Spatial Distribution of the Rural Settlements from the Hydrographic Basin of Crişul Negru River

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From the administrative point of view, the surface of this territory is composed of 50 communes, concentrating a number of 258 villages, distributed in an area of 4.476 Km^2. The quantitative distribution of the settlements points to the fact that the density of the rural settlements and mostly the area coefficient and the medium distance between two settlements has values very similar to the national average. Regarding the dissipation extent of the rural settlements, this indicator amounts its value from west-side to east-side, which means from the plain area to hills and mountains, while half of the communes centers have an intermediate or great polarization potential.

The morphological distribution indicates a superior concentration of the settlements along the main axis of Crişul Negru river, and on its tributaries, in the contact area between depressions and hills as well as in the contact area between the plain and the hills.

The analyzed territory extends over two districts: the south and south-west part of the Bihor county with 2/3 surface of the basin and a small part from the north part of the Arad county. The hydrographical basin of Crişul Negru river includes from the administrative point of view the area occupied by 13 communes from the District territory of Arad and the area occupied by 37 communes from the county territory of Bihor, with a global surface of 4.476 Km^2. In the spatial distribution analysis of the rural settlements two important aspects have been taken into consideration: the quantitative distribution and the morphological distribution.

I. In the case of the quantitative distribution, the following elements have been analyzed: the medium density of the rural settlement over 100 Km^2, the medium surface of one rural settlement (the area coefficient), the medium distance between two settlements, the index of dispersion and the polarizing potential.

1. *The density of the rural settlements* represents the proportion between the numbers of settlements over the surface unit, usually represented by number of settlements per surface unit. Thus, for a surface of 4.476 Km^2, there are 258 villages so a medium density of 5,7 villages to 100 square km, a similar value to the national one which is 5,5 settlements to 100 square km.

Analyzing the density of the rural settlements at the inferior administrative level, or commune level, some disparities of the territorial profile can be noted. Thus, increased values, above the average are registered in those communes whose territory is situated in depressions like Beiuş Depression or in the contact area between the plain and the hills (figure 1). Here, the density value overcomes the average registration, in some communes, values of 20 or over 20 villages/square km. As example: the commune of Drăgăneşti (24,5 villages/100 Km^2), Pocola (20,5 villages/100 Km^2), Sâmbăta (20,03 villages/100 Km^2), Răbăgani (16,9 villages/100 Km^2), Pomezeu (14,5 villages/100 Km^2). The explanation of these raised values can be found in the fact that these communes have in their administration a great number of villages, which in some cases can reach up to 9 villages/commune, occupying a small surface of territory fact that determines a growth of pressure on the territory.

If the territory situated in depressions and the one situated in the contact area are characterized by a raised number of villages over the surface unit, the west part of the territory analyzed which corresponds to the plain area is characterized by values of density inferior to the average one. There are administrative units with a large surface but with a small number of villages (2 or 3 villages/commune).

Figure 1. Hydrographic basin of Crişul Negru river. Density index of rural settlement at 100 km² (2002).

As example: Şicula (2,3 villages/100 km²), Cermei (2,5 villages/100 km²), Sintea Mare (2,6 villages/100 km²), Ciumeghiu (2,7 villages/100 km²).

A similar situation appears also in the case of the communes of whose administrative territory extends to the area of Bihor Mountains, Pădurea Craiului Mountains or Codru-Moma Mountains. As examples: Budureasa (1,4 villages/100 km²), Roşia (2,7 villages/100 km²), Pietroasa (3,4 villages/100 km²), Finiş (4,8 villages/100 km²).

2. *The area coefficient (a)* shows the medium surface occupied by a commune, being the reverse of the density, or the ratio between surface and the number of settlements. In the territory analyzed this coefficient has the value of 17,3 km²/rural settlements.

