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Geology - Geography

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THE MOCIU METEORITE IN THE AIUD NATURAL SCIENCE MUSEUM

Vlad CODREA[1], Iulia ŞTEFĂNESCU[2]

Abstract. Six pieces originating from the Mociu meteorite fall in 1882 are curate in the Natural Science Aiud Museum collections, in "Bethlen Gábor" College. They are totalizing 1.995 kg. According to Koch (1882 b), probably the baron Gyula Kemény donated these meteorite pieces. The initial amount of the samples was probably larger, but a part seems to be lost in ambiguous circumstances. A brief macroscopic description of these meteorite pieces is given.
Key words: Mociu (=Mocs) meteorite; chondrite; Aiud Natural Science Museum; Transylvania.

Introduction

The largest meteorite ever reported in Rumania is the one that fell down at Mociu (= Mocs), forty km eastward from Cluj-Napoca (Fig. 1) on February 2, 1882 around 4 P.M. (Maxim, 1958). When it fell down, before reaching the ground the meteorite broke apart in a multitude of pieces, which spread on a wide asymmetric ellipsoid-shaped area outlined by the localities Mociu – Ghiriş – Cântăraş – Visea – Tăuşeni – Palatca - Chesău. Their number is rather unclear: it had been estimated between 3000 and 100000, the heaviest being found nearby Mociu (35.700 kg). The smallest pieces spread on northwestern direction (Maxim, 1958).

Numerous pieces were immediately collected either by geologists, or natives from villages. As at the time Transylvania was part of the Austrian-Hungarian Empire, a lot of these meteorite pieces reached afterwards the collections in Budapest and Vienna museums. However, a large number got at the former Transylvanian Museum (nowadays, the Mineralogy Museum of Babeş-Bolyai University in Cluj-Napoca). Not very long after the meteorite fall, Koch (1882 a, b; 1885) listed the pieces from this museum, himself donating a large part of them. In course of time, some samples had been exchanged with other museums. In this manner, several Mociu meteorite fragments are actually hosted in collections from Western Europe and U.S. (Graham et al., 1985).

Bedelean et al., (1979) made the most recent list of the Mociu meteorite pieces from the Cluj museum but regrettably, this list do not make any reference concerning the donators.

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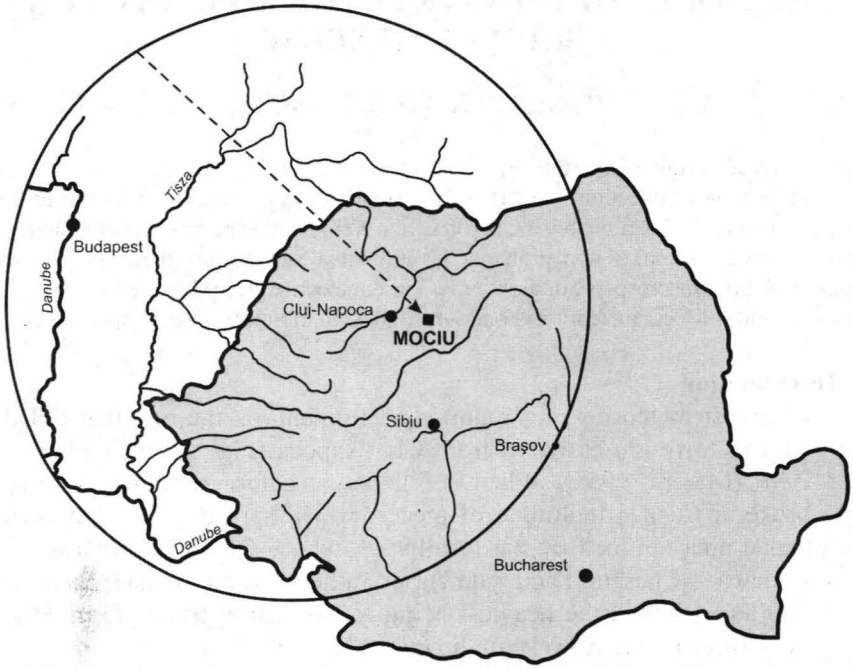

Fig. 1: Location of Mociu on the Rumania map. The arrow indicates the Mociu meteorite fall trend.

The Mociu meteorite in the Aiud Natural Science Museum

Six pieces of the Mociu meteorite are curate at the Natural Sciences collection of the Aiud Museum, in "Bethlen Gábor" College.

According to Koch (1882 b), probably the baron Gyula Kemény donated almost all these meteorite pieces. Their initial amount was considerably larger (13 pieces, totalizing 6.902 gr.), but a part seems had been lost in ambiguous circumstances.

The labels still attached to the meteorite pieces, are all in a very poor state of preservation, being almost faded. However, one can still distinguish the pieces location (all originating from Ghiriş, a village neraby Mociu – "Gyáres"), the year (1882) and the weight of each one (in decigrams). The former inventory numbers are still preserved too, on different labels glued on the exhibits.

However, a detail it is worth to be stressed out. Koch (1882 b) mentioned that Kemény donated to the Aiud Museum a large piece (3194 gr.) originating from Vaida-Cămăraş. This one is now missing from the collection. The same concerns another piece from the same locality (2150 gr), donated to the Aiud College by Gyula Gál.

In these circumstances, the accurate number and weight of the Mociu meteorite pieces initially curate at Aiud museum remains confuse. One can rather presume that

Kemény was the donator of the Ghiriş meteorite pieces, because no reference is making an incontrovertible connection between baron Kemény and Ghiriş locality.

Later, the Mociu meteorites from Aiud remained practically unknown. This collection was neither mentioned in the international meteorite catalogues (Graham et al., 1985; Grady, 2000), nor in papers issued in Rumania (Maxim, 1930, 1958; Stanciu & Stoicovici, 1943).

Recently, Miura et al. (1995) studied one of the meteorite pieces from Aiud, alongside with other various samples from the Mociu meteorite originating from other various musems. Thereafter, the Mociu meteorite had been reclassified as L 5-6 chondrite with shock degree of S 3-5. It is the single detailed mineralogical study issued on a sample originating from Aiud Museum. On the opposite, some of the samples from the Cluj Museum had been investigated immediately after the meteorite fall (Koch F., 1882).

The six Mociu meteorite pieces from Aiud are the following ones (numbers refers to the old inventory):

525. Weight: 0.135 kg (Pl. I, Fig. 6). Triangular prism-shaped broken on one side. The other sides are covered by sub-millimeter black crust. Piezoglypts are obvious on a single side of the rock.

528. Weight: 0.500 kg (Pl. I, Fig. 1). Pyramid-shaped, covered by thin black crust excepting a small area nearby the old label still glued on the sample. One side is exposing piezoglypts.

529. Weight: 0.415 kg (Pl. I, Fig. 4). This piece is heteroclite-shaped, broken on three small areas, with piezoglypts on the surface where the label is still glued on.

530. Weight: 0.070 kg (Pl. I, Fig. 7). A small parallelepiped-shaped, irregular rounded block. This piece had been sampled for the analysis carried on by Miura et al. (1995).

531. Weight: 0.575 kg (Pl. I, Figs. 2-3). Flattened fragment, widely broken on one side where fresh rock is exposed. On this surface one can observe chondrules of millimeter size. The remaining surface is covered by black crust.

532. Weight: 0.300 kg (Pl. I, Fig. 5). A parallelepiped rounded block, broken on one side. A rusty crust covers the broken area. The remaining surface is covered by black crust. One side is exposing piezoglypts.

Conclusion

Six pieces of the Mociu chondrite meteorite are actually curate at "Bethlen Gábor" Natural Science Museum, totalizing 1.995 kg. Originally, the meteorite pieces hosted in this collection were more numerous, if we are thinking about the gap of the inventory numbers, but also to the Koch's lists issued in 1882. Some pieces seem had been lost, perhaps during the 20th century wars. But even after these losses, the Aiud collection is still hosting an appreciable sample of this meteorite.

