

THE INFLUENCE OF LANDFORM ON HUMAN SETTLEMENTS AND LAND USE IN THE LOPADEA HILLS

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The morphographic and morphometric features of the Lopadea Hills (about 320 km²), the area's major and derived relief, facilitated the building of 39 rural settlements and one town, Ocna Mureș. The following types of settlements in the Lopadea Hills: 21 settlements (52.5%) in the main, large peripheral valleys, on terraces and in floodplains; 5 (12.5%) villages in the secondary valleys, tributaries of the peripheral ones; 14 villages (35%) in the upper reaches of lower-order tributary valleys, occupying small basinettes or confluence areas. Landform features and the region's socio-economic potential have stamped their mark on land use. Land use structure in Lopadea Hills: arable lands, pastures and hay-fields, forests, vine-yards, settlements, orchards, etc.

Key-words: landform, human settlements, land use, Lopadea Hills.

A part of the Târnava Mică Hills, the Lopadea Hills¹ (about 320 km²) are bounded by the Mureș River in the north and west, the Târnava and the Târnava Mică rivers in the south and Valea Fărăului (with Valea Alecuș its tributary) and Valea Pânade (a tributary of the Târnava Mică) in the east (Mărculeț I., Mărculeț Cătălina, 2003). Although the marginal corridors of the Mureș and the two Târnave rivers are distinct morphological units, yet they make an organic socio-economic whole with the limitrophe hills.

1. Landform Characteristics and Their Role in Settlement Pattern and Development

The morphographic and morphometric landform features of the Lopadea Hills have exerted, among other physico-geographical factors, both a favourable

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¹ The relief sub-unit, situated in the north-east of the Târnave Plateau between the Mureș, Târnava and Târnava Mică Rivers, was in time named Dealurile Lopadei (Hills) (MIHĂILESCU, V., 1969, *Geografia României*, III, *Carpații Românești și Depresiunea Transilvaniei*, 1987; MĂRCULEȚ, I., MĂRCULEȚ, CĂTĂLINA, 2003; BADEA, L. *et al.*, 2006), Podișul Târnăvenilor (Plateau) (ȘONERIU, I., 1976), Dealurile, Mediașului (Hills) (TUFESCU, V., 1974), Podișul Lopadei (Plateau) (*Enciclopedia geografică a României*, 1982; POSEA, GR., BADEA, L., 1984; SOROCOVSCI, V., 1996; BUZA, M., MĂRCULEȚ, I., 2002 ș.a.), Mureș – Târnava Mică and Târnava Mică – Târnava Mare Interfluvies (SAVU, AL., 1980) and Dealurile Fărăului (Hills) (Pop Gr. P., 2001).

and a restrictive influence, contributing significantly to the development of the 40 settlements in the region: maximum altitude 548.2 m (the Podina Hill, north of Lopadea Nouă settlement), minimum altitude 240 m (the Mureș floodplain), top level difference as against the Mureș and the Târnava Mică floodplains, 308.2 m and cca. 200 m, respectively, relief energy of the hills 241-280 m along the Podina – Țuculeu – Creasta Beței – Cornul Șoimușului – Măgura Mihalțului summit on the lefthandside of the Mureș and 141-160 m along the Pietrișului – Bisen – Turdașului – Crucea Colcerului – Coasta Zăpozii summits situated in the central-eastern part.

The density of fragmentation varies between lowest values ($0.0-0.50 \text{ km/km}^2$) in the south-west along the Creasta Beței – Cornul Șoimușului – Măgura Mihalțului – Măgura Cisteiului summits dominated by marl and sand deposits, and highest values ($0.75-1.0 \text{ km/km}^2$) along the Pietrișului – Bisen – Turdașului Summit and on the lefthandside of the Mureș, between the settlements of Păgida, Ocna Mureș and Noșlac. Declivity is concordant with the fragmentation gradient, decreasing sharply from east and north-east to west and south-west (N. Josan, 1979).

