km<sup>2</sup> occupies more than half of the municipal area (344,0 km<sup>2</sup>).

**Table 1** Ranking of the Baranja settlements per number of inhabitants, cumulated social activities and difference of ranks  
**Tablica 1.** Rangiranje baranjskih naselja prema broju stanovnika, kumulaciji društvenih djelatnosti te diferenciji rangova

Settlement	Number of inhabitants in 2001	Rank A	Cumulation of social activities	Rank B	List according to Rank C	Rank C (associated)
Sudaraž -	0	1	0	1	Sokolovac	-21
Podunavlje	2	2	0	2	<b>Draž</b>	-14
Zlatna Greda	12	3	0	13	Zlatna Greda	-10
Tikveš	29	4	0	3	Novi Bezdán	-10
Sokolovac	55	5	0	26	<b>Baranjsko Petrovo Selo</b>	-9
Mitrovac	64	6	0	4	Novo Nevesinje	-7
Novo Nevesinje	73	7	0	14	Kotlina	-7
Zeleno Polje	80	8	0	5	Gajić	-7
Širine	86	9	0	6	<b>Vardarac</b>	-7
Kozjak	93	10	0	7	Podolje	-6
Jasenovac	95	11	0	8	<b>Suza</b>	-6
Majške Međe	99	12	0	9	Topolje	-5
Novi Bolman	129	13	1	10	Luč	-5
Mirkovac	135	14	1	11	Batina	-4
Podolje	168	15	1	21	Kopačevo	-3
Kamenac	177	16	2	15	Lug	-3
Svajcarnica	231	17	2	12	Grabovac	-3
Torjanci	317	18	3	16	Zmajevac	-2
Novi Bezdán	329	19	3	29	Čeminac	-2
Kotlina	334	20	3	27	Branjina	-1
Gajić	354	21	4	28	Sudaraž -	0
Branjina	378	22	4	23	Podunavlje	0
Novi Čeminac	390	23	5	18	Bolman	0
Bolman	450	24	5	24	Popovac	0
Topolje	473	25	5	30	Kneževi Vinogradi	0
Luč	487	26	6	31	Bilje	0
Šečerana	559	27	6	22	Darda	0
Šumarina	567	28	6	17	Beli Manastir	0
Baranjsko Petrovo Selo	570	29	7	38	Tikveš	1
Uglješ	597	30	8	19	Kamenac	1
Kopačevo	608	31	8	34	Mitrovac	2
Draž	623	32	8	46	Torjanci	2
Suza	636	33	8	39	Petlovac	2
Vardarac	660	34	10	41	Zeleno Polje	3
Duboševica	690	35	10	32	Širine	3
Kozarac	789	36	10	25	Kozjak	3
Petlovac	801	37	10	35	Jasenovac	3
Meće	840	38	12	20	Majške Međe	3
Lug	852	39	12	42	Novi Bolman	3
Grabovac	895	40	12	43	Mirkovac	3
Kneževo	970	41	13	36	Duboševica	3
Zmajevac	974	42	13	44	Svajcarnica	5
Batina	1048	43	13	47	Novi Čeminac	5
Karanac	1065	44	15	37	<b>Šečerana</b>	5
Popovac	1079	45	15	45	<b>Kneževo</b>	5
Čeminac	1108	46	18	48	<b>Karanac</b>	7
Branjiin Vrh	1189	47	18	33	<b>Jagodnjak</b>	8
Jagodnjak	1469	48	18	40	<b>Šumarina</b>	11
Kneževi Vinogradi	1715	49	25	49	<b>Uglješ</b>	11
Bilje	3224	50	31	50	<b>Kozarac</b>	11
Darda	5394	51	43	51	<b>Branjiin Vrh</b>	14
Beli Manastir	8671	52	141	52	<b>Meće</b>	18

**Table 2** Density of social activities in Baranja given per km<sup>2</sup> and inhabitant  
**Tablica 2.** Gustoća društvenih djelatnosti u Baranji izražena po km<sup>2</sup> i stanovniku

Municipality	Area of municipality, km <sup>2</sup>	Population according to census of 2001	Cumulation of elements of social activities d	Density of social activities d/km <sup>2</sup>	Density of social activities (d/st) × 100
Beli Manastir	62,84	10.986	171	2,760	1,557
Bilje	344	5.480	61	1,770	1,113
Darda	86,75	7.062	65	0,750	0,920
Čeminac	72	2.856	45	0,625	1,576
Popovac	62,41	2.427	32	0,513	1,319
K.Vinogradi	183	5.186	67	0,366	1,292
Petlovac	93,84	2.743	29	0,309	1,057
Draž	150	3.356	41	0,273	1,222
Jagodnjak	105	2.537	24	0,239	0,946