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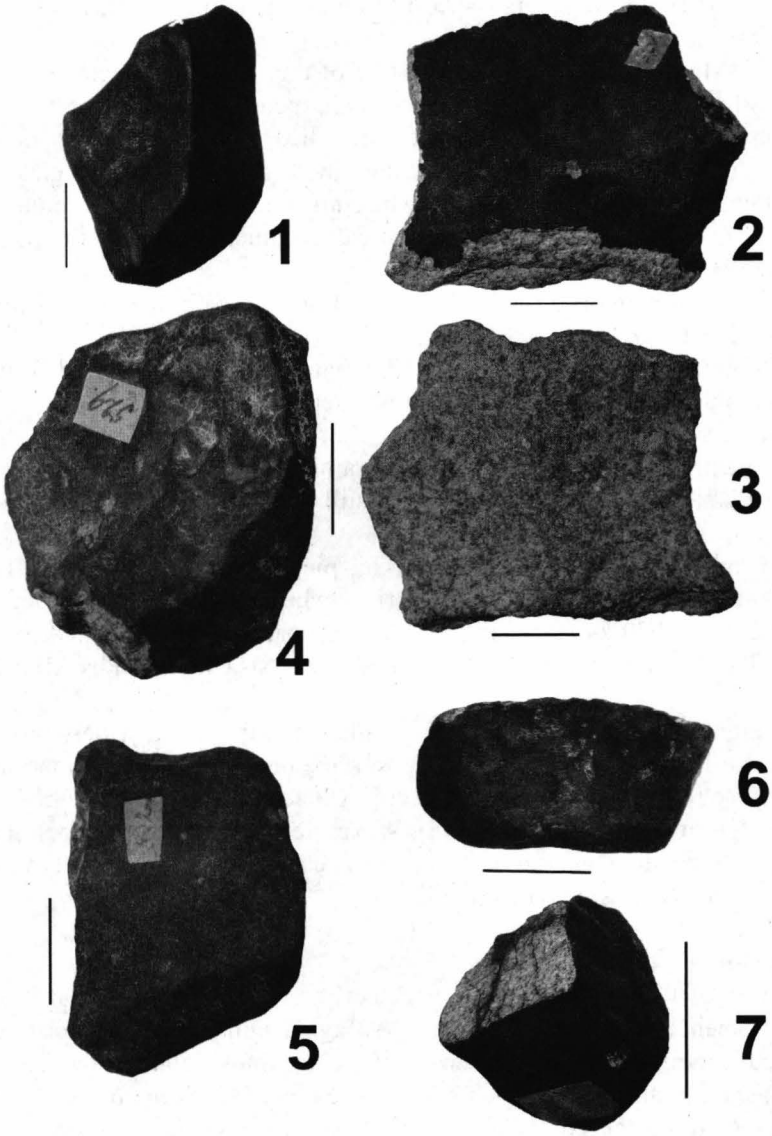
Iancu (Al. I. Cuza University, Iaşi) for their valuable help in obtaining several data on the Mociu meteorite. Our colleague Dana Pop provided useful references and Cristina Fărcaş drew the text-figure on computer. We are thanking them too.



Pl. I: The Mociu meteorite from the Aiud Natural Science Museum (Figs. 1-7). Scale bar: 30 mm

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THE DEGRADATION PHENOMENON OF THE CONSTRUCTION MATERIALS USED AT THE ST.MICHAEL CHURCH IN CLUJ NAPOCA

Voicu DUCA, Raluca VESA, Ioana POPIŞTER

History

Besides the Black church from Brasov and The Evangelic cathedral from Sibiu, St. Michael Church from Cluj is considerate to be one of the most imposing Gothic building from Romania.

Alteration process due to extrinsic and intrinsic factors

The monument's location in the city's civic center determines a gathered attack of the climate factors, gas, and powders released from vehicles or by industrial sources or of other nature.

The powders are the source of accumulations through current sedimentation, but they can also be captured by the asperities or wet surfaces of the construction materials, forming a black colored accumulation, frequently confused with the black crust.

In the low altitude clouds above town is being accumulated ozone, which in contact with water vapors form H2O2.

This favors the oxidation of SO2 resulting H2SO4 or H2SO3, which produce the reduction of pH from the water vapors up to values between 2-4, which for the carbonates that compose main composition of the limestones used at St. Michael Church becomes a factor with maxim aggression.

Alteration and deterioration forms

a) Black crust:

- represents a reaction product among the aggressive chemical factors and those of the building materials. These reactions take place at the contact surface generating accumulations of neoformed minerals in which the sulphates, sulphide and carbonate are predominant.
- the presence of the acicular microcrystal becomes a trap for the dust particles, pigmenting the surface of the rock in black

The dark color of the crust's formation it's given by the presence of the industrial dust, and the solar radiation makes it warmer, causing a higher dilatation than of the calcareous rock surface .

Fig. 1: Black sulphuric crust on the Baciu limestone that is exfoliating due to the different dilations on the surface, and because of the crystallization pressures of the sulphates and sulphides in the crust.

RX analyze of a black crust sample taken from the eastern wall confirms the existence of sulphide and sulphates beside neoformed aragonite and calcite.

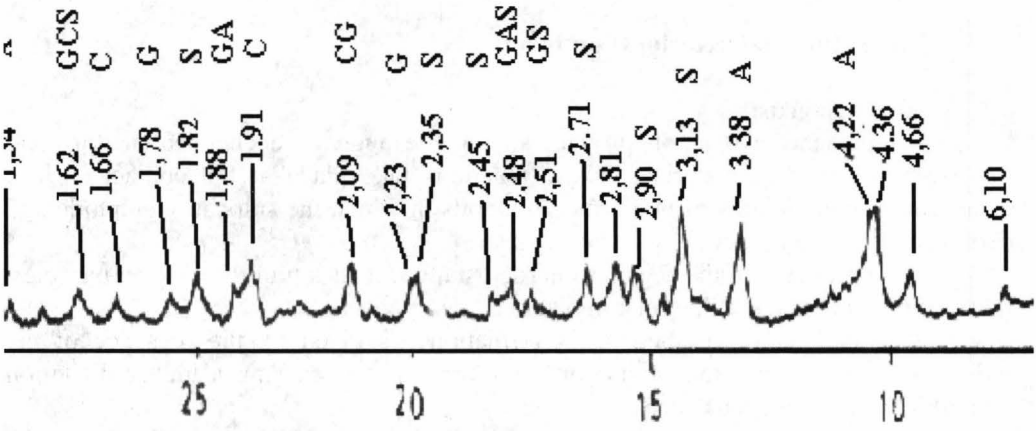

Fig. 2: Interpretation of the diffraction made on the black crust that parasites the limestone G= gipsum, C= calcite, S= CaSO3, A=aragonite

b) Micro fissures appearance

They appear during the rock's remaking process, when the mechanical shocks induce these defects. The mechanism consists in grouping at the micro fissure's opening angle of some mechanical tensions that have greater values as the median radius is lower. Currently in this point are generated tensions up to 200daN/cm2.

The appearance of such great mechanical values makes the level of calcite crystals to produce a quasiplastic behavior the may help generate the so-called "mechanical macles".

The appearance of these macles in a crystalline network implies the appearance of certain defects that may increase the number of unsaturated coupling and the calcites chemical radioactivity. The spatial display of micro fissures appears frequently at approximately 0.5-1.0 cm below the rocks finishing surface level.

The spaces created by the increase in density and the volume's diminution become available for the water's circulation and accumulation, that circulate through pores and capillaries, renders soluble CO2, gas that generates chemical solutions, especially carbonic acid that has an excessive action especially during the low temperature periods.

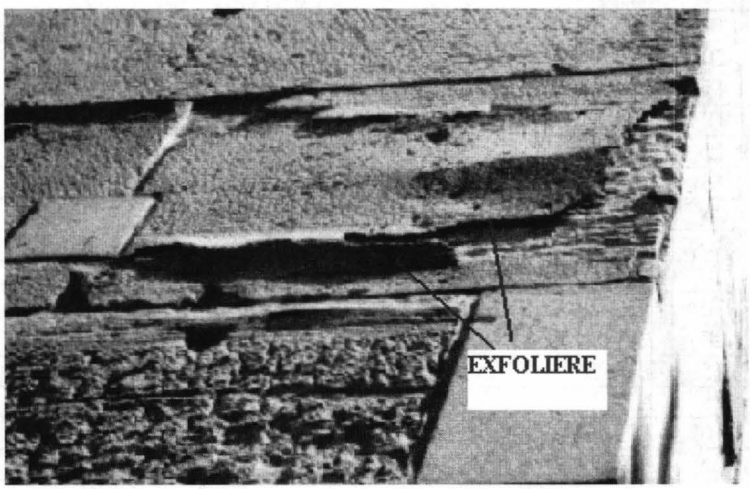

Fig. 3: Exfoliates produced by pressures generated at the aragonite-calcite tranzition on the southern abutment

Besides these components that causes the solutions pH to have lower values, lately there is another factor that is generated by the usage of catalytic that lower the CO contents, but increase in a very alarming way the quantity of the unburned organic component, that are photochemical transformed in radical acids that are added at H2SO4, and H2CO3.