All in all, the unit largely overlaps the anticline folds in the west of the Târnava Mică Hills, undergoing significant relief modelling processes, e.g. developed asymmetrical valleys, true subsequent depressions parted by major, 470-540 m-high, summits usually north-west-south-east oriented. Secondary summits with saddles and monticles (350-450 m alt.) perpendicular to the main ones, branch off in a north-east – south-west, here and there north-south direction (Josan N., 1979).

In the north of the Lopadea Nouă Depression, drained by the Râtu Brook, stands the Ocna Mureșului and Băgăului hilly unit, the highest sector of the study-area (450-550 m alt.), including the following individual hills: Coasta Zăpozii, 522,7 m; Podina, 548 m; Tăușoru, 524 m and Țigla, 490.2 m. In the south are the Bucerzii and the Pânade Hills modelled into folded Mio-Pliocene formations of tight anticlines and synclines (Ocnișoara – Blaj, Pânade – Bălcaciu). The drainage basins developed here, which have deeply fragmented the region, look like asymmetrical depressions sometimes with a boggy bottom. Interfluves in this sector are low, preserving erosion outliers, e.g. the Chicei Hill, 468 m, the Pârva Hill, 472 m, etc.

Marginal Valleys are intensely populated and have a special economic importance, lands are used mostly for agriculture and major communication lines cross the area. A real drawback is moisture caused by an elevated ground level, precipitation and flooding which seriously deplete crop outputs and damage constructions, as it happened especially in 1970 and 1975 when the majority of settlements located in the Mureș, Târnava Mică and Târnava valleys were hit by the floods. In May 1970 the Mureș flow reached $1,580 \text{ m}^3/\text{s}$ at Ocna Mureș and $2,450 \text{ m}^3/\text{s}$ at Alba Iulia (some 24 times the multiannual mean of $71.4 \text{ m}^3/\text{s}$ at Ocna Mureș and $103.2 \text{ m}^3/\text{s}$ at Alba Iulia). On June 1975, the top flow value on the Târnava was $1,350 \text{ m}^3/\text{s}$ at Mihalț (a settlement on the lefthandside of the Târnava at cca. 2 km upstream of its confluence with the Mureș), that is nearly 43 times the multiannual mean ($31.4 \text{ m}^3/\text{s}$) (Morariu T., Bogdan Octavia, Maier A., 1980).

Downstream of its confluence with the Fărău Valley, the area covered by the middle and the lower terraces of the Mureş is quite small: t_1 (8-12 m) – at Cisteiu de Mureş, Ciumbrud, Sâncrai, Rădeşti and Leorin; t_2 (18-25 m) – at Gâmbaş, Rădeşti and Meşcreac; t_3 (30-40 m) – at Ocna Mureş, Micoşlaca, Ciumbrud, between Rădeşti and Sâncrai and at Căpuđ –, t_4 (50-60 m) – at Rădeşti – and t_5 (80-90 m) – at Ciumbrud, Rădeşti and Căpuđ (Josan N., 1979; Buza M., 1996). In the north of the Lopadea Hills, the Mureş has a wide floodplain (max. 2.7 km at Cisteiu de Mureş, down to the stream channel) preserving traces of the old meanders and showing several alluvial fans shaped by the tributaries springing from the Apuseni Mountains (*Fig. 1*).

In the Târnavă Mică Valley, only small terraced areas (t_1 , t_2) have been preserved between Pânade Village and the confluence of the Târnavă Mică with the Târnavă Mare. These terraced areas were mapped out at Pânade, Iclod and Petrisat (Buza M., 1997). The relative absence of terraces on the righthand side of the Târnavă Mică is the result of the permanent shifting of the River northwards, engendering a steep slope and narrowing the floodplain (by some 100-200 m down to the stream channel).