Also in this case, regarding the average value, there are some disparities at the inferior administrative units level. This time, the raised values of this coefficient will characterize the communes with a large surface but with a small number of villages: Budureasa (69,1 squre km/rural settlements), Şicula (43,8 km²/rural settlement), Cermei (40,6 km²/rural settlement), Ciumeghiu (36,7 km²/rural settlement), Roşia (36,2 km²/rural settlement). The most reduced values of the area coefficient will appear in the case of communes situated in depressions where the number of villages per surface unit is larger: Răbăgani (2,8 km²/rural settlement), Drăgăneşti (4,1 km²/rural settlement), Pocola (4,9 km²/rural settlement), Pomezeu (6,9 km²/rural settlement), Holod (8,2 km²/rural settlement).

3. Using the area coefficient (a) *the medium distance between two settlements* can be calculated. This indicator is calculated using the formula:

$$dm = 1{,}2\sqrt{a}$$

The value calculated for this unit is also very similar to the national value: 5,0 the value in this territory and 5,1 the national value. Even though it is just a theoretical indicator, because in territory the settlements are not extended uniformly, I insisted in calculating it in order to observe the disparities between the communes situated in the depressions and those situated on the plain or extended till the mountains area. In the first case, the medium distance between

two settlements is about 2 or 4 km while in the second case, the values are over the average and are about 10 km for Budureasa commune, 7,2 km for Roşia commune, 7,9 for Şicula commune or 7,4 for Şintea Mare commune.

Thus, in the areas where there are many settlements per administrative unit or an increased density of the settlements, the value for the area coefficient is low and the one for the medium distance between two settlements is also low, which is also the case of communes with an extended area but with a small number of villages.

4. *The index of dispersion*. This indicator is also very important in the studies of Rural Geography because it highlights the way of distribution of the settlements, the degree of grouping or dispersion of the hearths in the territory. The dispersion can be influenced by natural factors as the morphometric characteristics of the relief (energy, altitude, fragmentation etc) by the hydrographic network and also by the demographical or social and economical factor as the density of the population, the ownership relations, the type of economy etc. In order to calculate the index of dispersion of the rural settlements from Crişul Negru hydrographical basin we used the classical formula of A. Demangeon:

$$I_d = \frac{(N - N')n}{N}$$

N - the population of the commune;
N`- the population of the commune centre;
n - number of villages incorporated except the centre of the commune.

Using this indicator, values from 0,00 (Şepreuş) commune) to 7,2 (Craiva commune) resulted, therefore, we divided the communes in five categories (figure 2):
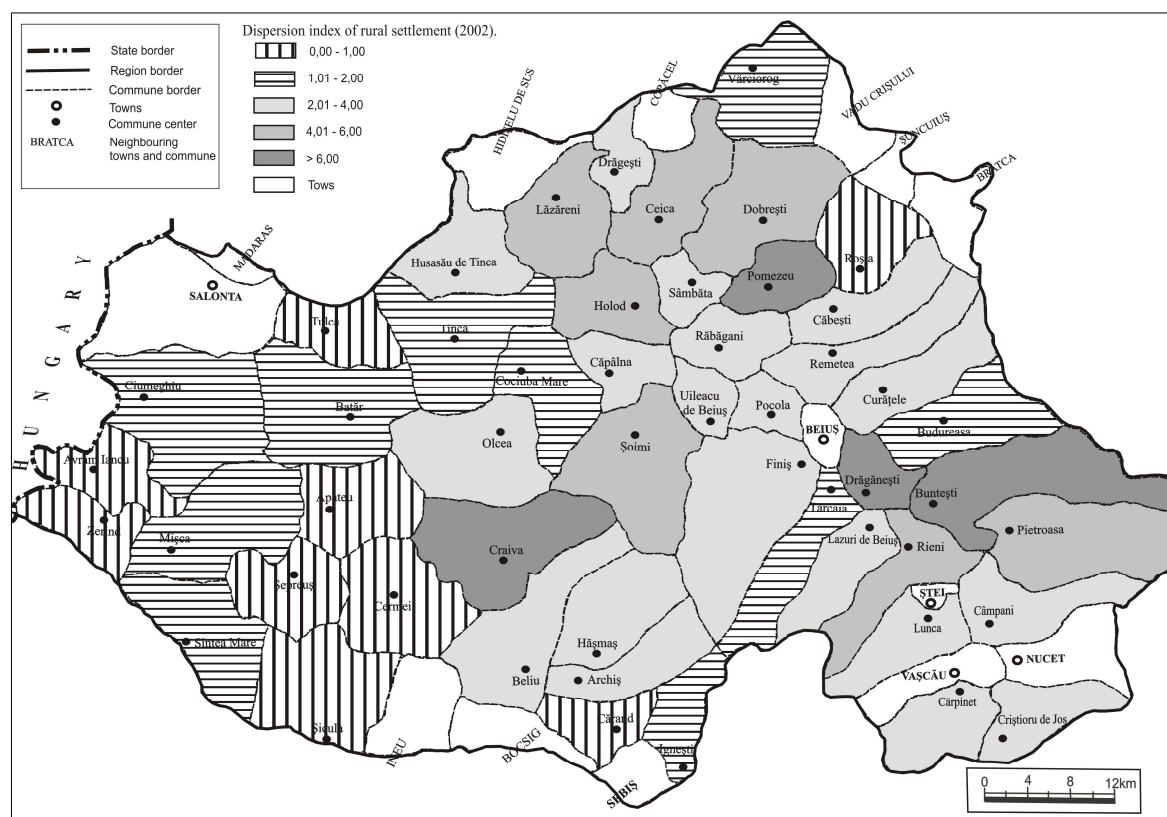