Besides the aggressive factors above, there are some pure physical factors. One of the most important factor is the crystallization of water through freezing, process

that develops pressures up to 2000 daN/cmp, value that can be reached at a temperature of –22 ^{0}C, when the water behaves like a solid with normal contraction.

c) Salt crystallization

In case the Portland cement is it used as a binding material, the micro fissures generated during the remaking-moulding processes increase the rock's specific surface and helps the crystallization of gypsum by producing some notable pressures.

Tabel 1:The interpretation of the diffraction made on the black crust that is generated on the sulphates dissolved from the cement

Nr	θ	I/Io	dÅ	Gips	Ettringit	Mirabilit	Thenardit	CSH (B)	C2SH (C)	C10S5 H6(A)	C2S H4	C3A H8	Cuart
1	5,77	10	7,66										
2	5,87	10	7,53	+									
3	7,18	30	6,16			+							
4	9,12	10	4,85		+	+		+					
5	10,07	20	4,40		+								
6	10,45	15	4,24	+				+					+
7	13,12	10	3.39			+		+					
8	13,37	12	3,33										+
9	14,45	15	3,086			+	+						
10	14,62	25	3,051	+				+	+	+			
11	14,75	100	3,025								+		
12	15,62	20	2,86	+		+			+	+		+	
13	16,12	70	2,77		+		+				+		
14	16,70	20	2,68	+	+	+			+	+		+	
15	18,07	15	2,48					+			+	+	+
16	18,52	15	2,42			+		+		+			
17	19,25	10	2,33				+		+	+		+	
18	19,75	25	2,27								+		+
19	20,12	20	2,23				+	+		+			
20	21,27	20	2,12							+		+	
21	21,62	20	2,09	+				+		+	+		
22	23,45	15	1,93							+			
23	23,75	30	1,91				+			+	+		
24	24	15	1,89	+			+	+			+	+	
25	24,27	15	1,87				+				+	+	
26	24,85	10	1,83				+			+	+		+

Another cause is the dissolving of etringitte in the cement, that generates gypsum at the contact with limestone, the crystallization pressures of this neoformation mineral causes the detachment of the heads of binding elements in some windows sill.

Another deterioration type, produced by salt crystallization appears inside some capillaries, which dimension and frequency controls the mechanism of the physical-mechanical processes.

Fig. 4: Salts accumulation on limestone and cement on the footing of the church

The limestones in which are more frequent capillaries with a diameter closed to 1μm, stops the water from running in the rock, and helps the salt crystallization that appears as solutions at a relatively high dept from the surface. The pressures that are generated lead to the rock's fragmentation.

In case the limestone has higher capillaries, the solutions dynamics increases, the crystallizations appearing at the surface of the rock, and causes the detachment of relatively slim fragments, in the shape of flakes.

Fig. 5: The presence of the Portland cement generates the forming of the black crust. Under the cement's level the SO2 anions attacked the limestone that is degrading by simple multiple and flake exfoliation.

Another form of deterioration is the forming of alveols.

Another possible mechanism is the pores widening under the action of the chemical attack and the crystallization pressures.

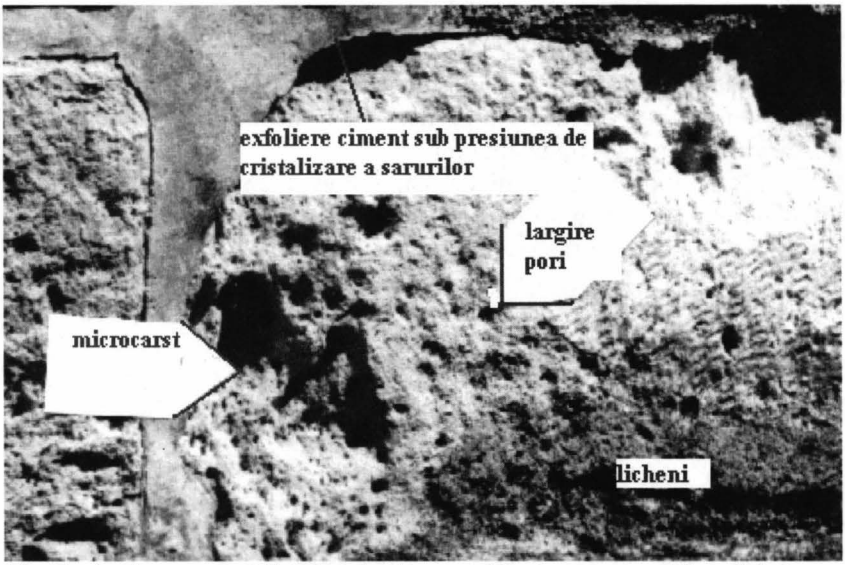

Fig. 6: The Portland cement exfoliated under the crystallization process of the sulphates, and the limestone pores are widening through dissolving process, that leads to the formation of microkarst.

d) Exfoliates

The surface created by the rock's "mechanical resign" is transformed in a place where water accumulates salt and soluble gas, being the main place of the dissolving processes catalyzed by the presence of the network defects and the chemical gradients.

Besides, the alternation of the frost-defrost fazes determines the widening of the fissures, and the gathered effect of all these factors is materialized by causing exfoliations.

A particular exfoliation case represents the surface of the South-East abutment, where the material used is different from the current one that has been used.

It can be easily noticed that in the rock there are some ferruginous intercalations that are very well expressed morphologically on the surfaces that remain after the exfoliation. The iron diffusion in a common solution with the carbonates pigments the surface of the limestone in brown-red, mostly on the east side of the abutment.

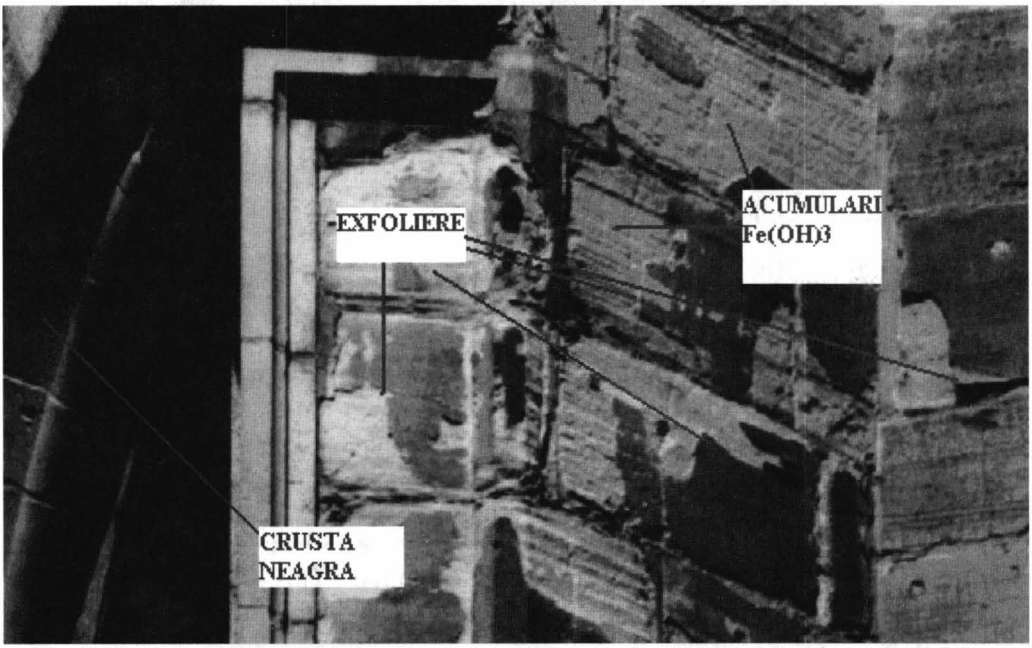

Fig. 7: The iron diffusion in a common solution with the carbonates pigments the surface of the limestone in brown-red

The exfoliation process is present at the footing of the building's walls, because of the continuous circulation of water through the rock's capillaries, with all the physical-chemical processes that are produced.