The Târnavă Valley, about 15.2 km long, is cut into the lower step of the lower erosion level which Josan named “valley level” (1979). The rather smooth river terraces, formed of Pleistocene sands and gravels, were mapped by Josan N. (1979) and Buza M. (1997), who delimited the following terraces: t_1 (18-25 m) north of Cistei; t_3 (30-40 m) in the surroundings of Bucerdea Grânoasă Village; t_4 (50-60 m) east of Cistei, and t_5 (80-90 m) east of Bucerdea Grânoasă. The Târnavă floodplain, which contains Holocene sands and gravels, is 1-4 m higher than the river, and prone to flooding.

The source areas of **secondary valleys** lie inside the unit. They are generally subsequent with a radial flow pattern, have a steep questa slope affected by numerous modelling processes (mainly landslides) and a larger and milder dipping slope cut into structure-controlled surfaces.

The alternation of highly pervious rocks (Sarmatian and Pannonian sands and gravels) with impervious rocks (clayey marls), together with the action of external natural agents and some anthropic activities have favoured the onset of vast weathering processes (gullies, lenticular slides, rock-and-soil falls, monticles, mudflows, etc.) which in most cases are restrictive for the development of such settlements as Peşelca², Căpuđ, Zărieş, Cornu, etc. (Mărculeş I., Mărculeş Cătălina, 2004a).

² The effects of present-day relief modelling and the relative isolation of some of the Lopadea Hills villages are mirrored by the demographic situation of Peşelca Village featuring marked population aging and depopulation: 452 inhabitants in 1977, 280 in 1992 and 186 in 2002 (MĂRCULEŞ I., MĂRCULEŞ CĂTĂLINA, 2004b).

