

PRELIMINARY ISSUES ON NUCLEATION PHENOMENA IN REGIONAL GRAVITY AXES

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ABSTRACT – Irrespective of their univocal or biunivocal structure, gravity axes facilitate the emergence of nucleation phenomena, the genesis of certain settlements with polarizing functions of various ranks and hierarchical levels. The formation of the habitational nuclei takes place in the areas where natural gravity reaches representative parameters, such as river confluences, depressions and the more spread out sectors of the river meadows, where a concentration of the vectors of the geomorphologic evolution is remarked. The nucleation processes follow a spiral of conditionings, being triggered by the natural facilities and subsequently amplified by the diversification and the intensification of the human activities.

Keywords: nucleation, gravity axes, the Târnava rivers, the Siret Corridor, polarization

GRAVITY AXES – CONCEPTUAL CLARIFICATIONS

Certain areas under the form of stripes or corridors, where the movement of elements receive an increased effervescence, where a concentration of infrastructures and logistic systems appear that subsidize the development of some of the most complex activities out of which the ones carrying mass, energy, goods, and interests stand out, often individualise themselves within the spatial structures of a territory. That is of the majority of the principles for the development of the respective geographical unit, no matter of its size or its physical or geographical-human features.

Generally, these concentration stripes, which, through spatial and functional individualisation become *gravity axes* proper, overlay the major hydrographical corridors (the Danube, the Siret, the Olt, the Mureş, the Someşul Mare, the two Târnava rivers), the representative morphological corridors (the peripheral depressions of the Transylvanian Depression, the sub-mountainous depressions of the Sub-Carpathians, Rucăr-Bran and Timiș-Cerna intra-mountainous corridors), the contact areas between major forms of relief (plain-hills/plateaus, plain-mountain, hills/plateaus-mountainous area), where the complementarity of resources has attracted population since the beginning of the inhabitation process. A similar function can be played in the territory by a series of low, interconnected alignments such as the one between Jibou-Zalău-Șimleu Silvaniei-Marghita, analysed from this viewpoint by Pop, C.C. (2003). In addition, a classical axis is the one superposing the interface line between two major geographical environments such as land and water in the case of the Black Sea seaside. In all these cases, the a priori achievement of a natural gravity turned into a genuine spatial matrix can be ascertained, invariably followed by human gravity and concentration.

A factor of significant influence on the nucleation phenomena is the one represented by the functional features of axes. Thus, the presence of several functional types of such spatial entities can be noticed in Romania, namely *univocal axes* and *biunivocal axes*.

Univocal axes are basically some pseudo-structures in which gravity and the development of phenomena mainly receive a one-way direction, usually oriented from upstream to downstream. They

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are typical for the upper sectors of the main rivers (the Mureş and the Olt), as well as of some better-developed tributaries, such as the ones of the Siret river (Trotuş, Bistriţa, Bârlad, Moldova). In this case, gravity receives the form of an *inertial discharge*, with a progressive amplification downstream, a situation frequently observed also in the size and the functions of the nuclei.

Biunivocal axes are classical entities, of reference for such territorial structures, made of corridors or stripes with ambivalent charge and discharge. The most relevant prototype is the one of the Rucăr-Bran and the Timiș-Cerna intra-mountainous corridors, whose extremities take the form of some receiving funnels that concentrate and orientate the mass and goods flows inside the axis proper. They are also significantly individualised in the middle and lower corridors of rivers (the Danube, the Siret, the Mureş, the Olt). The driving factor of this type of axes is represented by *transit*, the two-way circulation of the principles of both the own spatial development and especially of the more or less contiguous regions.

Another feature of axes, passed in functional terms, derive from their morphography. From this point of view, the presence of *parallel* and/or *bifurcated axes* can be ascertained, grafted on branched hydrographical or morphological systems. An interesting example of parallel axes is the one of the two Târnava rivers, where Târnava Mare and Târnava Mică, although joined in Blaj, maintain a relative independence, facilitated by the modest polarisation and influence potential of the above-mentioned town (Coțiu, Andreea, 2010). A relevant bifurcated axis is the one of the Someș, developed on its two main tributaries, the Someșul Mare and the Someșul Mic. It becomes, through geographical position and through the spatial relations between its components proper, as well as with its surrounding units, a structure consisting of the blending of two, practically independent axes, without a direct reciprocal interconnection, such as that in the case of the two Târnava rivers.