Source: The 2001 census. DZS, Zagreb, 2002 and Table 1

Izvor: Popis stanovništva 2001. DZS, Zagreb, 2002. i tablica 1

population is higher than is the density with regard to the area. It can be concluded that the expressed values of the social activities' density per area are in conformity with the current demographic trends of population (polarization)

while the density of the social activities per inhabitant (Table 2) is not connected with the settlement hierarchy but reflects the distribution of activities with regard to the municipality network of settlements and presents the basis for correction.

The results of these analyses can be related and discussed. First, better traffic provisions make a space more frequented and therefore less demanding as to the provision of social activities. Second, a space more developed in previous phases and now experiencing regression, can be detected by the amount of social activities due to their endurance and "harder disintegration". In the process of organizing the activities, they are associated with the quantitative and qualitative demographic features but once they have been set up they remain connected with the space. "While formal institutions can change relatively quickly, informal institutions like conventions or traditions change slower and tend not to change at all" [14]. We assume that this is why the polarization space takes place before the phase of superstructure i.e. production of social activities while the space outside this belt still has a satisfactory level of provision, the threat posed to it being expected due to further polarization and urbanization.

## 5

### Projection of development potential and social activities according to population trends indices

Projekcija potencijala razvoja i pojave društvenih djelatnosti prema indeksima kretanja stanovništva

Previous results of the social activities' distribution in the Baranja space have been backed up by the research into demo-geographic trends. Out of the collected and processed data of the 1991 and 2001 censuses the categories that present natural and structural trends of population have been selected. Natural trend of population is presented by the 2001/1991 population rate of change index (category 1), the 2001/1991 relative density rate of change index (category 2) and vital index. The following categories of structural features are considered to be the elements with direct impact on production or distribution of social activities: population age structure by the 2001/1991 age index (category 4), population educational structure by the 2001/1991 number of illiterates index (category 5), the 2001/1991 population without educational background index (category 6), the 2001/1991 higher educated population index (category 7), population economic structure by the 2001/1991 active population index (category 8) and the 2001/1991 agricultural population index (category 9).

The values of the nine categories considered<sup>12</sup> are shown in Table 3 for the nine municipalities of the Baranja space. Four of them are within the polarization field (Beli Manastir, Bilje, Čeminac i Darda) and five out of it (Draž, Jagodnjak, Kneževi Vinogradi, Petlovac i Popovac).

To obtain a cumulative assesment of the municipalities' capabilities a ranking mechanism is assigned to each of the categories (Table 4). In this way the ranking of the municipalities is made possible for each respective category – they are assigned marks from 1 (one) to 9 (nine), one being the mark for the lowest level of provision and nine for the highest. Total number of marks gives the projection of elements that have a positive impact on establishing social functions; the higher the total amount the higher the potential for superstructure and production of social activities.

By examining Table 4 distinct deviations by municipalities can be noticed which is the proof of the space heterogeneity. In the ranks referring to *Beli Manastir* a phenomenon not specific for urban surrounding can be

noticed – high rate of illiterates and low rate of higher educated persons. This might be due to the profile of immigrant population since in the observed period, between 1991 and 2001, occupation of the region and its peaceful reintegration took place resulting in the emigration of population. This deviation in the education rank is the root problem of the Baranja triangle urban zone. In the total sum column *Bilje* is on top. It has the best potential for production of social activities but the agricultural population growth rate index points to a somewhat more complicated structure – the immigration of the Baranja inhabitants who are sticking to farming activities delays the development of tertiary activities, the tertiary sector being linked to the differential growth of the secondary sector [10]. Such result can initiate further investigation into the development of activities of this municipality close to Osijek which is developing as a "joint" between the regional town and the region. *Čeminac* is a municipality of balanced indicators with only a slight deviation in negative direction for the category of population activities. By the typification of the Osijek-Baranja county Spatial Plan, *Darda*, along with *Bilje*, was defined as a higher urbanized settlement. Although they share the same index - the growth of the rate of agricultural population, *Darda* is additionally marked by the growth of illiterates and the population without educational background. The municipality of *Draž* stands out by the highest number of negative marks (rank 1) designating old, uneducated population, lacking vitality. Although in the year 1991 *Jagodnjak* was among the top municipalities by the rate of illiterates, in the meantime this parametre became considerably lower<sup>13</sup>. The municipality of *Kneževi vinogradi* has got balanced marks with a slight reduction of the rate of illiterates and persons without educational background and an increase in the rate of higher educated population. The municipality of *Petlovac* has the smallest range of ranks – from 3 to 7, denoting a balance between natural and structural qualities of the population. In the neighbour municipality of *Popovac* there is a distinctive