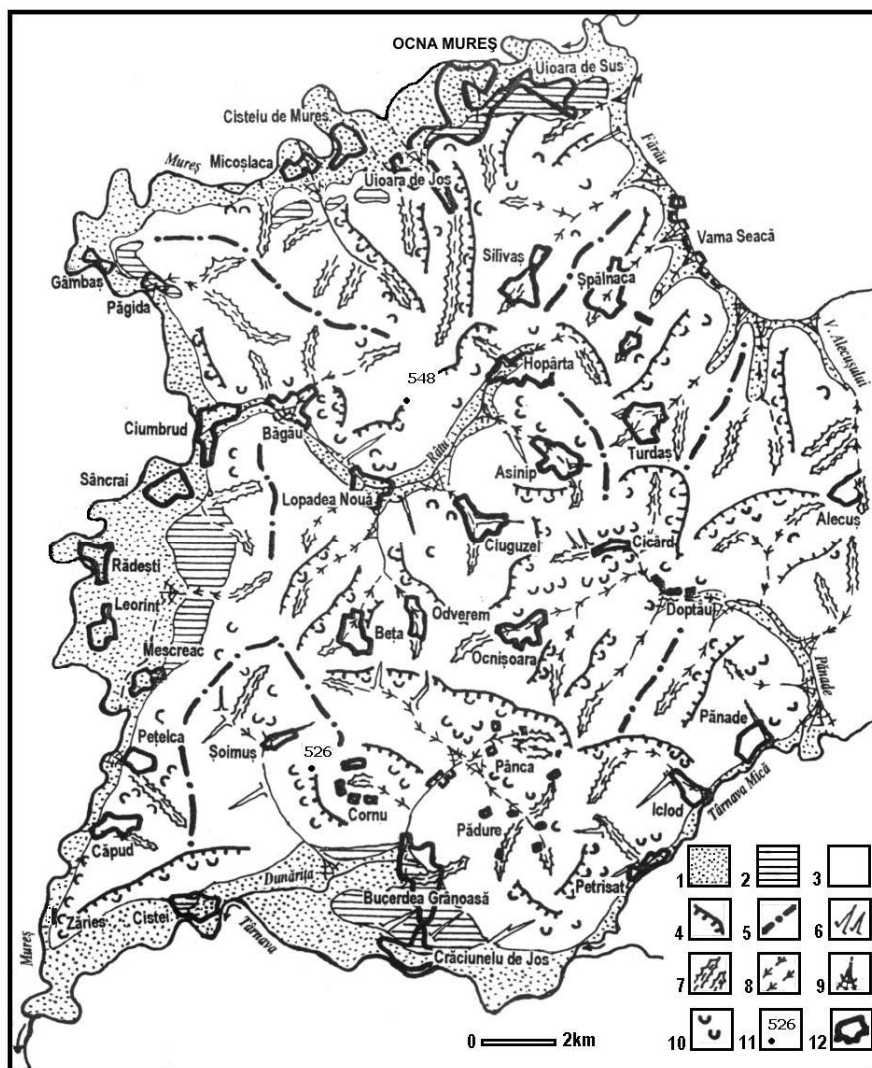


Fig. 1. Landform and settlements in the Lopadea Hills: 1. floodplain; 2. terraces; 3. slopes; 4. quęsta; 5. rounded interfluve; 6. gullies; 7. torrential formations; 8. deepened thalweg; 9. alluvial fan; 10. landslides; 11. level; 12. settlement

2. Distribution of Settlements in Terms of Landform Particularities

All the 40 settlements found in the Lopadea Hills are medium-and-small-sized villages, with only one town among them, namely Ocna Mureș. Densities of

about 8 villages/100 km² are higher than in the Transylvanian Depression (1.3 villages/100 km²). The overall village area occupies 1,280 hectares, over 90% of it extending at altitudes below 400 m.

Broadly speaking, the Lopadea Hills settlements are located as follows:

Twenty-one villages (52.2% of all) in the **main peripheral valleys**:

- Ocna Mureş (10,270 inhabitants), Uioara de Sus (1,359 inh.), Uioara de Jos (1,279 inh.), Cisteiu de Mureş (710 inh.), Micoşlaca (349 inh.), Gâmbaş (543 inh.), Păgida (126 inh.), Ciumbrud (1,365 inh.), Sâncrai (863 inh.), Rădeşti (719 inh.), Leorinţ (320 inh.), Meşcreac (277 inh.), Peţelca (202 inh.), Căpuđ (352 inh.) and Zărieş (8 inh.), in the Mureş Valley;
- Pânade (713 inh.), Iclod (1,844 inh.) and Petrisat (594 inh.), in the Târnavă Mică Valley;
- Crăciunelu de Jos (2,092 inh.), Bucerdea Grănoasă (2,235 inh.) and Cistei (638 inh.), in the Târnavă Valley.

In terms of landform, the situation is the following:

- on terraces and in the floodplain: Ocna Mureş, Uioara de Sus, Meşcreac, Crăciunelu de Jos and Cistei;
- in the floodplain: Cisteiu de Mureş, Micoşlaca, Gâmbaş, Sâncrai, Rădeşti, Leorinţ and Zărieş;
- on terraces: Bucerdea Grănoasă;
- partly in the floodplain, on terraces, alluvial fans and tributary valleys: Uioara de Jos and Păgida;
- partly in the floodplain and on some tributary valley slopes: Ciumbrud, Peţelca, Căpuđ, Pânade, Iclod and Petrisat (*Fig. 2*).

Apart from landform particularities, which account overwhelmingly for the wide diversity of village form and morphostructure, the presence of roads of communication and of drinking water has also contributed significantly to the development of these settlements.

A number of five villages (12.5% of the Lopadea Hills settlements): Băgău (569 inh.), Lopadea Nouă (1,053 inh.), Hopârta (345 inh.), Doptău (devoid of inhabitants) and Vama Seacă (234 inh.), occur in the **secondary valleys**, basically tributary to the above peripheral ones. These valleys are either rather narrow, without terraces, or large floodplains. Most of the villages are seen in the flat colluvial-deluvial areas and partly in the wide floodplain sectors. Some settlements situated alongside the main valleys, also branching out on secondary valleys (the Băgău, Hopârta, etc.), have an elongated, compact structure (I. Mărculeţ, Cătălina Mărculeţ, 2003).