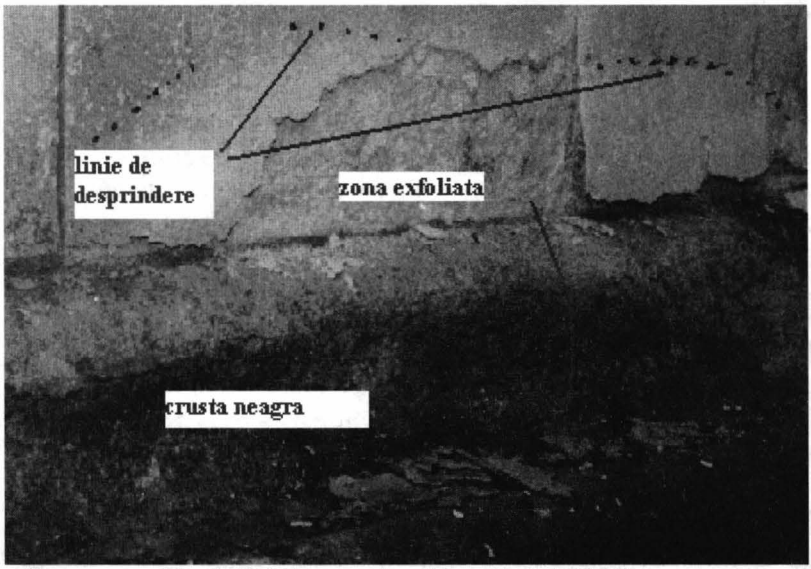

Fig. 8: Exfoliates produced by salt crystallization

No matter which might be the accepter explication, the manner in which the degradation evolves leads to old deteriorations, where the emergency intervention is the substitute of the entire affected block with a new one.

Conclusions

- The classification of the deterioration forms is the most important operation, because it represents all the analysis steps that are being done on the monument, becoming a very important document of decision. After the intervention on the monument is done, the new materials that might present a certain level of incompatibility towards the old ones start to react, building an active complex system that very often may cause the mineralogical composition, fact that leads to the formation on neoformation minerals.
- The action of these processes may become extremely accelerated, fact that implies the necessity of new partial or entire interventions. This is a very strong reason to establish monitoring projects of the monuments evolution after the restoration is complete.

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A FOSSIL-BEARING „FELEACU CONCRETION" IN VÂLCELE (CLUJ DISTRICT)

Vlad CODREA[1]

Abstract. A so-called "*Feleacu concretion*" (Middle Sarmatian, i.e. Bessarabian) found in Vâlcele (village nearby Feleacu, not far from Cluj-Napoca, on NW side of the Transylvanian Basin) is bearing a vertebra, probably belonging to a dolphin. The paper deals with its description, stressing out the rarity of the presence of such a bone inside the rock: until now, it is the single finding of a fossil bone embedded in a "Feleacu concretion".
Key words: Transylvanian Basin, Middle Sarmatian, Feleacu concretions, vertebrate fossils, cetaceans.

Introduction

Koch (1884) was the first to describe the Feleacu Formation in the Middle Miocene (i. e., Late Bessarabian; Filipescu, 1999) of the Transylvanian Basin. Clastic rocks, as quartz sandstone, arenite and conglomerate, dominate this formation. Clay and marl have meager participation in these deposits. These rocks evidence a near shore brackish-basin area, in littoral realm. The Feleacu Formation peculiarity refers to its content of a large number of sandstone concretions, sometimes in huge amounts.

The formation is cropping out discontinuously on the borders of the Transylvanian Basin. The typical site where it is exposed is in Feleacu, village located at 6.5 km S from Cluj-Napoca. Therefore, these sandstone concretions had been named the "Feleacu concretions", a name already notorious in the Transylvanian geology. As a matter of fact, these concretions had stood in relief since very long time ago. Beudant (1822) is among the firsts who stressed out their presence near Cluj: "les grès des environs de Klausenburg présentent un fait intéressant que tous les auteurs ont cité. C'est une aggrégation des matières arénacées en boules, dont la grosseur est plus ou moins considérable, et qu'on employe souvent dans les rues pour former les bornes des maisons et pour plusieurs autres objets" (pag. 317).

However, these Sarmatian concretions can be observed not only in Feleacu, but on other Transylvanian Basin borders too, as in Domneşti (Bistriţa-Năsăud district; Chintăuan & Codrea, 2000).

Basically, the concretions begin to expand around a nucleus, as a rule a lithoclast. Just for the nonce, this nucleus can be a vertebrate fossil.

Description of the Vâlcele concretion

In Vâlcele (village at 7 km south from Feleacu; Fig. 1) the well sinker Florea Mugur, digging a well, found at four meters in depth a "Feleacu concretion" bearing a fossil vertebra inside. Short time after, senior lecturer dr. Raul Rusu (Faculty of Geography) donated the concretion to the vertebrate collection of the Babeş-Bolyai University in Cluj-Napoca.

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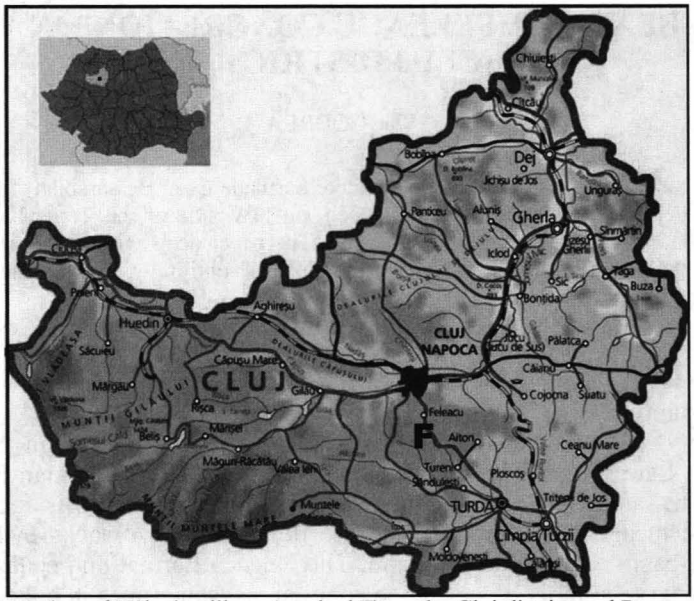

Fig. 1: Location of Vâlcele village (marked F) on the Cluj district and Romania maps.

The concretion (Pl. I) is ovoid shaped, relatively small: the largest diameter is 139 mm only (the biggest known Feleac concretions are exceeding 2.5 m; Nicorici, 1957). Its form attests a poliphasic genesis, with several generations of sand increments.

The concretion agglutinated around its nucleus medium to coarse quartz arenite, feldspars, muscovite, as well as very few mafic minerals.

The peculiarity of this concretion is the presence inside of a vertebrate fossil. Fossils in the Feleac concretions had been already mentioned, but always they concern invertebrates, as foraminifers or mollusc shells (Nicorici, 1957). The vertebra probably belonged to a young cetacean specimen (the synostosis between the *centrum* and the *caput vertebrae* disk was not complete, therefore the disk had been lost before the bone burial). The major part of this vertebra is embedded inside the rock. The only elements still visible on the concretion surface are: the cranial articulation face as well as narrow terminal extremities from the transverse and neural apophysis. The left transverse apophysis is visibly fractured and displaced downward from its natural position, probably consequence of the contractions occurred along the concretion evolution. As the fossil is by far less diagnostic for genus or species assignation, I let the concretion in its initial shape of preservation, renouncing to extract the bone from its rock matrix.

According the morphologic elements within eyeshot, one can consider that this bone could belong to the last dorsal vertebras of a cetacean, very likely a young dolphin. In this respect, the high dorsal neural apophysis associated with the large development of the transverse apophysis could indicate such a position into the spine. De Muizon (1988) described such morphologies in the Kentriodontidae from the South America Miocene (Peru).

Pl. I: The Lower Sarmatian fossil-bearing concretion from Vâlcele. Scale bar: 50 mm.

Discussion and conclusion

Cetacean fossils are not rare in the Sarmatian *s. s.* deposits from Transylvania (Koch, 1899; Codrea, 1996; Kazár & Venczel, 2004; Kazár et al., 2004), as well as in other correlative formations in Romania (Nicolaescu, 1933; Macarovici & Zaharia, 1968; Ionesi & Galan, 1988; Codrea & Sereţan, 2004). However, in spite of all these mentions, undoubted systematic assignations remain few. These systematic rather incertitude originated in the poor sample of fossils, usually referring to post-cranial bones than skulls.

In Vâlcele surroundings, the closest cetacean finding is in Cluj-Napoca in the former Iris clay open pit (Lower Sarmatian deposits lying beneath the Feleacu Formation) It refers to the pithanodelphininae species *Atocetus* (?) *fuchsii* (Brandt, 1873) (Kazár et al., 2004).

