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WIND FARMS, SOLUTION FOR THE ECONOMIZATION OF THE TERRAINS IN FĂLCIU HILLS (PĂDURENI AREA)

ΒY

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Abstract. Present regional politics regarding the superior economization of natural resources imply the aggregation of interdisciplinary studies and analyses, in which specialists would depart from geo-ecosystemic concepts. In this context enters and the research regarding the terrain in the north of Fålciu Hills (Pådureni area), with the purpose of locations limits for the emplacement of wind turbines. The geological and geomorphologic surveys conducted in the area, accompanied by data obtained from geological drills, allowed the creation of cartographic materials on which were marked the limits of the areas favourable as regards natural conditions (geological, geomorphologic and climatic) for the emplacement of wind farms. In a second stage, the separated areas were analysed as regards land use and their degree of de-/economization by establishing wind farms.

Key words: Chersonian-Meotian; lithology; geomorphology; slope processes; land use.

1. Introduction

During the last years, preoccupations regarding to obtain electric energy from ecological sources have intensified in Romania too, to this domain belonging and this

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research in the north of Fălciu Hills. To mark the limits of the study area have been had in view the landscape hypsometric and morphographic characteristics, accompanied by slope processes' dynamics and the existence of a minimum road network that would facilitate the access to fluvial divide areas.

From an administrative viewpoint, the region belongs to the commune territories of Pădureni, Leoști, Davidești, Văleni, Urlați, Plutonești, Ivănești, Stănilești, Lunca Banului and Oțetoaia. From a geographical point of view, the area belongs to the Moldavian Plateau, more precisely the northern part of Fălciu Hills and the higher central-northwestern part of the Hilly Plain of Fălciu (Băcăuanu *et al.*, 1980; Condorachi, 2006) (Fig. 1).

The relief is compliant with the morphographic and morphometric style of the central-eastern part of the Moldavian Tableland, being characterized by more or less undated large fluvial divides (sculptural or structural), with terraced or accentuated slopes (in the case of structural plateaus) and valleys characterized by the presence of accumulative landforms (alluvial floodplains, floodplain terraces and colluvial contacts). From the morphometric viewpoint, occurs a decrease in altitude from north (362.7 m in Popii Hill) to south (177.6 m in Guzarului Hill) and from west (307-360 m on the western limit) to east (about 20 m in the Prut-Pruteț floodplain).



Fig. 1 – The position of the study area in the Moldavian Plateau.

Morphographically, the western part of the perimeter is characterized by the presence of some hilly divides elongated on the NNW-SSE direction, reaching maximum altitudes in the north-western part. At the upper part of the divides are found structural plateaus of variable extensions. From north to south are disposed the following fluvial divides: Bogdan– Drăceni Hills, Vulpe – Mijloc Hills, Popii Hill,

Recea – Şchiopeni Hills, Plotoneşti and Mutului Hills. The divides' altitudes remain generally high, in most of the cases over 200 m (Figs. 2 and 5; Table 10).

The territory is drained by a consequent river network, developed on the NNW-SSE direction, strongly adapted to the geological structure. The collectors, Elan and Pruteţ, receive as tributaries Pârâul Mare and the brooks of Şchiopeni, Porceana, Budului, Sărata, Huşi and Hârtopului.



Fig. 2 - Lithostratigraphical map of Racova - Bârlad - Prut region (Ionesi et al., 2005).

This paper should not refer to the names of individuals, organisations, products or services unless it is essential to understanding and then only appear once. The text must be neither gratuitously complimentary nor in any way derogatory about any person or organisation. Principal participants in a project should be listed separately from the text in an Acknowledgement. Scientific and technical English manuals might be very useful for inexperienced authors.