Fourteen villages (35% of all) are located in the **upper sectors of lower-order tributary valleys** and occupy small basinettes or confluence areas: Silivaş (255 inh.),

Șpălnaca (263 inh.), Asinip (156 inh.), Turdaș (275 inh.), Ciuguzel (655 inh.), Cicârd (depopulated), Ocnîșoara (37 inh.), Beța (304 inh.), Șoimuș (82 inh.), Cornu (21 inh.), Pădure (25 inh.), Pânca (19 inh.) and Alecuș (171 inh.). Because of the landform they are in general polygonal-areolar or elongated in shape with one or several ramifications. The majority are compact or spread out, and only a few hamlets (Pânca, Pădure and Cornu) are scattered.

Like other sub-units of the Târnave Plateau (e.g. the Hârtibaciu and the Secașe plateaus), interfluves are devoid of settlements (with the exception of some households in a few hamlets located on the interfluve between the Râu Brook and the Târnave River), mainly because of the lithological substrate which is responsible for ground water lying at great depth.

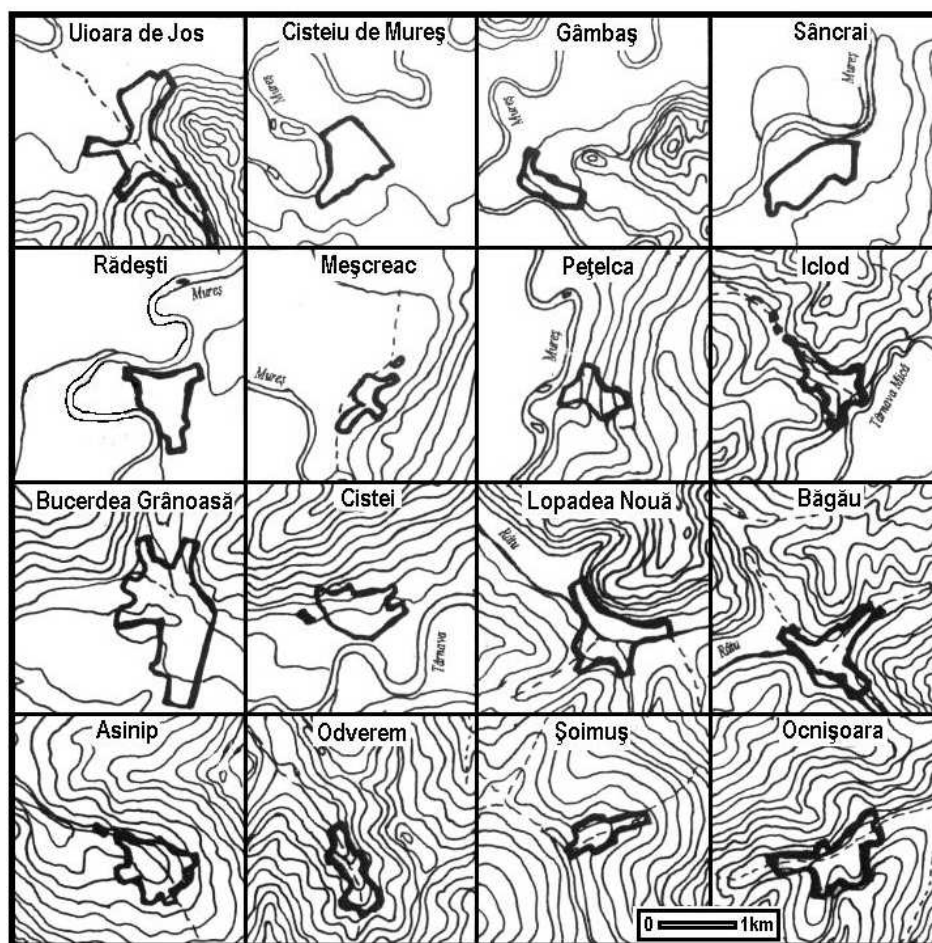


Fig. 2. Location of some Lopadea Hills rural settlements in terms of landform

3. Landform – Related Land Use

The genetic types of landform, its morphology and morphometry, alongside the other environmental elements – climate, vegetation, soils, etc., are closely interrelated and have a great influence on land use. Land use structure in Lopadea Hills: arable lands (cca. 40%), pastures and hay-fields (cca. 35%), forests (14%), vine-yards (cca. 3.5%), settlements (cca. 4%), orchards (cca. 1%), etc., lands with other uses and unproductive lands (cca. 3.5%), (Fig. 3).