In this respect, the Vâlcele concretion is until now a single finding, due to its fossil vertebra. It is the first such sample ever found among the huge number of the Feleacu concretions already discovered. In spite of this rarity, the presence of this fossil inside the rock is natural, because it could concerns either a distinct nucleus around which the concretionary process developed, or just an element embedded during the diagenetic concretion grown.

Acknowledgements. The author is thankful to his colleague, Dr. Raul Rusu, who was kindly providing this sample for study.

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THE FOSSILIFEROUS GRITTY SANDY CONCRETIONS IN CICĂU (ALBA)

Ioan CHINTĂUAN [1]

Summary. The work describes some gritty sandy, micro-rudaceous, fossiliferous concretions, which can be found in the dominantly sandy formations of the middle Sarmatian in Cicău, Alba. It is the second time when the same author points out some concretions with Sarmatian molluscs, after the one in Izvoarele (Constanţa).
Key words: fossiliferous concretions ; middle Sarmatian ; molluscs ; Cicău, Alba

The place called Cicău is located upstream the Aiud town, with the 46° 24'00'' North and 23° 41'00'' East geographical co-ordinates, on the territory of the Mirăslău commune, Alba county, sector where some geological formations belonging mainly to the middle Sarmatian are exposed. Downstream Cicău and upstream Mirăslău, the dominantly sandy deposits of the middle Sarmatian compose the hills that frame the Cicău valley, reaching heights of hundreds of metres. These sands, with sandwiches of marls, sandstones and micro-aggregates, include numerous gritty sandy concretions in various stages of growing. These concretions have been taken up to the surface by erosion both by the Cicău valley, as they can be seen in the riverbed and in the high steep shores, and by the torrents that come down the hills that flank the left shore of the valley.

The concretions are countless, they have various shapes and sizes, elements that allow them to fall into the 'Feleac' category, however with some differences as compared to the classical model. The differences consist in:

- the very high thickness of the sand layers, with thin sandwiches of marls, sandstones and micro-aggregates (Fig.1);
- the very large number of the concretion nuclei and the almost metrical size of some of them (Fig. 2, 3);
- the presence of the fossil remains of molluscs caught amongst the dominantly siliciclastic granules, which, in their whole, make up the extra-formational polymyctic micro-aggregates of the fossiliferous concretions.

The concretions show up to the surface in the riverbed of the Cicău valley and in its shores, especially in the left steep shore (Fig. 4, 5), where their sizes are metrical. The same big sizes can also be found in case of the concretions that come up to the surface on the slopes of the hills that frame the valley, between Cicău and Mirăslău, but only in the left shore of the valley, upstream and downstream the road bridge, where the litho-stratigraphy of those respective deposits can clearly be noticed. Here the sand metrical layers are interrupted by thin intercalations of grey, brown marls, which are

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almost uniform in thickness, by some micro-aggregates in enclavized or lens-shaped layers, by some lens-shaped and stratiform concentrations of nuclei-centres of concretioning, made of grey, brown, brick-lie marls, rich in iron oxi-hydroxides. The dipping of the layers has got variations in the value of the angle, which can sometimes reach 45°, some other times their lying is criss-crossed or even chaotic, which is a sign specific to the margin area. This position in space is owed the presence of numerous loamy-ferruginous nuclei of concretioning, their concentration and the big sizes of some of them. The presence of the fossils in the micro-aggregated concretions is also a sign of this positioning in space, as the paleo-ecological conditions have created the conditions necessary for the development of a rich fauna of Miocene aquatic molluscs, especially gastropods.

The gritty sandy concretions, composed of an agglomeration of fine sand, have only rarely fossil remains of molluscs and in these cases, fragments of valves and shells that may have undertaken some shifting, that is a reshuffling, are caught amongst the granules ; the valves and shells cannot be determined.

The concretions made of coarse sand and finely broken gravel, alongside with countless fragments of valves that cannot be determined, not even generically, have got samples of gastropods that can be determined specifically and that are well preserved.