2. Geological Data

In what regards the historic of the study area or the adjacent region's geology, the most important are the papers published by Grasu *et al.* (1999, 2002), Gugiuman (1959), Ionesi (1994), Ionesi & Ionesi (1976, 1994), Ionesi &

Barbu (1996), Ionesi *et al.* (1991, 1994, 2005), Jeanrenaud (1966, 1969, 1971), Macarovici (1955, 1960), in which a synthesis of the results concerns by the Moldavian Platform is given.

Morpho-structurally, the area of Pădureni belongs to the southern part of the Moldavian Platform (Săndulescu, 1984). The depositional architecture is characterized by an alternation of sedimentary bodies of sands, silts and clays, with reduced intercalations of cinerites and sandstones, of a Chersonian-Meotian age. The depositional succession is set into a TST (transgressive systems tract), which overlays the moldo-valah II paleorelief formed on upper Basarabian deposits. As regards the lithostratigraphy, in the Chersonian -Meotian interval in the Pădureni area have been deposited the Huşi and Nuţasca-Ruseni formations, which suffer lateral litofacial variations, east of Prut being equivalent with the Botna Formation, and west of Siret with the Văleni one (Jeanrenaud, 1966, 1969, 1971; Ionesi *et al.*, 1991, 2005). The Chersonian-Meotian lithology transgressively covers the deposits of the Bârnova–Muntele, Repedea, Șcheia and Bohotin formations of Basarabian age (Fig. 2).

a) **Botna Formation.** Lithologically it comprises yellow sands, sometimes with lenticular intercalations of sandstones, rarely microconglomerates, clays and silts. On the stratigraphic scheme of the Miocene from the stratigraphy of the Moldavian Republic, the Chersonian with small mactra sums up 115 m thickness (Ionesi *et al.*, 2005). Later Roşca and Hubka (2005) separated Chersonian deposits with small mactra into two horizons: upper and lower. *The lower horizon* (70...80 m thickness) includes *Mactra (C.) caspica*, *M. (C.) timida*, rarely *Solen subfragile* and *Potamides nefaris*, being chronostratigraphically parallel with the Upper Basarabian Bârnova-Muntele Formation. *The upper horizon* (24...60 m), through its fossil content (*Congeria panticapaea, Theodoxus crenulatus semiplicatus*, etc.) belongs probably to the Meotian.

b) *The Huşi Formation* includes the deposits from the Huşi – Vaslui area and represents the western continuation of the Botna Formation. Without being able of mentioning a stratotype, Ionesi *et al.* (2005) named these deposits the Huşi Formation. Macarovici (1955, 1960) describes in the Chersonian, in the Voloşeni-Şchiopeni area south of Huşi, a fauna with small mactra and helix in sands and sandstones, over which are deposited sands with sandstone concretions and a fauna with *Unio wetzleri*, *U. cf. radiodentatus* and *Helix sp.* The author concludes that the Chersonian is represented by a litoral-neritic facies, similar to the south of the Moldavian Republic. On the right side of Prut River he mentions only the base of the Chersonian, followed by sands with *Unio wetzleri*.

Jeanrenaud (1971) demonstrates that in that region, Chersonian deposits belong to the brackish marine facies with small mactra (*Huşi Formation*, Ionesi *et al.*, 2005). The author describes from this biofacies an outcrop in the area of Muntenii de Jos (5 km SE of Vaslui). As lower limit, the author considers a

stratum with shell rock (30...40 cm thickness), with small mactra (M.(C.) caspia sinzovi, M. (C.) intermedia, M. (C.) supernaviculata). Between the shell rock with small mactra and the terminal Basarabian with Mactra (S.) fabreana etc., he separates deposits with a thickness of 30...40 m, with Unio sp. and Helix sp. which he ascribes to the Basarabian, naming it "the upper Basarabian horizon" (Hersonian) (Ionesi et al., 2005). The Chersonian with small mactra in brackish marine facies sums up 130...150 m thickness (up to the limit with the Nuţasca-Ruseni cinerites). Gugiuman (1959) describes the Chersonian deposits north and south of Huşi, placing them on the geological sketch of the region. The author shows that over the Basarabian with Mactra (S.)fabreana, Plicatiforma fittoni, etc., follow sands with intercalations of clays, in which at Drăslăvăţ and Voloşeni, approximately 35 m from the limit with the Basarabian, mentions Mactra (D.) bulgarica bulgarica, M (C.) caspia caspia, M. (C.) supernaviculata (Fig. 3).