The floodplains of the peripheral valleys – the Mureş, Târnava Mică and Târnava, have a wide range of economic uses (Fig. 4). At its contact with the channel, the low floodplain is covered with willow, osier, poplar, reed, club rush, etc., plants of low economic value; in the same situation are the patches of grazes affected by excess of moisture and flooding.

The high floodplain (2-4 m above the river), sheltered from periodic flooding, is covered with arable land cultivated with cereal crops, vegetables, technical plants and fodder plants. The flat ground proved suitable to the construction of railways and highways.

The lower terrace scarps are planted with superior vine (*Riesling italian*, *Traminer roz*, *Fetească albă și regală*, *Muscat Ottonel* etc.)³. The surface of terraces is dotted with settlements and has very productive arable lands.

On mild slopes they grow mainly cereal plants (maize, wheat and barley); on steep slopes one finds grazes and hay-fields with hair grass, feather grass, bird's-foot trefoil, hop clover, yellow clover, etc. The forest vegetation of steeper slopes and of high interfluves consists of *Quercus pedunculata*, common oak, maple, crab (*Malus sylvestris*), wild cherry tree, etc.

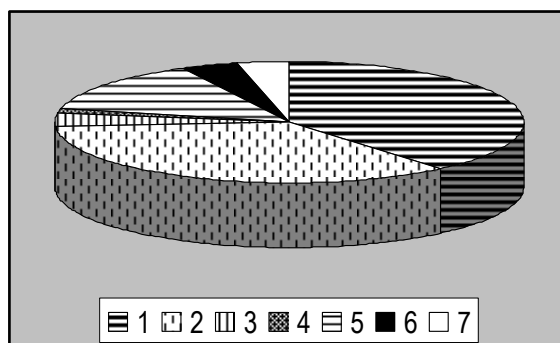


Fig. 3. Land use structure in Lopadea Hills: 1. arable lands; 2. pastures and hay-fields; 3. vine-yards; 4. orchards; 5. forests; 6. settlements; 7. other terrains

³ Some vine-yards are seen also on several high terraces and on the righthandside of the valleyslope of the Rătu Brook.