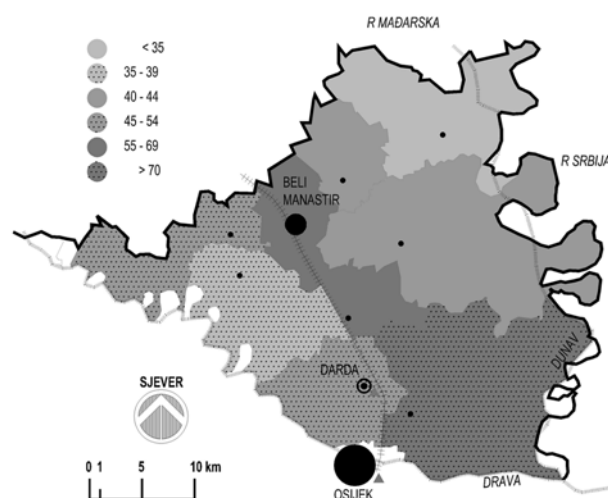


Figure 2 Cumulation of ranks as a potential for superstructure and production of social activities according to Table 5

Slika 2. Prikaz kumulacije rangova kao potencijala za nadgradnju i stvaranje društvenih djelatnosti prema Tablici 5

<sup>12</sup> Categories 1, 2, 4, 5, 6, 7, 8 and 9 are given by dynamic indicators of change – indices according to data of the 1991 and 2001 censuses while category 3 – vital index – is given for the year 2001 only.

<sup>13</sup> This analysis does not discuss the reasons of demographic trends but gives the projection of the possibility of each of the municipalities to develop social activities based on its actual state of development.



**Table 3** The Baranja municipalities by categories of natural and structural rate of population  
**Tablica 3.** Prikaz općina u Baranji po kategorijama prirodnog i strukturnog kretanja stanovništva

Municipality	Population in 2001	Population in 1991	Population change index	Relative density rate of change index	Vitality index	Age index	Illiterates index	Population without educational background index	Higher educated population index	Active population index	Agricultural population index
Beli Manastir	10.986	13.108	83,8	77,1	72,3	95,1	80,6	62,9	115,9	96,9	37,1
Bilje	5.480	6455	84,9	84,9	85,5	82,6	77,8	60,0	168,4	100,1	62,7
Čeminac	2.856	3536	80,8	80,9	77,9	90,9	62,1	44,3	145,0	94,1	31,6
Darda	7.062	8685	81,3	81,3	86,0	77,2	73,7	71,6	121,7	94,4	68,9
Draž	3.356	4623	72,6	72,7	41,8	168,8	97,1	93,5	130,8	74,8	38,4
Jagodnjak	2.537	3602	70,4	70,5	42,3	113,3	60,4	69,3	111,8	95,6	64,4
K.Vinogradi	5.186	6848	75,7	75,6	44,7	114,4	82,9	72,4	152,9	90,1	50,7
Petlovac	2.743	3785	72,5	72,5	64,7	101,7	64,0	65,7	125,0	83,8	46,3
Popovac	2.427	3623	67,0	66,9	42,9	103,8	69,0	63,0	138,1	72,4	37,5

Source: The 2001 census. DZS, Zagreb, 2002

Izvor: Popis stanovništva 2001. DZS, Zagreb, 2002.

**Table 4** Ranked values of the categories of natural and structural trend of population in the municipalities of Baranja  
**Tablica 4.** Prikaz rangiranih vrijednosti kategorija prirodnog i strukturnog kretanja stanovništva općina u Baranji

Municipality	Sum of social activities	Sum of ranks 1-9	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Rank 9
Beli Manastir	171	55	8	6	6	6	3	7	2	8	8
Bilje	61	73	9	9	8	8	4	8	9	9	3
Čeminac	45	69	6	7	7	7	8	9	7	5	9
Darda	65	53	7	8	9	9	5	3	3	6	1
Draž	41	34	4	4	1	1	1	1	5	2	6
Jagodnjak	24	35	2	2	3	2	9	4	1	7	2
K.Vinogradi	67	43	5	5	2	4	2	2	8	4	4
Petlovac	29	48	3	3	5	5	7	5	4	3	5
Popovac	32	40	1	1	4	3	6	6	6	1	7

Source: The 2001 census. DZS, Zagreb, 2002

Izvor: Popis stanovništva 2001. DZS, Zagreb, 2002.

difference between negative natural influx and structural improvement of the population.