Fig. 3 – Basarabian-Chersonian deposits north of the Vaslui – Huşi line (Gugiuman, 1959; Ionesi *et al.*, 2005).

About 5 km west of Huşi there is an outcrop on Fântânele brook, in which occur sands with siltites and clays. Sands are dominant, have a yellowish colour, but occur also brown or even red lenses. They frequently present oblique or crossed laminations. In these sands are observed lenses and strata of sandstone, and also sandstone concretions. Siltites and clays form intercalations which do not exceed 1...2 m thickness. In the lower part of the outcrop occur lenses of breccia with fragments of clays, with lengths up to 5...6 m and thicknesses up to 1 m. The mentioned succession sums up to 50...60 m thickness. Both in the siltites and sands have been identified specimens of *Planorbis*. The sands outcropping on the Fântânele (Pădureni) brook probably stand on the deposits with small mactra (Ionesi *et al.*, 2005).

c) *The Văleni Formation* is developed west of Siret, in the Hoiseşti– Mărgineni–Văleni area, representing a lateral variation of the Huşi and Nuțasca–Ruseni formations. The Chersonian starts having sands with small mactra in which is found, re-deposited, a lower Basarabian fauna. The position of the Văleni Formation with respect to the Basarabian deposits is visible in the hydrographic basin of Mărgineni brook and the area of Hoiseşti.

From the Hoisesti outcrop have been analysed, concerning the chemistry and grain size distribution, two average samples (5 m and, respectively, 10 m thickness) of sands. Chemistry refers only to the analysis of the contents of SiO₂ (94.18%), Fe₂O₃ (0.96%), CO₂ (0.42%), CaO (0.4%) for the washed samples. Mineralogy was analysed on sections, on artificially cemented sands which have revealed the dominance of quartz, to which are added small quantities of plagioclase feldspath, muscovite, garnet, rutile, zircon, hornblende, litoclasts of quartzite, bioclasts of foraminifera and mollusks, as well as clay minerals. As regards the grain size distribution, the sand is fine to mediumcoarse, well sorted (with a maximum sorting in the case of the fine fraction), which suggests a low water dynamics (Grasu et al., 2002). The grain size distribution analysis of the sands from the Hoisesti outcrop has led to the identification of five facieses (storm, waves, longitudinal currents, beach and lagoon), on the basis of which it is considered that the deposition occurred in a coastal domain, in a litoral-lagoon system. The rudites and sands levels with dispersed ruditic fragments are important for the correlation of the paleogeographical evolution of the Pădureni area.

Beginning with the Chersonian, sedimentation became almost exclusively arenito-pelitic (both in the facies with sweet water mollusks and the small mactra one), which implies that in the terrigenous source area occurred a very active erosion. Corroborating these two aspects, the dewatering and the activation of the terrigenous source, it results that these have occurred as a consequence of a geotectonic elevation process, which determined an interruption in the sedimentation and the active erosion. This elevation affected the platform and the Carpathian lands, on both elements being installed a river network.



Fig. 4 – The architecture of the clastic Chersonian-Meotian bodies from Pădureni region.

The Pietros-Popii-Şchiopeni Hills profile has been lithostratigraphically detailed on the basis of outcrops and drills data. From the analysis of the

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litostratigraphic successions the following conclusions were drawn (Fig. 4):

a) the bottom of the drills stopped in all cases in the calcareous Basarabian clays;

b) in all the drills, over the calcareous clays follows a level of weathered calcareous clays with a thickness of 3...9.3 m, over which are found sands with small gravels in base. This assemblage may be interpreted as follows: the deposits of weathered calcareous clays, with a reddish color, represent deposits which have evolved in the presence of oxygen, most probable being a paleosol; the deposits of sands with small gravels in base represent the base of the Chersonian-Meotian TST depositional sequence; the Chersonian sequence (Huşi Formation) presents a transgressive character; the limit between Chersonian and Meotian cannot be traced only on the basis of drills conducted in the Pădureni area.