Figure 2. Hydrografic basin of Crişul Negru river. Dispersion index of rural settlements (2002).

a. *Communes with a very low index of dispersion*. This category has values between 0,00 and 1,00 and incorporates the communes that have no villages in their administration except the centre of the commune (Şepreuş) and also communes with one or two villages in

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their administration. These communes have as characteristics the fact that the centers of the communes stand out from a demographical point of view, while the villages in their administration have a low demographical potential, being small villages, in majority of cases. Example: Roşia, Tulca, Zerind with one village in administration and Avram Iancu, Apateu, Cărand, Cermei, Şicula administrating two villages.

b. *Communes with low index of dispersion* have values between 1,01 and 2,00, characteristic to the communes who have in their administration between 2 and 4 villages. The centers of the communes have a very different demographic potential, from a low one (Igneşti) and medium (Cociuba Mare, Tărcaia, Vârciorog) to a significant one (Batăr, Budureasa, Ciumeghiu, Mişca, Şintea Mare) and even a determinant one (Tinca). The villages in their administration are medium-sized villages except those under the administration of the communes extended till the mountainous area. (Vârciorog, Tărcaia and Igneşti) that have a small demographical potential.

c. *Communes with a medium index of dispersion* (2,01 – 4,00) are 20. Half of these communes have 4 villages in their administration, 5 of them have 5 villages in their administration and 5 of them have 3 villages in their administration. Generally, the demographic dimension of the center of commune is medium and the villages are medium-sized, too. There are situations when the villages in administration have more inhabitants than the center, having, thus, a more important role. Examples: Drăgeşti, Lazuri de Beiuş, Olcea, Remetea, Uileacu de Beiuş, Archiş.

d. *Communes with a high index of dispersion* (4,01 – 6,00) have in administration between 6 and 8 villages (Ceica, Dobreşti, Holod, Lăzăreni, Pietroasa, Şoimi). We have an exception, Rieni, with only 5 villages in administration. The centers of communes are medium – sized villages and the villages in administration are very different from a demographic point of view from small to very small and medium – sized villages.

e. *Communes with very high index of dispersion*. This category includes 4 communes: Craiva – with the highest index of dispersion from the area (7,2), followed by Bunteşti (7,03), Drăgăneşti (6,8) and Pomezeu (6,6). These communes are characterized by the greatest number of villages in administration (an average of 9 villages), the centers are medium – sized villages being demographically overcome by one or more villages in administration.