GENESIS, FUNCTIONS AND TYPOLOGY OF THE SPATIAL AGGREGATION NUCLEI

Spatial aggregation nuclei, synonymous to the settlements with polarizing role, result, in the case of gravity axes as well, from the long-time competition between the different units of habitat within the given territory. Those with a more favourable geographical position in terms of natural support base, with more numerous and more facile interconnection opportunities with the habitats situated in the neighbouring regions, with a more rigorous and more innovative management, hierarchically impose themselves by detaching from the competing settlements.

Within the gravity axes, due to their elongated configuration and to the establishment of some anisotropic-type regional systems, the competition between settlements receives a series of particular features, which differentiate it from the similar phenomena developed in the geographical areas without natural obstructions or determinisms. Thus, the morphological barriers of the lateral interfluves of the axis represent restrictive factors as regards the interconnection with the settlements situated on their opposite side, altitude and land fragmentation being elements of major impact upon the access infrastructure and through them, upon the connectivity between the habitat elements. In transverse plane, the nucleation receives the feature of a unique, concentrated structure, developed on the lower terraces of the river network afferent to the axis or in the hearth of the morphological corridors. The expansion of the built-up area, especially after 1990, when the process of building individual houses “on land” was triggered, led to the occupancy of the lower third of slopes such as in the case of Mediaș, Blaj or Târnăveni in the Târnava Mare axis, Cluj Napoca or Gherla in that of the Someșul Mic, etc. However, the vestiges of the medieval towns are situated on the slope promontories (the fortress of Sighișoara is a good example in this respect). Nevertheless, it stretches longitudinally, upstream and downstream, with obvious polarizing effects, delineated by the 20-30 minute isochrone, beyond which the attraction force reduces its intensity, making possible the appearance of another polarizing centre. In fact, the position of the three main gravity centres in the Târnava Mare axis, namely Sighișoara, Mediaș and Blaj, follow closely this rule, the distance between them being around 40 km (the intercalation of Copșa Mică does not visibly disturb the respective layout, its development

being linked both to the junction with the access corridor towards Sibiu and especially to the implantation of some units with major role in the trophic chain of the chemical industry branch and zinc refining).

Thus, a process of sizing the intensity of the nucleation phenomenon is ascertained, in close relation to the attractive potential of the competing centres. Generally, the urban type of attractive centres predominates, represented by small and medium-sized towns, large cities being rather exceptions than a rule of the nucleation phenomenon in the perimeter of axes. Thus, along more than 1,000 km, in the Danube gravity axis, only three such centres are located, namely Drobeta-Turnu Severin, Brăila and Galați, only one, Bacău, in the Siret gravity axis, while in the Someșul Mic axis, it is solely the city of Cluj-Napoca. However, there are numerous gravity axes lacking such poles, as those of the two Târnava rivers, of the Someșul Mare, Rucăr-Bran, Timiș-Cerna, etc.

Depending on their way of development and affirmation, there are four types of nucleation processes, namely endogenous, connective, junctional (confluence) and mixed.

The **endogenous nucleation** defines the attractive centres appeared and developed exclusively under the impact of the axial, univocal or biunivocal transit processes. The lateral intake, in transverse plane, is missing or is completely insignificant. The habitation nuclei, consisting of small-sized towns or with super-communal attractive functions, of small potential, belong to this category such as Dumbrăveni (on the Târnava Mare), Sângeorgiu de Pădure and Sovata (on the Târnava Mică) (Fig. 1), Sângeorz Băi (on the Someșul Mare), Gherla (on the Someșul Mic), Mărășești or Siret (in the Siret Corridor). The exception is, however, the Danube axis, where besides small towns (Orșova, Bechet, Corabia, Zimnicea, Turnu Măgurele, Oltenița), there are also several middle-sized towns (Călărași, Tulcea) or large cities (Brăila, Galați), etc.

Connective nucleation has appeared in the areas where the attractive centre is situated at the intersection of the longitudinal axis with transverse axes of the same rank or even of lower rank. The confluence and the radial diffuence of the carrying vectors have widened the gravity area, the respective settlement becoming a focalising, nodal point of the territorial system. From this point to the increase of its economic, social, cultural, logistic potential as well as to rank advancement was only one step. This explains the overlapping of these nucleation areas over the large and middle-sized towns, with major role in achieving the management and the cohesion of the afferent territory.