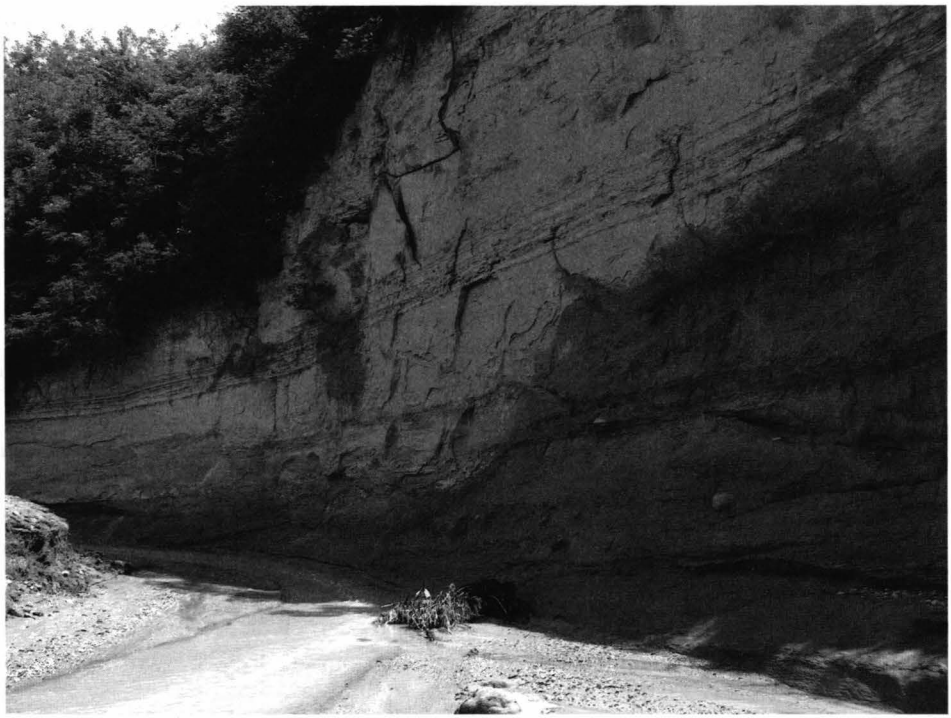

Fig. 1: High thickness of the sand layers

Fig. 2: Concretion nuclei

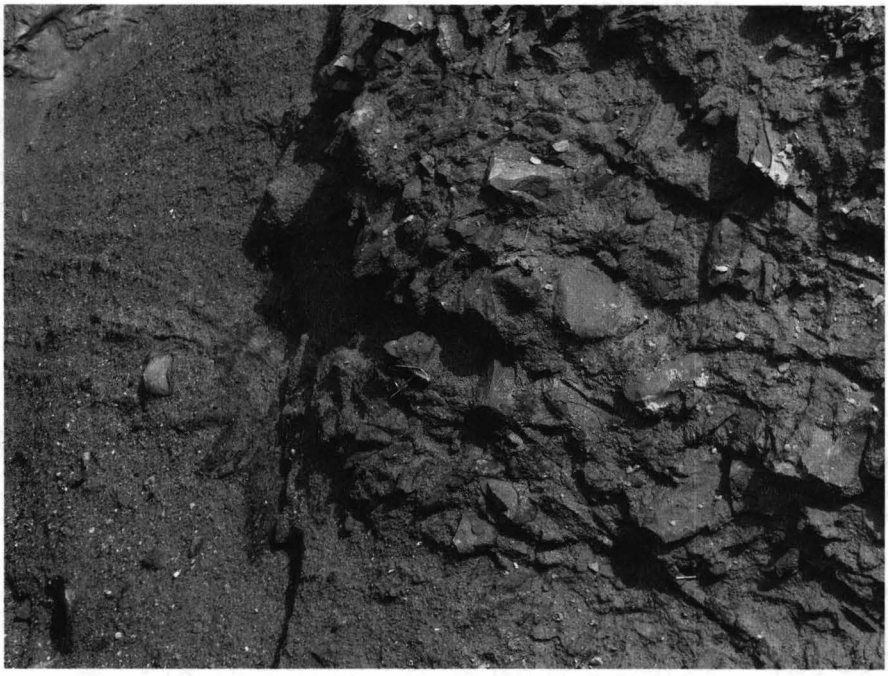

Fig. 3: Sandwiches of marls

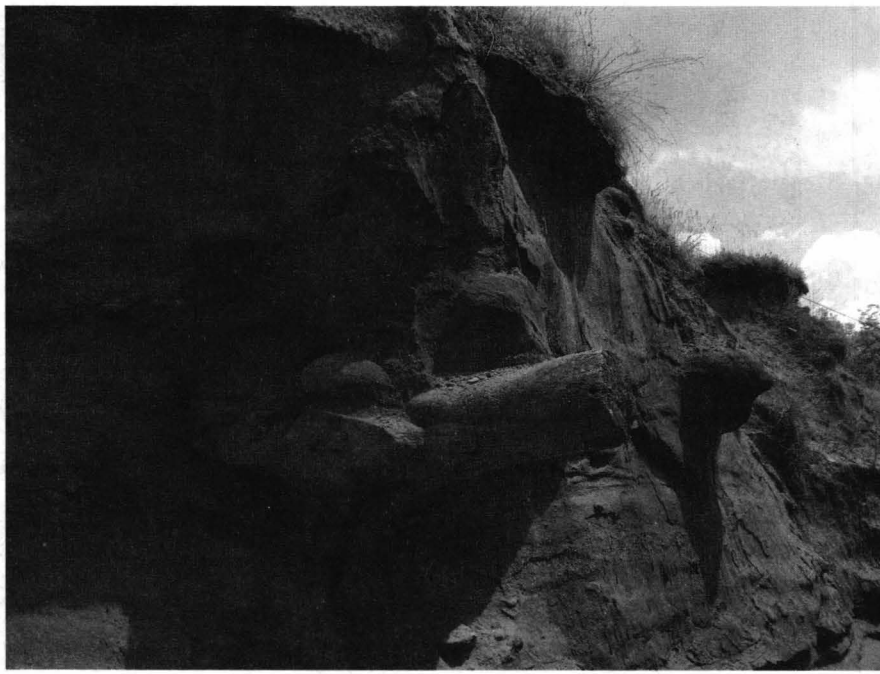

Fig. 4: Concretions of the Cicău Valley

Fig. 5: Sandstones, marls and micro-aggregates of the Cicău Valley

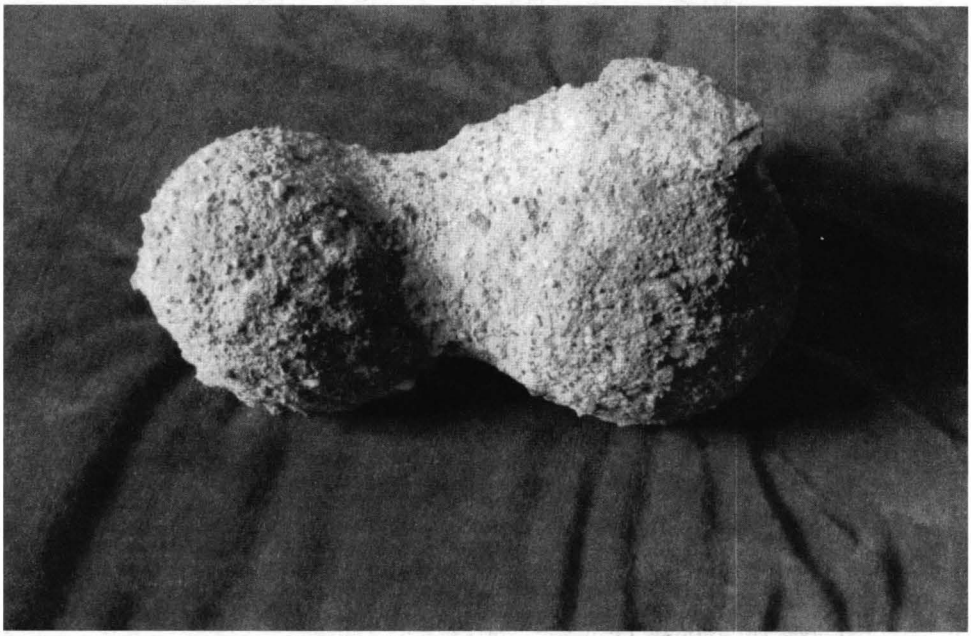

Fig. 6: Micro-aggregates concretion

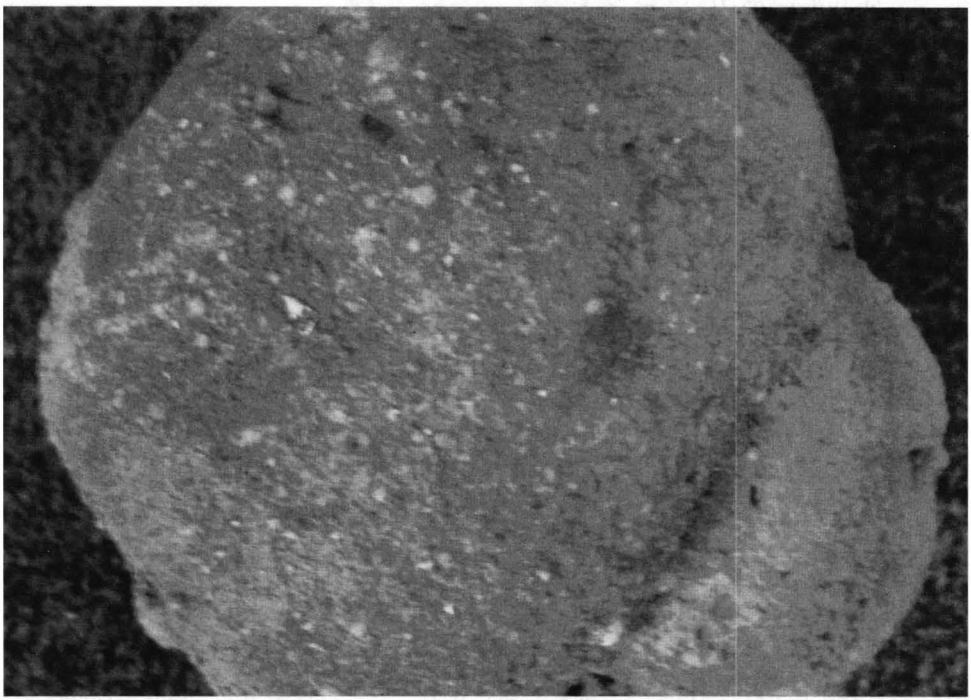

Fig. 7: Micro-aggregates of the fossiliferous concretion

Palentology

I have recognized the following species of gastropods in the micro-aggregated concretions:

Class: GASTROPODA
Sub-class: PROSOBRANCHIA - Milne-Edwards, 1848
Order: CAENOGASTROPODA – Cox, 1959
Super-family: Cerithiacea
Family: Cerithiidae
Type: Cerithium Bruguiere, 1789
Cerithium (Thericium) vulgatum europeum – Mayer, 1878
Cerithium (Thericium) vulgatum europeum – Mayer, 1878..... Chira, page 120, Pl.VI, Fig.8a, 8b

Stratigraphic range: The Badenian in Vienna's Basin and in Danube middle Basin. In Romania it is quoted for the Badenian in Lăpugiu de Sus.

The Thiaridae Family
Type: Melanopsis Férussac, 1807
Melanopsis impressa Krauss, 1852
Inv. no. 5101 ; Fig. 2
Melanopsis impressa Krauss.....Jekelius, 1944, page 73, pl.16, Fig.1-13
Melanopsis impressa Krauss.....Chira, page 120, Pl.VII, Fig.13

Stratigraphic range: In the Central Paratethys, from the Eggenburgian until the Pannonian. Svagrovschi (Chira, 2000) notes the presence of this species in the Sarmatian from Vienna Basin, in Danube middle and in the South-East of Europe.

Chira (2000, page 120) quotes it in the Sarmatian in Comseşti.

The Calyptraeacea Super-Family
Family: Nassariidae
Type: Dorsanum Gray, 1847
Dorsanum cf. opinabile (Kolesnikov, 1932)
Buccinum opinabile Kolesnikov, 1935, page 247, table XXIX, fig. 24-26
Dorsanum cf. opinabile (Kolesnikov, 1932).....Chira, 2000, page 126, Pl.VII, Fig.12

Stratigraphic range: The Sarmatian from Vienna Basin ('The Layers with Ervilia'), Danube's middle Pond and the one in the South-East of Europe.

Carmen Chira (2000, page 126) quotes it in the Sarmatian in Comşeşti.

Conclusions:

The fossiliferous, gritty sandy and micro-aggregated concretions in Cicău, Alba, represent a third location and a third report of fossiliferous, sandy concretions (Chintăuan, 2004 ; Codrea, 2008) and the second one with Sarmatian molluscs (Chintăuan, 2004).