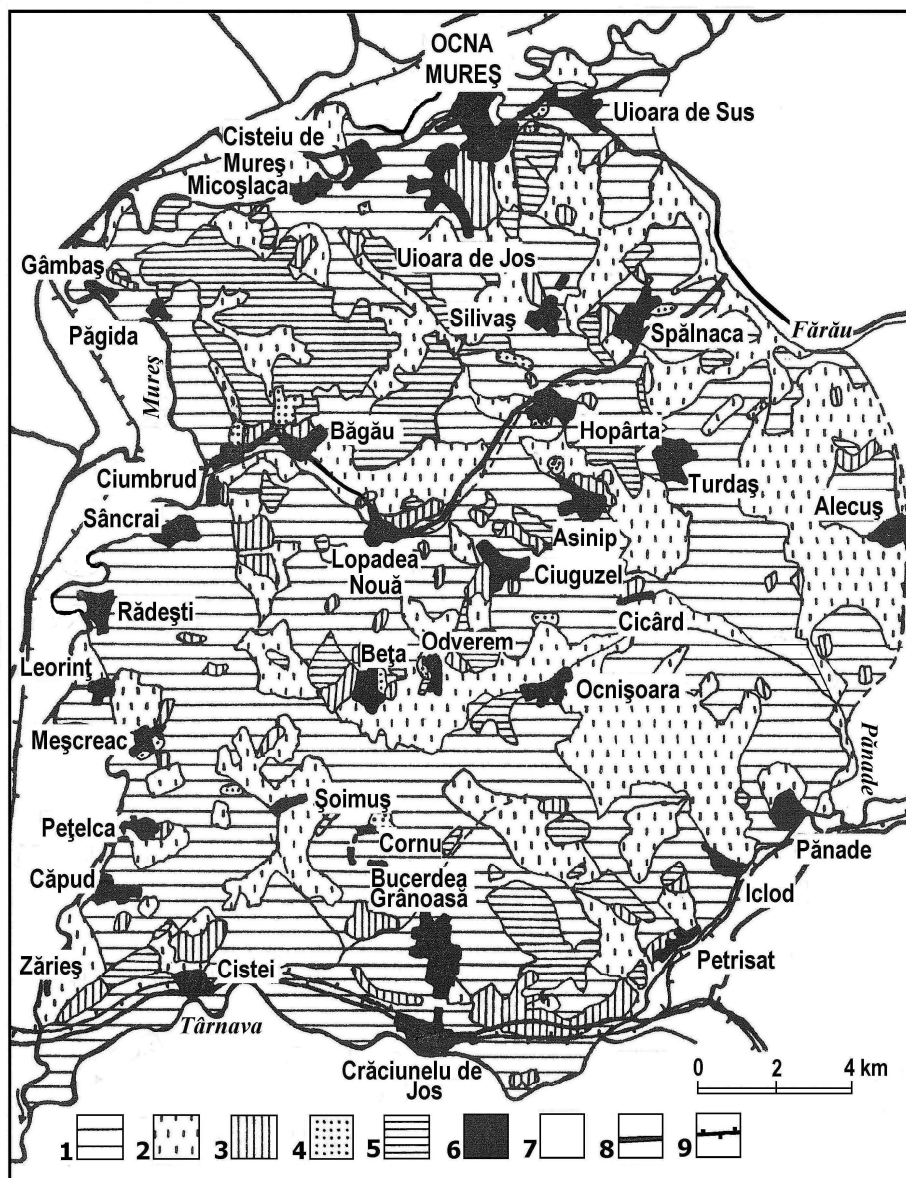


Fig. 4. Land use in Lopadea Hills: 1. arable lands; 2. pastures and hay-fields; 3. vine-yards; 4. orchards; 5. forests; 6. settlements; 7. other terrains; 8. road; 9. railroad

Conclusion

The absence of towns in the Lopadea Hills should not be blamed on landform alone, but like in other units, on the relative isolation of the region – the main roads, linking the towns of Târgu Mureș, Ocna Mureș, Aiud, Teiuș, Alba Iulia, Târnăveni and Blaj, were built in the unit's peripheral valleys (the Mureș, Târnavă Mică and Târnavă) – and to the absence of substantial natural resources for the development of economic activities, other than agriculture, necessary for a town to exist.

Most settlements lie in the large valleys, with extended floodplain and terraces, a favourable location for development. Inside the study-unit, lithology, morphometric elements, slopes and density of fragmentation, as well as relative isolation proved a drawback to their expansion. This exclusively rural region of the Târnavă Plateau, relatively isolated and subjected to present-day modelling, is currently undergoing depopulation, a process begun in the latter half of the 20th century.

The relief also bears on the type of land use. Thus, floodplains and lower terraces are covered mainly with arable land, while on slopes pastures and hay-fields prevail.

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