This analysis is limited to the space of Baranja by the mutual ranking of its municipalities. In this way parts of the space are being differentiated giving the picture of regional development and directing the development trends (Table 2). Structural analysis of the population is the basis for discussion about requirements of this region, the requirements being connected with the study of social activities, network of settlements and polarization of the space in Baranja.

## 6

### Superimposing of current demo-geographic trends of population, distribution of social activities and system of settlements in Baranja

Superponiranje suvremenih demogeografskih kretanja stanovništva, rasporeda društvenih djelatnosti i sustava naselja u Baranji

The mechanism of ranking the municipalities in Baranja, described in the previous chapter, has been used in order to quantify the development potential of different parts of the Baranja space. The ranking is carried out by defining the position of a particular municipality among all other municipalities based on a number of various criteria so that a higher achieved number represents a better positioned municipality with a greater potential of development.

Table 5 displays the sum total of achieved ranks (positions) of each municipality.

**Table 5** Sum total of the ranks given in table 4  
**Tablica 5.** Zbroj rangova iz tablice 4

	Municipalities	Ranks sum total
Municipalities within polarization corridor	Bilje	73
	Čeminac	69
	Beli Manastir	55
	Darda	53
Municipalities within socio-demographic depression	Petlovac	48
	Kneževi Vinogradi	43
	Popovac	40
	Jagodnjak	35
	Draž	34

By analysing the superimposed actual population trends (Figure 3), the results of investigating the social activities distribution by settlements and the settlements with a tendency to disappear<sup>14</sup> it can be concluded that the traffic corridor is filling up the central part of the Baranja triangle and emptying the remaining part. The first part results of the research support the fact that social activities in settlements respond to this dynamically slower. The final research of the social infrastructure development potential shows that their development tendency is compatible with the effects of polarization and urbanization. Therefore a smaller concentration of social activities is expected outside the central part, the consequence of this being the accelerated extinction of settlements.

Traffic accessibility is inseparable from numerous processes that take place in a space. The present two-part research into the actual and assumed situation supported by

<sup>14</sup> Settlements with less than 100 inhabitants and with age index above 100 for year 2001 according to [5].



the already existing information leads to the conclusion that the dynamics of the social activities' emergence and disintegration depends on traffic accessibility but that the dependence is not unambiguous and time balanced.

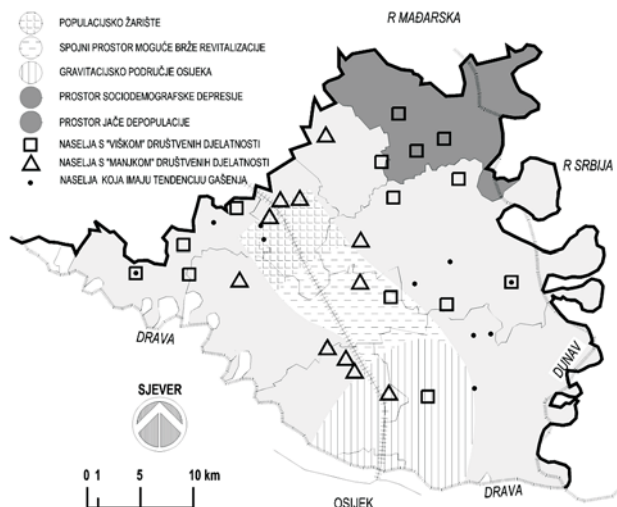


Figure 3 Superimposing of actual demogeographic trends of settlements with the "surplus" or the "shortage" of social activities and settlements tending to get extinct according to [13]

Slika 3. Superponiranje suvremenih demogeografskih kretanja naselja s "viškom" i "manjkom" društvenih djelatnosti i naselja s tendencijom gašenja prema [13]

According to the 2001 census<sup>15</sup> it is evident that in several categories (education level, lower rate of active population, lower rate of young population) the Baranja space population is lagging behind the Croatian average. The disintegration of the Baranja space into the polarization corridor and "the rest" is not necessarily a negative fact. Space is a dynamic system in which different elements – population is one of them – interact.