The presence, in these concretions, of some species of gastropods, wide spread in the Sarmatian, however also present in some older Miocene formations, with their shells entire, well preserved, certifies a Sarmatian, but it does not exclude the existence of some species of reworked molluscs from the Badenian, especially two-valved ones.

A fauna-based study on the gritty sandy concretions, including the micro-aggregates that are identical from the genetic and positional point of view is to be recommended and the approach, from the fauna viewpoint, of all the concretions in Romania, is necessary.

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RADIOACTIVITY OF THE NEOGENE COAL MINED AT SĂRMĂŞAG (SĂLAJ DISTRICT)

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Abstract. The Sărmăşag coal mining area is one of the main ones located in NW Romania. Actually, the Neogene lignite is mined in a single open pit, situated nearby the Crasna River. In order to establish the radioactivity of this coal and its dust, several measurements had been done in a systematic manner, inside the coal open pit, along four tracks around the open pit, as well as into the coal silo. According the data issued from these measurements, the radiation level accumulated by the population from the Sărmăşag area is originating from the natural background, including the one of the Neogene lignite. As main conclusion, our values are under the caution limit meaning that there is no risk for the human health in this area.
Key words: Neogene, lignite, radioactivity, environmental hazards, Sărmăşag, NW Romania.

Introduction

The Sărmăşag coal mining area is one of the numerous sectors where the Neogene coals had been mined in NW Romania (Fig. 1). At present, only a single open pit is still working. The underground works, stopped their activity in the last decade of the former century. The lignite mined at Sărmăşag is still used for thermo-electric plants, in Zalău and Oradea. After its combustion, the remaining ash is stored in dumps. In this respect, it is important to know how radioactive this coal is, in order to avoid the environmental hazards. Therefore, we measured the Sărmăşag lignite radioactivity in and around the open pit area.

Fig. 1: Location of the Sărmăşag coal open pit.

The coal radioactivity

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The radioactivity is the range of phenomena in which unstable atomic nuclei spontaneous discharge corpuscular or electromagnetic radiations (y). The researches carried on over the years showed the existence of some peculiar types of coal bearing radioactive features, considered to originate from some heavy radioactive elements (U, Th) or because of the radioactivity of light elements (^{40}K). So, the existence of uranium bearing coal in many countries as England, Argentina, Hungary, Russia, USA and others is a reality.

The uranium bearing coal is or was situated near of magmatic or metamorphic rocks. From these rocks, through usual phenomena of decay and levigation, the uranium was brought in solutions, after that being fixed by the organic substances during the different stages of the aging of coal process.

The presence of radioactive potassium in some coal has another explanation. It is known that potassium is a major nutrient, being the richest cation inside the vegetal cell. The potassium solubility is highly related to the pH of the water from the peat bog. So, the potassium fixed in coal originates from the organic source, which is relatively insoluble, and from the one selectively retained by the clay minerals associated inside the coal layer (Petrescu et al., 1986, 1987).

The radioactive elements can be met in coal, but also in its ash, which can come in contact with humans when it is dispersed in the air or water. The radiation level from the burnt coal had been studied for many years. In the urban area, the radiation dose for coal is considered small. The dose absorbed by people exposed to radioactive medical sources is 11%. Here, the medium dose of the people given by the coal radioactivity is under 1% from the entire dose. So, from the coal burning into ash we have a small source of radon, which is not very dangerous comparing to that containing uranium (Tadmore, 1986).

While coal is burnt the most concentration of uranium, thorium and residues are divided between the combustion products, solid and gas. The division between the gas and the solid is controlled by the volatility and chemical qualities of the coal. Actually, the whole radon existing into the coal mass is liberated as free gas (Cothern & Smith, 1987).

In contrast, the less volatile elements as thorium, uranium and the majority or residual products are retained almost entirely in solid combustible residual matter. Modern electric plants can recover more than 99.5% from the coal matters. The ash resultant from the coal combustion, in some countries, has a total weight of approximately 10% only. The largest quantity of thorium in coal is related to the phosphate minerals as monazite or apatite. In ash, uranium can be found in a greater concentration in the smaller sized particles (very fine).

All stages of the coal fuel-cycle, including mining, combustion and utilization or disposal of the ash, cause minor perturbations of the natural radiation environment (Corbett, 1983). The majority of the coal and ash are insignificant in related to radioactive elements, comparatively to ordinary soil and rocks. This observation offers a useful geological perspective related to the society concern about the radiations and danger they embody (Swaine, 1990)

GEOGRAPHIC AND GEOLOGIC SETTINGS

Sărmăşag settlement covers 68.38 km^2 and geographically belongs to the Sălaj Border Platform, at the crossing between the Togaciu Hills and the Sălaj Piemont, alongside Zalău and Crasna rivers.

Nobody knows exactly when coal mined begun in Sălaj. However, it is certain that some hundreds years old tools had been discovered, used to coal mining. Before 1900, mining was poor in Sălaj, but immediately after the coal mining activity grew, mainly due to the discovery of the rich lignite ores. So, the Sărmăşag ore contains 27 coal layers, from which only one – 16th layer – has economic value, being mined. In the sterile beds located between the coal strata, sandy water-bearing layers usually appear, under the levels +168 and +160m (Petrescu et al., 1987).

The coal ore sector in Sărmăşag is situated on the NE side of the Silvania Depression, which is surrounded by Plopiş and Meseş mountains and Ticău, Bîc and Măgura Şimleului metamorphic uplifts.

The relief in the area is generally hilly, not exceeding 375 m in altitude, high fragmented by the rivers erosion on the soft rocks forming the Neogene deposits. Landslides often occur on the hill slopes. In the area there are also accumulative deposits, forming the Crasna Valley and its tributaries (Zalău and Maja) low terraces.

The radioactivity in the area of the Sărmăşag coal open pit

The Sărmăşag coal is mined in the open pit (Fig. 2, 3) then, carried by trucks on a short road to a silo (Fig. 4), where it is stored. From this silo the coal is transported to Oradea and Zalău thermo-electric plants.

Fig. 2: The coal open pit, general view

Fig. 3: Coal mining in the open pit

Fig. 4: Coal silo at Sărmăşag

The measurements were performed in June 2007 using a mini radio – Röntgen-meter model 90. The measurements were performed for the radiation level in the open pit above the coal bed, on four tracks around the open pit (track # 3, along the road between the open pit and coal silo) as well as inside the coal silo (Fig. 5).

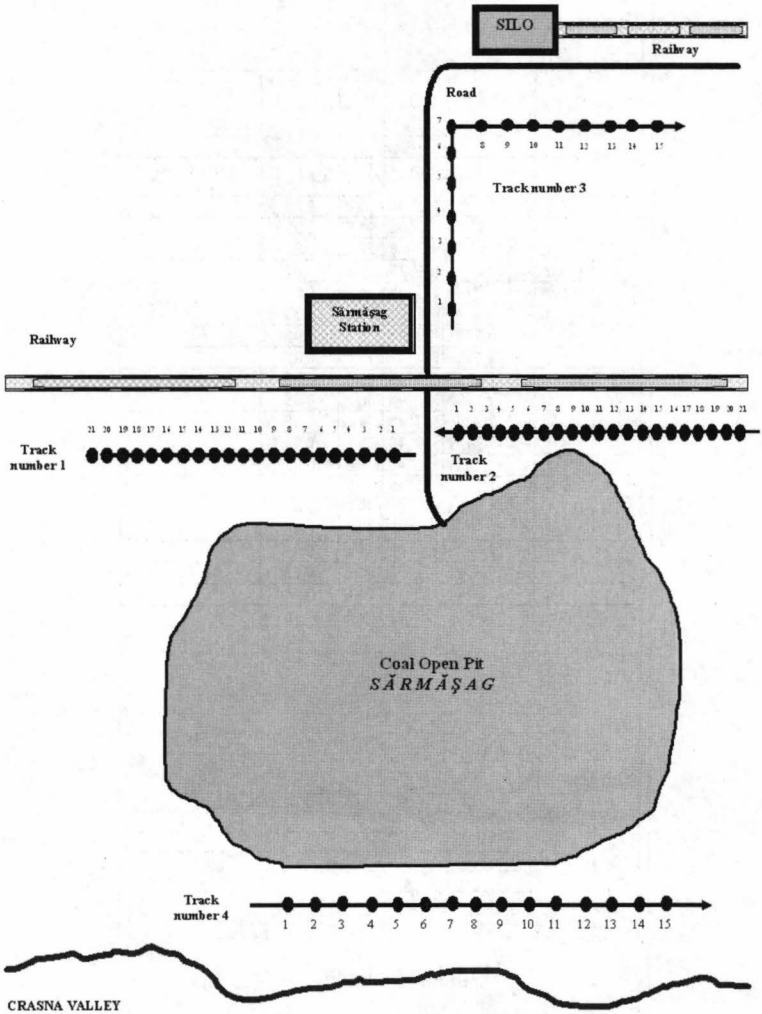


Fig. 5: The map of the measurements tracks for the radioactivity in Sărmăşag quarry

According to the data from tables and graphics, we will present the radiation level measured along the four tracks, around the Sărmăşag coal open pit.