3. Geomorphologic Data

From a geomorphologic viewpoint, the study region presents the characteristics of the two physico-geographical regions on whose contact it developed: the northern part of the Fălciu Hills, sub-unit of the Bârlad Tableland, and the higher area of the Fălciu Hilly Plain (Ungureanu, 1993).

The characteristic landforms are the sculptural ones, with a hilly fragmentation in the west, north-west and north of the region, area belonging to Fălciu Hills, and a knobby one in the east, south-east and south, typical for a hilly plain. Locally, favoured by the general monocline structure with a NNW-SSE direction of the Moldavian Plateau, these knobs have an asymmetric aspect, with a slope of the cuesta forehead type (with western orientation), shorter and more abrupt, and the other as the cuesta backside, of eastern orientation, elongated and with a reduced slope (Ioniță, 2000).

Among the different landforms are being remarked, on about 760 ha (8.5% of the area), a series of elongated fluvial divide ridges, with a genesis locally favoured by some harder sandstone intercalations covered by more permeable Chersonian-Meotian deposits, which create a general (pseudo-structural) plateau aspect (Fig. 5 and Table 1).

Although the occupied surface is relatively reduced, these areas are characterized by an accentuated stability as regards the intensity of the terrain degradation processes, which are reduced to weak and moderate forms of sheet erosion. There are no problems regarding slope stability provoked by landslides or gulling, except the margins of these plateau ridges.

On about 85% of the surface dominate slopes in different stages of degradation. According to the geomorphologic map, the weakly degraded slopes occupy 1,170 ha (13.1% of the total) and are affected by a moderate and strong sheet erosion, but also by some land sliding and gulling processes, more reduced as intensity. The moderately degraded slopes occupy over 1,940 ha (21.7%) and are affected by intense soil erosion processes, and also by intense manifestations of landslides and gullies. The excessively degraded slopes that

occupy 4,390 ha (49.1% of the total) are affected at maximum (excessive) intensity both by soil erosion (parent material is sometimes reached), by intense gulling and also by large and deep landslides.

In opposition to the large scale distribution of the sculptural forms, on reduced areas, of only about 660 ha (7.3%), is observed the development of accumulative flood-meadows of an aluvio-coluvio-proluvial type. Being developed at the lowest altitudes, in the floodplains of the main rivers and at the slope base, the only geomorphologic process present in these areas is that of sedimentation, with no slope stability problems.



Fig. 5 – Geomorphologic map of Pădureni area.

Fercentages of the Math Lanaforms in the Fadurent Area			
Landforms	ha	%	
Stable ridges	763.73	8.55	
Weakly degraded slopes	1,177.59	13.18	
Moderately degraded slopes	1,940.36	21.72	
Excessively degraded slopes	4,393.45	49.17	
Aluvio-coluvio-proluvial flood-			
meadows	659.90	7.39	
Total	8,935.03	100	

 Table 1

 Percentages of the Main Landforms in the Pădureni Area

As regards the main morphometric elements, the study area presents features typical for a transition area, being obvious the contact zone both on the hypsometric and slope map (Figs. 6 and 7).





Fig. 6 – Geomorphologic map of Pădureni area

Fig. 7 – Pădureni area. Slope map.

The minimum altitude values decrease towards the Prut valley under 50 m, while the maximum exceed 350 m in the north-eastern extremity of the region, resulting an average value of 166 m, close to the limit between the two large physico-geographical units. The medium altitudes have an approximately superposed distribution on the different landforms.