Thus, Bacău, Roman, and Adjud have stood out at the intersection area of the longitudinal axis of the Siret with the transverse axes discharged towards the Bârlad Plateau in the east and the Moldavian Sub-Carpathians in the west (Fig. 2). The town of Pașcani is grafted at the intersection point of the same longitudinal axis with the transverse axis that links the city of Iași with the Moldavian Sub-Carpathians and Transylvania. In the area of the two parallel axes of the Târnava Mare and the Târnava Mică, the connective nucleation functionally defines the representative towns in their urban system, Sighișoara, Mediaș and Târnăveni, respectively. A town that has not capitalised its positional potential of economic and functional connectivity is the town of Năsăud, left in the condition of a small urban settlement despite its favourable geographical position, at the intersection of the longitudinal axis of the Someșul Mare with the one grafted on the Sălăuța Valley towards Maramureș County and on the connexion line with Bistrița, respectively. However, Năsăud benefits by a wide polarisation area due to its cultural prestige.

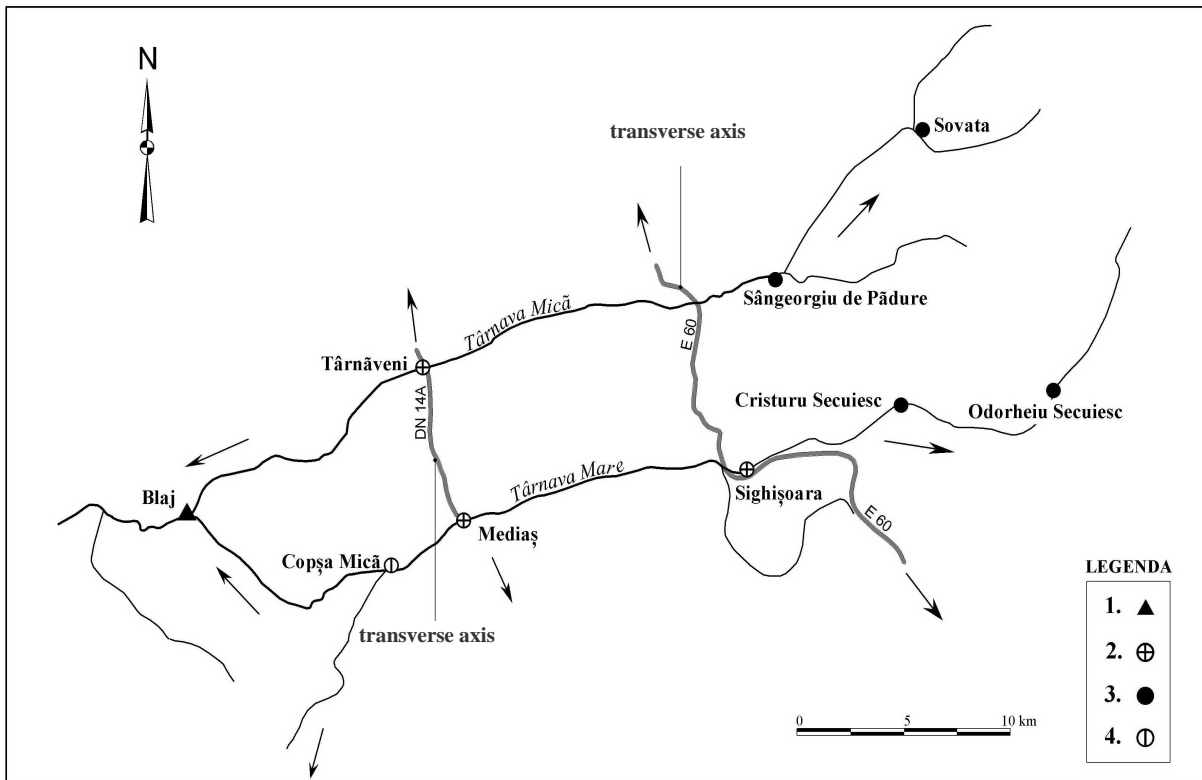


Figure 1. Nucleation phenomena in the gravity axes of the two Târnava rivers: 1. junctional nucleation; 2. connective nucleation; 3. endogenous nucleation; 4. mixed nucleation.

In the case of the Danube axis, the connectivity can be perceived both at national level (in the Hârșova – Vadu Oii, Fetești-Cernavodă areas), as well as at cross-border level (Giurgiu-Ruse, Calafat-Vidin, Drobeta-Turnu Severin – Kladovo), having as “bridgeheads” some transversely interconnected towns.