A space like that of Baranja, rich in various natural and anthropogenic elements, is particularly movable in time. The geographically heterogeneous space of Baranja is dispositionally organized and sometimes some positions precede others and "take the lead" while at some other moment in time they are the elements of degradation. The polarization belt from Bilje to Kneževo is getting more important at the moment and is expected to get on even more importance with the termination of the north-south Baranja part of the European road corridor connecting Budapest and Ploče. Is it necessary to wait for more people moving into the urban corridor and the effect of the population relocation so that the rest of Baranja could experience the positive effect of improved infrastructure? And finally – what will happen with the remaining space in the meantime – should the planning methods be applied and how? Reduction of urban network is not something to be accepted without thinking it over. The forecast envisaging four or more settlements in Baranja disappearing before long [2] might present a natural course of development of these settlements, but it is the task of physical planning to ask questions about the legitimacy of such a scenario and, if necessary, to prevent such occurrences by possible interventions. The loss of a "locus" represents a spatial loss and ignorance of heritage.

The rank order of municipalities shown in Table 5 can be related to traffic accessibility and thus prove the rule that the settlements along transport corridors are the places around which functions and exchange of goods and services

are concentrated. The municipalities at the top of the table can be linked to the gravitational influence of Osijek, inseparable from Baranja, while the municipalities being in the group characterised by socio-demographic depression belong to the gravitational zone of Beli Manastir. The corridor development of the Croatian part of the Baranja region is evident. It can be intensified in order to preserve the natural qualities of the space outside the corridor (quality of agricultural surfaces and the Nature Park Kopački rit). The rural character of the region, the Nature Park and the two waterways are the main phenomena of the region and they direct the planning approach towards the notions of sustainability and environment protection. That is why the rationalization of infrastructure within the corridor is the right choice but an overall spatial vision can only be obtained by the synthesis of other sector data, trends and balance-sheets. Baranja is now faced with a complete reconstruction of all urban systems, definition of regional supply and ability to compete. The assumption is that in such a situation the controlled poly-nuclear dispersion and development of specialized centres in line with the region environment protection would better respond to modern trends of space planning.

## 7 Conclusion Zaključak

At the time when ethical codes are defended by economic sustainability and economic profitability justified as being reasonable and necessary, the matter is to be considered from another point of view too. The allocation of functions is more complex in the new social system in which decision making on property relations has become more complicated and less transparent for the public. Public interest, manifested by social activities like education, sports and culture, is often incompatible with market competition thus growing into an ethical imperative of spatial planning. In a situation in which there is just a vision of economic development and in which demographic trends are unfavorable, the actual social structure presents an element of the population sustainability in a space. In this connection institutions are present not only as formal rules – as constitutions, legislation and usability - but also as informal restrictions – such as sanctions, customs, tradition and codes of conduct [14].

The results of this research can be summarized as follows:

1. The social activities distribution dynamics of development does not keep pace with the actual demogeographic trends in Baranja that are related to traffic development, and
2. The anticipated trend of gradual disappearance of the social activities outside the development corridor and the extinction of settlements in the same space point to the need for development of a secondary development course as an indispensable initiative for a complete development of the Baranja space.

The Baranja space is still suffering from the consequences of the war devastations that resulted in

<sup>15</sup> In the Baranja region there is a higher rate of illiterate population and the population without educational background than on the state level and there is a lower rate of higher educated than in the Republic of Croatia [5].

negative trends of population. For a long time solution of this problem all elements of the Baranja space have to be considered. Positive examples<sup>16</sup> of the changes taking place in such spaces in the world – increased number of inhabitants through planned settlement, considerable capital investment in improving rural living conditions, creating the profile of new population employed in tertiary activities – give an impetus to vision.

## 8

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#### Authors' addresses

Adrese autora

**Doc.dr.sc. Sanja Lončar-Vicković, dipl. ing. arh.**

Sveučilište J. J. Strossmayera u Osijeku  
Građevinski fakultet  
Drinska 16a, 31 000 Osijek

**Dina Stober, dipl. ing. arh.**

Sveučilište J. J. Strossmayera u Osijeku  
Građevinski fakultet  
Drinska 16a, 31 000 Osijek

<sup>16</sup> In the paper "Od konkurencije i konfrontacije do komunikacije i koordinacije-ruralni prostor novo otkriće?" ("From competition and confrontation to communication and coordination – rural area new discovery?") Jasenka Kranjčević gives an account of the 9th Munich conference on spatial planning and rural development. Example is given of Bavarian rural municipalities whose trend of development is desirable in Baranja [15].