Thus, the values decrease from a maximum of 215 m for the divide ridges to 182 m in the case of weakly degraded slopes, 166 m for the moderately degraded slopes, 158 m for the excessively degraded and only 113 m in the case of floodplains (Figs. 8 and 9).

In the case of slope/declivity, the average value computed for the entire area reaches 6.5° , with low mean values of only 2.2° in the case of ridges and only 2.8° in the case of plateaus. For the various slopes, declivity values increase considerably up to 3.7° for the weakly degraded, 6.1° for the moderately degraded and a maximum of 8.8° in the case of the strongly degraded ones (Figs. 10 and 11)

At the basin level, slope orientation confirms through the existence of the two high percentages of 47.8% (north-eastern and eastern slopes) and 37.6% (south-western and western slopes) the existence of a well evidenced cuesta relief. On the fund of a general NNW-SSE inclination of the geological strata, only 11.1% of the area surface maintains this orientation (Figs. 12 and 13).

Analysing these parameters for each landform, can be evidenced a

series of useful information regarding the terrain favourable structure for the installation of wind turbines.





Fig. 8 – Percentages of hypsometric classes on landforms.



Fig. 10 – Percentages of slope classes on landforms.



Fig. 12 – Percentages of slope orientation classes on landforms.

Fig. 9 – Surfaces of hypsometric classes on landforms.



Fig. 11 – Surfaces of slope classes on landforms.



Fig. 13 – Surfaces of slope orientation classes on different landforms.

Geomorphologically, the divides ridges from this area present optimum conditions for this activity. Usually, 80% of the surfaces that decrease from the central summit of Fălciu Hills (551 ha) occur at over 200 m altitude, on the fund of a general inclination towards SSW lower than 3^0 in a 79% proportion.

Relatively optimum conditions occur also in the case of weakly degraded slopes, but only where these situations are met at the upper part of the slopes, close to the ridge, have a lower declivity, an optimum orientation and present only forms of sheet erosion. A total surface of only 135 ha meets these conditions.

In the case of terrains with moderately and excessively degraded slopes, the favourable character is reduced first of all due to the low stability they have. Locally, are added and other causes that relate to the deficient exposition or sheltering in the conditions of lower altitudes.

Because of their position in the landscape, although the slopes and degradation processes' intensity present a high favourable character, floodplains present the most unfavourable conditions.

4. Land Use

Land use represents on one side society's fingerprint on the general geographical conditions from the study area, and on the other side the way in which society managed to adapt to natural conditions (Fig. 14).

According to the Corine Land Cover (2000) methodology, arable and complex arable (small parcels of arable terrains combined with vineyards, orchards and pastures) categories dominate the studied area with over 4,200 ha (47.3%). Forests and shrubs follow with about 1,770 ha (19.8%), and then pastures with over 1,280 ha (14.4%). Only 969 ha (10.8%) of the terrains are occupied by settlements, the lowest proportions being held by vineyards (631 ha, 7.1%) and orchards (45 ha, 0.5%) (Table 2).

As it is natural, on hypsometric classes constructed areas occupy lower levels, usually less than 150 m. In rest, can be observed a quite heterogeneous distribution of the land use categories (arable, complex arable, vineyards, orchards) on altitude classes (Figs. 15 and 16). Land use mainly takes into account the immediate needs of the owner, his material possibilities and less favourable character for certain exploitation. Only in the case of forests may still be observed, on certain areas from the higher part of the study region, areas of the large woods that once covered almost completely Fălciu Hills.

The same observations are underlined and by the histogram of the slope classes on land use categories (Figs. 17 and 18). An inadequate usage is seen mainly in the case of arable and complex arable terrains, in whose case from the 4,200 ha, 48% are situated on declivities higher than 5^{0} . In the case of vineyards can be seen a heterogeneous distribution. Usually vineyards occur on small

parcels, many in an advanced degradation state, which have problems with the access of agricultural machines and thus cannot be used properly. In the case of pastures, they occupy mostly strongly degraded terrains, which cannot be used otherwise with significant results.