Generally, the level of dispersion of the settlements amounts in the analyzed territory from west to east, or from the plain area to the hilly and mountainous area. In the east side (the mountains area) the villages are radial disposed according to the mountains that surround them. There are villages that have households much dispersed inside their hearths, as examples: Vârciorog, Fâşca, Topa de Sus, Luncasprie, Roşia, Susag, Ciunteşti, Criştioru de Sus etc.

If in this case, some natural factors, among which the relief and hydrographic network had determined the dispersion of the settlements, in the west side of the basin which corresponds to the inferior course of Crişul Negru river, on the plain, the hearts are more compacts, almost geometrical. Still, there are some villages which have secondary hearths that separate them, but the reasons are social and economical as the type of property of the land or the economy type. In this case, the secondary hearths appeared because of the rural law implementation, like the one from 1921 when the people who fought in the war had received some land at the border or at some distance from the main hearth of the village, creating a new hearth. Example: Tulca, Batăr, Tăuţ, where the secondary hearths are easy to be identified because of their denomination starting with "new": Tulca Nouă, Batăru Nou.

Considering all these, the actual administrative division in communes had determined the rising of a center of commune in order to coordinate and polarize, in many of the cases being the village with the highest demographic potential. Around this village the rest of the villages are disposed, with some distance between them gravitating towards the center of the commune.

5. *The polarizing potential of the center of communes* is an indicator that highlights the power of attraction of the centers on their administrative territory. Analyzing this indicator, we have to deal with the so-called "conventional village" that has a demographic size very close to to the number of inhabitants of one village (the average).

The formula that calculates the polarizing potential was elaborated by V. Surd and L. Nicoară in 1980 and I used it for the analysis of the rural space from the hydrographic Basin of Crişul Negru river:

$$P_p = \frac{N - N'}{P_c}$$

N – the population of the commune;
N` - the population of the center of commune;
Pc – the population of the conventional village.

In the analyzed area the population of the conventional village has the value of 591 inhabitants expressing the medium demographic potential of one rural settlement from the hydrographic Basin of Crişul Negru river in 2002.

It results that the polarizing potential indicates the number of conventional villages that gravitate towards the center of commune, administratively speaking.

In the case of the communes that don't have all the territory included in the analyzed space but the center of commune is included (Husasăul de Tinca, Mădăras, Vârciorog, Igneşti) the population of all villages in administration has been taken into account, even those not situated inside the region.

Analyzing the values obtained (between 0,00 and 7,10) the 51 centers of communes can be grouped in the following categories (figure 3):
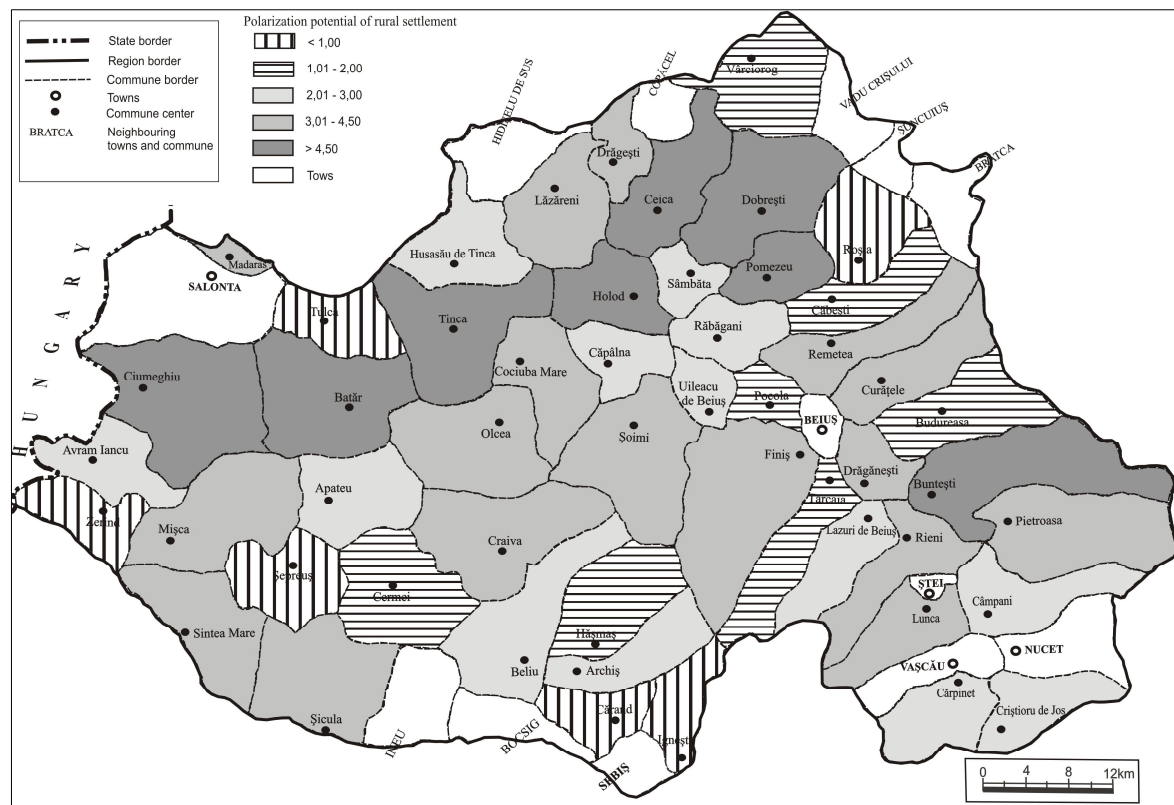