Junctional nucleation comes into being at the intersection of the main axis with a secondary, lateral axis or at the confluence between two gravity stripes, continued afterwards by a single axis. Illustrative examples are the poles represented by the towns of Dej and Blaj, developed at the confluence of the independent axes of the Someșul Mare and of the Someșul Mic, and of the Târnava Mare and the Târnava Mică, respectively. Another type of junction appears in the connection area between the major axis and a truncated, lateral axis (developed on only one side, without an intersection proper), such as in the case of the town of Bucecea (connection area between the Siret Corridor and the Jijia Depression, through Botoșani). A striking fact that resides from the above-mentioned examples is represented by the modest rank of the attractive centres localised in the junction area, although the spatial gravity vectors that rule the dynamics of the phenomena in each axis frequently interfere. The fact that the town of Dej, where there is practically a triple junction, remains in the position of a middle-sized town can be explained only by a long-term deficiency in urban management, which has not observed and has not perceived the exceptional advantages that can result from such a geographical location.

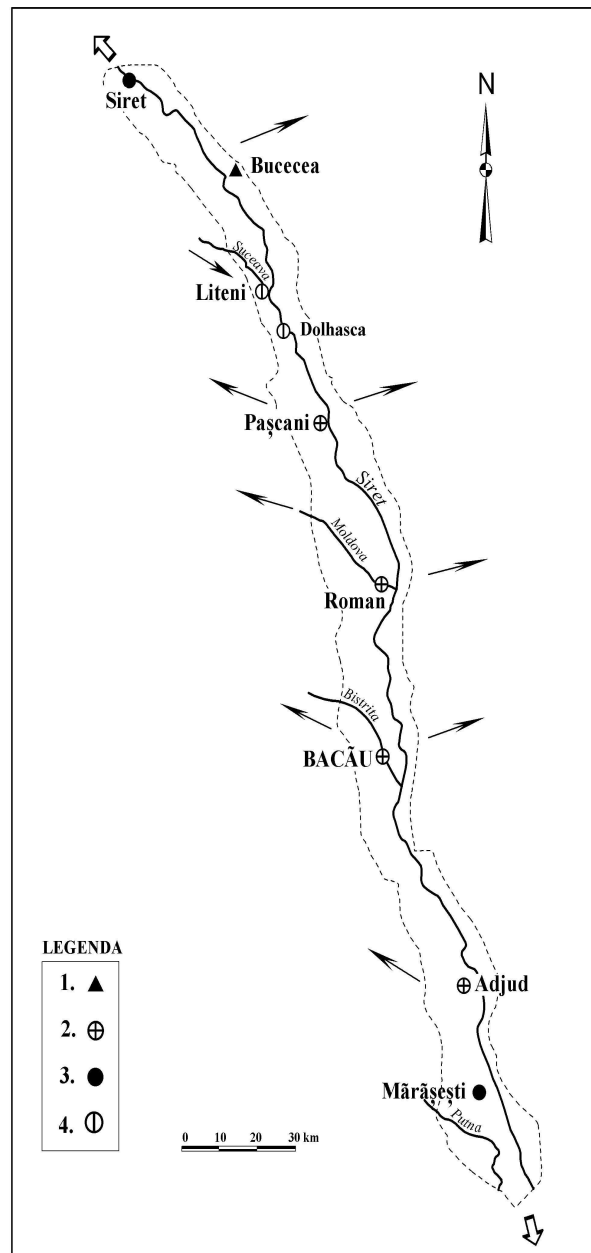


Figure 2. Nucleation phenomena in the gravity axis of the Siret: 1. junctional nucleation; 2. connective nucleation; 3. endogenous nucleation; 4. mixed nucleation.

The **mixed nucleation** brings together certain elements from the previous types, either related to a physical-geographical frame, favourable in terms of support base, or to the connectivity or partial junction between the longitudinal axis and the transverse ones. It is peculiar to the towns of Gherla and Beclean, situated in the gravity axes of the two Someș rivers, both of them having a polarizing hinterland towards the Transylvanian Plain, to the town of Copșa Mică (where the corridor of interconnection with Sibiu debouches), to Dolhasca and Liteni, in the area of confluence of the Siret River with its tributaries flowing from the Suceava Plateau, etc. In this case also, the rank of the nucleation area is modest, coinciding with small towns or with supra-communal polarizing centres.

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