Fig. 14 - Land use map in the Pădureni area (Agenția Europeană pentru Mediu)

Table 2		
Main Land Use Categories from Pădureni		
Area (according to CLC-2000)		

med (decording to Che 2000)			
Land use category	ha	%	
Localities	969.10	10.85	
Arable	3,625.05	40.57	
Vineyards	631.17	7.06	
Orchards	45.08	0.50	
Pasture	1,286.84	14.40	
Complex arable	605.95	6.78	
Shrubs	488.87	5.47	
Forest	1,282.97	14.36	
Total	8,935.03	100	



Fig. 15 – Proportion of the hypsometric classes on land use categories.







Fig. 16 – Surfaces on hypsometric classes on land use categories.



Fig. 18 – Surfaces of slope classes on land use categories.



Fig. 19 – Proportions of land use classes on landforms.



As regards the distribution of land use categories on landforms, an interesting aspect is the proportion of over 60% which arable terrains and pastures have on the fluvial divide ridges (Figs. 19 and 20).

These are the terrains that present the best conditions for installing wind turbines. As in the case of forest and constructed land use types is more difficult to change the usage category, the agricultural terrains on these fluvial divides and in a lesser proportion from some slopes may become a viable solution for an superior economic exploitation of the terrains in this area.

5. Conclusions

As regards the conclusions reached about the favourable character of natural conditions in the surveyed area for our case study, the following conclusions can be mentioned:

a) the relief of the area is characterized by cuesta landforms and pseudostructural fluvial divides with altitudes that vary between 100 m and 350 m;

b) the maximum declivities are met on the cuesta forehead slopes (the majority of western orientation), with values generally between $10^0...25^0$; on reduced surfaces declivities exceed 25^0 ;

c) cuesta backside slopes have declivities of $5^0 \dots 15^0$;

d) the maximum intensity of slope processes is registered on the cuesta forehead slopes, resulting an accentuated gulying and landslides; the cuesta backside slopes are affected by medium intensity processes, but important for the degradation of terrains in certain areas;



Fig. 21 – 3-D perspective image evidencing the areas with high favourable character for installing wind turbines (Google Earth, 2011).

e) the fluvial divides have the aspect of structural plateaus, appearing as large easily undulated surfaces, with declivities between $1^0...5^0$;

f) the geomorphologic processes of terrain degradation are insignificant on the fluvial divides, being areas of maximum geotechnical stability; g) the accentuated atmospheric dynamics is associated with these divide areas, here being measured the maximum wind frequency and speed;

h) the analysis of the fluvial divide surfaces/degraded slope ratio reveals the following proportions:

- 1. *total study surface = 8935.03 ha (100%)*;
- 2. weakly degraded slopes 1,177.59 ha (13.18%);
- 3. moderately degraded slopes 1,940.36 ha (21.72%);
- 4. excessively degraded slopes -4,393.45 ha (49.17%);
- 5. floodplains 659.9 ha (7.39%);
- 6. geotechnically stable fluvial divide surfaces 763.73 ha (8.55%);

i) the access to the divide areas is ensured by agricultural exploitation roads which detach from the Huşi – Pădureni county road.

In this context, from the viewpoint of the natural settings, the fluvial divides meet optimum conditions for installing wind farms. If land use is analysed as regards economic efficiency, is witnessed a weak adaptation of crops to the natural quality of terrains, and as a consequence a weak possibility to economization. A solution for the superior economization of the area is represented by the emplacement and exploitation of wind turbines, mainly having in view the fact that such terrains can still be used agriculturally.