Figure 3. Hydrografic basin of Crişul Negru river. Polarization potential of rural settlements (2002).

a. *Centers of communes with very high polarizing potential* (over 4.500 include 8 villages, representing 15,7% of the all centers of communes: Batăr, Bunteşti with the maximum value of polarizing potential (7,1), Ceica, Ciumeghiu, Dobreşti, Holod, Pomezeu and Tinca. In this case the administrative units are localized at the border of the region and have a great number of villages in administration (between 7 and 9) except the villages situated on the plain area Ciumeghiu, Batăr and Tinca with 3, 4 and 5 villages. In their development these centers of communes have benefited from an important economical and communication potential.

b. *Centers of communes with high polarizing potential* (3,01 – 4,50) represent 1/3 of the total (17). These are located in the plain area (Mişca, Sintea Mare, Şicula) in depressions (Cociuba Mare, Şoimi, Finiş) or in the hills between Bihor Mountains and Codru–Moma Mountains (Pietroasa, Curăţele, Lunca, Rieni) or in Tasnadului Hills (Lăzăreni, Drăgeşti). The

administrative units have various villages in administration (from 3 in commune of Sicula and Sintea Mare till 10 in commune of Craiva). The majority of the centers of communes have medium demographic dimensions and only two centers have a high polarizing potential (Cociuba Mare and Finiş), while two of them have small demographic dimensions (Drăgăneşti and Drăgeşti).

c. *Centers of communes with a medium polarizing potential* (2,01 – 3,00) represents 25,5% of total. They are located mostly in the east of the region on the superior course of Crisul Negru river (Criştioru de Jos, Cărpinet, Câmpani, Lazuri de Beiuş) or on the tributaries bordering the Depression of Beius (Răbăgani, Sâmbăta). This category of communes has a small and medium demographic potential and are polarizing between 3 and 5 villages in their territory. Sometimes, centers of communes situated on the plain area appear (Avram Iancu, Apateu) having a great demographic potential but in their polarizing area there are 2 small and medium – sized villages.

d. *Centers of communes with low polarizing potential* (1.01 – 2.00) are chaotically spread in territory, located on the plain area or in depressions (Cermei, Pocola), in the hilly area (Hăşmaş, Tărcaia, Budureasa, Căbeşti) or mountainous one (Varciorog). The majority of the centers are medium and large – sized except the centers of Pocola and Hăşmaş which are small and are polarizing between 2 and 5 villages of small and very small size.

e. *Centers of communes with very low polarizing potential* (0,00 – 1,00) are very few (6) and are marginal situated within the territory. The administrative units have in their administration 2 or 3 villages which mean that the centers of the communes are polarizing only one village (Roşia, Tulca, Cărand, Zerind). In this case, the polarizing center is very individualized by the number of inhabitants. As an exception, we can add the commune of Ignesti which, even thought has 4 villages in administration it is a small sized settlement.