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REFERENCES

- Băcăuanu V., Barbu N., Pantazică M., Chiriac D., Ungureanu Al., *Podișul Moldovei*. Edit. Științ. și Encicl., București, 1980.
- Condorachi D., Studiul fizico-geografic al zonei deluroase dintre văile Lohan și Horincea. Edit. Ștef, Iași, 2006, 273.
- Grasu C., Catană C., Miclăuș C., Bobo I., Molasa Carpaților Orientali. Petrografie și sedimentogeneză. Edit. Tehnică, București, 1999, 227.
- Grasu C., Miclăuș C., Brânzilă M., Boboș I., Sarmațianul din sistemul bazinelor de foreland ale Carpaților Orientali. Edit. Tehnică, București, 2002, 407.
- Gugiuman I., Depresiunea Huși. Edit. Științ., București, 1959, 218.
- Ionesi L., Geologia unităților de platformă și a Orogenului Nord-Dobrogean. Edit. Tehnică, București, 1994, 280.
- Ionesi B., Ionesi L., *Limite Bessarabien-Chersonien sur les unités de plate-forme Roumanie.* The Miocene from the Transylvanian Basin-Romania, Cluj-Napoca, 1994, 187-192.
- Ionesi L., Barbu N., *Considerații asupra genezei Câmpiei Moldovei*. St. și Cerc. de Geogr., Edit. Acad. Rom., Iași, XLIII, 23-31 (1996).

Ionesi L., Ionesi B., *Asupra vârstei "Nisipurilor de Văleni"*. An. Muzeului de Șt. Naturale Piatra Neamț, **III**, Geol.-Geogr., 145-158 (1976).

- Ionesi L., Barbu N., Ionesi B., *Présance d'un relief de modélage sous-aérien entre le Badénien et le Sarmatien, sur les unités de plate-forme.* Rev. Roum. de Géogr., Acad. Roum., București, **35**, 29-36 (1991).
- Ionesi L., Barbu N., Ionesi B., *Prezența unor paleouscături intrasarmațiene în cadrul vorlandului Carpaților Românești*. Stud. și Cerc. de Geogr., Edit. Acad. Rom., **XLI**, Iași, 23-31 (1994).
- Ionesi, L., Ionesi, B., Roşca V., Lungu Al., Ionesi V., Sarmațianul mediu și superior de pe Platforma moldovenească. Edit. Acad. Rom., București, 2005.
- Ioniță I., Relieful de cueste din Podișul Moldovei. Edit. Corson, Iași, 2000.
- Jeanrenaud P., Contribuții la cunoașterea geologiei regiunii dintre valea Siretului și valea Bîrladului. Anal. Univ. "Al. I. Cuza", Iași, s. II, Geol.-Geogr., XII, Iași, 61-67 (1966).
- Jeanrenaud P., *Precizări asupra meoțianului din Moldova*. Anal. Univ. "Al. I. Cuza", Iași, s. II, Geol., XV, 45-56 (1969).
- Jeanrenaud P., *Harta geologică a Moldovei centrale dintre Siret și Prut.* Anal. Univ. "Al. I. Cuza", Iași, s. II, Geol., **XVII**, 65-78 (1971).
- Jeanrenaud P., Saraiman A., Geologia Moldovei centrale dintre Siret și Prut. Edit. Univ. "Al. I. Cuza", Iași, 1995.
- Jipa C.D., *Bazinul Dacic. Arhitectură sedimentară, evoluție, factori de control.* Simp. "Evoluția Bazinului Dacic sub controlul factorilor globali/regionali", București, 2006.
- Macarovici N., Cercetări geologice în Sarmațianul Podișului Moldovenesc. An. Com. Geol., XXVIII, București (1955).
- Macarovici N., *Contribuții la cunoașterea geologiei Moldovei Meridionale*. Anal. Univ. "Al. I. Cuza", Iași, s. II, Geol., VI, 4, 231-234 (1960).
- Patriche C-V., Podișul Central Moldovenesc dintre râurile Vaslui și Stavnic. Studiu de geografie fizică. Edit. "Terra Nostra", Iași, 257, 2005.
- Săndulescu, M., Geotectonica României. Edit. Tehnică, București, 1984.
- Ungureanu Al., Geografia podișurilor și câmpiilor României, Edit. Univ. "Al.I.Cuza" Iași, 1993.
- * * Agenția Europeană pentru Mediu Corine Land Cover 2000, www.eaa.europa.eu www.google-earth.ro