The only center of commune with none polarizing potential is Şepreuş because he has no settlement over which it can extend its area of polarization. He has no village in his administration.

As a conclusion, more than half of the centers of communes have a medium and high polarizing potential. The great majority of the centers have medium demographic potential polarizing between 3 and 9 villages. The most intense pressure is manifested over the centre of Craiva commune that has the greatest number of polarized villages (9).

Generally, these centers of communes have an important educational, medical, and commercial potential and less industry potential.

In the case of the centers of communes with very high polarizing potential (Tinca, Dobreşti, Ciumeghiu), due to some natural, economic and historical factors a high development of the infrastructure was possible, thus there are high chances to become towns.

II. The morphological distribution is directly influenced by the relief fragmentation and energy, hydrographical drainage, litology and tectonic characteristics. That's why we analyzed the hearths disposure in relation with the morphological units.

Conditioned by the tributaries that are coming from the Bihor Mountains and Padurea Craiului Mountains, stronger than the ones that are coming from the Codru – Moma Mountains, the Hydrographical Basin of Crişul Negru River has an asymmetrical aspect.

 The hydrographic corridor of Crişull Negru River represents a true axis of concentration of the settlements especially in the superior sector but also in the depression sector: Beius Depression and Holod Depression. In their development, the settlements were also favored by the potential of communication.

These factors have favored the concentration of these settlements with long hearths disposed on both sides of the river or of the road. For example villages like Cărpinet, Leheceni, Sălişte de Vaşcău and Poiana are almost tied up one to each other along Crişul Negru Valley.

An important block of settlements is located in the area of contact between the plain and the hills (Husasău de Tinca, Fonău, Oşand, Râpa, Olcea, Ucuriş, Craiva, Beliu). Some settlements are located in the interior along the tributaries: Drăgeşti, Bucium, Ceica (on Ceica Valley), Corbeşti, Topa de Sus, Topa de Jos, Cornişeşti (on Topa Valley), Roşia, Căbeşti, Josani, Remetea, Şoimuş, Poietari, Pocola (on Roşia Valley). A particular case is the disposure of settlements around the settlement of Budureasa, where the villages have a circular disposure around the Piedmont of Budureasa. The water determined the circular disposure of the villages

Ferice, Săud, Leleşti, Blejeni, Saca, Sălişte de Beiuş, Talpe, Teleac, Mizieş, Nimăieşti, Pociovelişte, Burda etc.

If in the north part of the Piedmont of Codru – Moma, settlements had grouped on the both sides of Crisul Negru Valley, having a linear pattern, in the south part the settlements had developed around the Piedmont, on the tributaries that are coming from the mountains (Ciunteşti, Stoineşti, Mărăuş, Secaci, Botfei, Urviş de Beliu, Hăşmaş, Groşeni, Nermiş, Igneşti, etc). Generally, they are villages with small and very small demographic potential with a dispersive hearth.

In the west part where the Basin is represented by the plain unit, the settlement density is lower but the geometrical patterns are more obvious as we move to the west border of Romania. There are villages of great demographical size (Tulca, Batăr, Ciumeghiu, Avram Iancu, Şepreuş, Chereluş, Cermei, Zerind, Mişca etc), lots of them with many urban characteristics. The center of these settlements has a definite role, some of them being the weekly markets.

The villages situated in the mountainous area are very few and have the hearths dissipated on a large area with isolated households. Example: Hodişel, Dumbrăvița de Codru, Câmp, Câmp Moți, Coleşti, Izbuc în Codru Moma Mountains or Giuleşti, Criştioru de Sus, Băița-Plai, Poiana, in the west part of Bihor Mountains.

Thus, the hydrographic corridor of Crisul Negru river had played a very important role in the settlements emergence and development, with influence in the hearths organization, the settlements concentration having high values in the center of the region and low values at the borders.

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