PARCURILE EOLIENE, SOLUȚIE PENTRU VALORIFICAREA TERENURILOR DIN DEALURILE FĂLCIULUI (ZONA PĂDURENI)

(Rezumat)

Politicile regionale actuale privind valorificarea superioară a resurselor naturale presupun efectuarea unor studii și analize cu caracter interdisciplinar, în care specialiștii să pornească de la conceptele geosociosistemice. În acest context se desfășoară cercetarea privind caracterul favorabil al terenului în nordul Dealurilor Fălciului (zona Pădureni), în scopul delimitării unor areale în care să se amplaseze centrale eoliene.

Cercetările geologo-geomorfologice efectuate în zonă, completate cu datele obținute din forajele geologo-tehnice executate, au permis întocmirea unor materiale

cartografice geologice și geomorfologice, pe care se materializează arealele favorabile din punct de vedere al condițiilor naturale (geologice, geomorfologice și climaterice) pentru constituirea parcurilor eoliene. În continuare, arealele separate au fost analizate din punctul de vedere al utilizării terenurilor și gradul de valorificare/devalorificare ale acestora prin crearea parcurilor eoliene.

În ce privește concluziile privind caracterul favorabil condițiilor naturale în zona luată pentru studiul de caz, se pot preciza următoarele:

a) relieful zonei este caracterizat de forme cuestiforme și interfluvii pseudostructurale, cu altitudini interfluviale care variază între 100 m și 350 m;

b) pantele maxime se înregistrează pe versanții frunte de cuestă în majoritate cu orientare vestică, cu valori cuprinse în general între $10^0...25^0$; pe suprafețe reduse pantele depășesc 25^0 ;

c) versanții de revers au pante în general de $5^0...15^0$;

d) intensitatea maximă a proceselor de versant se înregistrează pe versanții frunte de cuestă, rezultând ravenare accentuată și deplasări în masă; versanții de revers sunt afectați de procese de intensitate medie, dar importante pentru degradarea terenurilor în anumite areale;

e) interfluviile au aspect de platouri structurale, prezentându-se ca suprafețe largi, ușor ondulate, cu pante de $1^0...5^0$.

f) procesele geomorfologice de degradare a terenurilor sunt nesemnificative pe suprafețele interfluviale, fiind zonele cu stabilitate geotehnică maximă;

g) dinamica atmosferică accentuată este asociată cu suprafețele interfluviale, unde se înregistrează frecvența și viteza cele mai ridicate ale vânturilor din zonă;

h) analiza raportului suprafețelor interfluviale/versanți degradați, relevă următoarele procente:

- total suprafață luată în calcul – 8.935,03 ha (100%);

- versanți slab degradați – 1.177,59 ha (13,18%);

- versanți moderat degradați – 1.940,36 ha (21,72%);

- versanți excesiv degradați – 4.393,45 ha (49,17%);

- şesuri aluviale – 659,9 ha (7,39%);

- suprafete iterfluviale stabile geotehnic - 763.73 ha (8,55%);

i) accesul pe interfluvii este asigurat prin drumurile de exploatare agricolă, care se desprind din drumul județean Huși-Pădureni.

În acest context, interfluviile intrunesc din punct de vedere al condițiilor naturale condițiile optime pentru amplasarea câmpurilor eoliene. Dacă se analizează utilizarea terenurilor din punctul de vedere al eficienței economice, se constată slaba adaptare a culturilor la calitatea naturală a terenurilor și, în consecință, o slabă valorificare a acestora. O soluție pentru valorificarea superioară a zonei o reprezintă amplasarea și exploatarea unor câmpuri eoliene, mai ales că, în paralel, terenurile se pot exploata și agricol.