For the study, the radiation level was measured in 76 locations, obtaining an average of 0.04 mR/h. The variation range is of 0.02 mR/h – 0.43 mR/h, the lowest

value being measured along the tracks, and the higher one being measured inside the quarry, in the coal bed.

Inside the silo, measured values ranged between 0.06 mR/h and 0.14 mR/h; inside the open pit above the coal bed, the measurements showed a radiation level between 0.08 - 0.43 mR/h.

These values point out that the radioactivity does not have harmful effects on the settlements from the area.

Point	Height	Coordinate		Radiation level (mR/h)	
TRACK 1					
0	168 m	47^0 21,994 N	22^0 48,429 E	0,03	near station SARMASAG
1	168 m	47^0 22,015 N	22^0 48,413 E	0,06	
2	169 m	47^0 22,035 N	22^0 48,394 E	0,05	
3	167 m	47^0 22,057 N	22^0 48,381 E	0,09	
4	166 m	47^0 22,077 N	22^0 48,363 E	0,04	
5	165 m	47^0 22,096 N	22^0 48,341 E	0,06	
6	165 m	47^0 22,117 N	22^0 48,324 E	0,03	
7	168 m	47^0 22,137 N	22^0 48,310 E	0,05	
8	170 m	47^0 22,158 N	22^0 48,294 E	0,03	
9	168 m	47^0 22,179 N	22^0 48,277 E	0,03	
10	168 m	47^0 22,199 N	22^0 48,260 E	0,05	
11	165 m	47^0 22,220 N	22^0 48,244 E	0,05	
12	164 m	47^0 22,240 N	22^0 48,228 E	0,06	
13	169 m	47^0 22,260 N	22^0 48,210 E	0,05	
14	169 m	47^0 22,280 N	22^0 48,195 E	0,05	
15	167 m	47^0 22,299 N	22^0 48,179 E	0,04	
16	170 m	47^0 22,320 N	22^0 48,163 E	0,06	
17	169 m	47^0 22,339 N	22^0 48,147 E	0,05	
18	170 m	47^0 22,359 N	22^0 48,132 E	0,05	
19	169 m	47^0 22,379 N	22^0 48,114 E	0,04	
20	169 m	47^0 22,400 N	22^0 48,098 E	0,04	

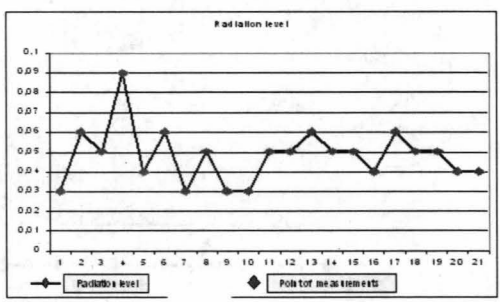


Fig. 6: Track number 1

The graphic and table point out the values on NE trend, near Sărmăşag railway station, on the track no.1, where the radiation level had been measured in 20 different locations, with values ranging between 0.03 – 0.09 mR/h. An average of the measurements shows a radiation level of 0.04 mR/h; the highest value is 0.09 mR/h.

Fig.4 shows the measurements of the radiation level from the 21 locations trended on the track number 2, in SE direction. The values range between 0.03 – 0.08 mR/h; medium radiation level is 0.04 mR/h.

Fig.5 shows the radiation level measured in 15 locations trended on the track number 3 on the road linking the railway station and the coal silo and its vicinity area. The measured values range between 0.03 - 0.08 mR/h. The average radiation level is 0,04 mR/h and the highest radiation one is 0.06 mR/h.

Three measurements had been done inside the coal silo, showing a radioactivity level between 0.06 - 0.14 mR/h.

Figure 7 shows the radiation level measured in 15 locations trended on the track 4, along Crasna Valley. These values are ranging between 0.03 – 0.06 mR/h, the average radiation level is 0.04 mR/h and the highest radiation level is 0.06 mR/h.

Point	Height	Coordinate		Radiation level (mR/h)	
TRACK 2					
1	172 m	47^0 21,973 S	22^0 48,448 E	0,03	near station SARMASAG
2	172 m	47^0 21,954 S	22^0 48,466 E	0,04	
3	177 m	47^0 21,935 S	22^0 48,482 E	0,03	
4	176 m	47^0 21,916 S	22^0 48,496 E	0,04	
5	177 m	47^0 21,899 S	22^0 48,513 E	0,05	
6	177 m	47^0 21,879 S	22^0 48,529 E	0,05	
7	174 m	47^0 21,863 S	22^0 48,547 E	0,04	
8	173 m	47^0 21,845 S	22^0 48,564 E	0,05	
9	176 m	47^0 21,826 S	22^0 48,579 E	0,07	
10	174 m	47^0 21,808 S	22^0 48,595 E	0,05	
11	175 m	47^0 21,789 S	22^0 48,611 E	0,08	
12	174 m	47^0 21,769 S	22^0 48,624 E	0,04	
13	172 m	47^0 21,752 S	22^0 48,640 E	0,03	
14	172 m	47^0 21,733 S	22^0 48,656 E	0,03	
15	173 m	47^0 21,714 S	22^0 48,674 E	0,04	
16	171 m	47^0 21,696 S	22^0 48,692 E	0,04	
17	173 m	47^0 21,676 S	22^0 48,704 E	0,04	
18	174 m	47^0 21,656 S	22^0 48,720 E	0,05	
19	176 m	47^0 21,637 S	22^0 48,737 E	0,04	
20	180 m	47^0 21,619 S	22^0 48,745 E	0,08	
21	177 m	47^0 21,599 S	22^0 48,748 E	0,04	

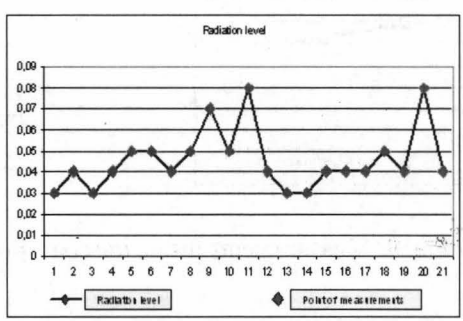


Fig. 7: Track number 2

Point	Height	Coordinate		Radiation level (mR/h)	
TRACK 3					
1	168 m	47^0 22,005	22^0 48,461	0,05	Station Sărmăşag
2	171 m	47^0 22,020	22^0 48,491	0,04	
3	171 m	47^0 22,033	22^0 48,514	0,03	
4	171 m	47^0 22,043	22^0 48,543	0,03	
5	172 m	47^0 22,049	22^0 48,574	0,02	
6	171 m	47^0 22,056	22^0 48,604	0,03	
7	170 m	47^0 22,062	22^0 48,634	0,05	intersection road
8	171 m	47^0 22,069	22^0 48,663	0,04	
9	170 m	47^0 22,076	22^0 48,693	0,05	
10	172 m	47^0 22,083	22^0 48,724	0,04	
11	170 m	47^0 22,092	22^0 48,754	0,06	
12	171 m	47^0 22,096	22^0 48,784	0,03	
13	169 m	47^0 22,084	22^0 48,805	0,04	
14	169 m	47^0 22,067	22^0 48,824	0,06	near silo
15	168 m	47^0 22,071	22^0 48,892	0,05	

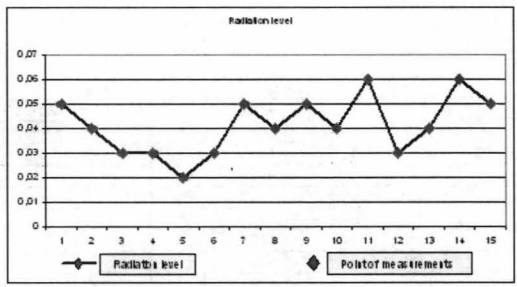
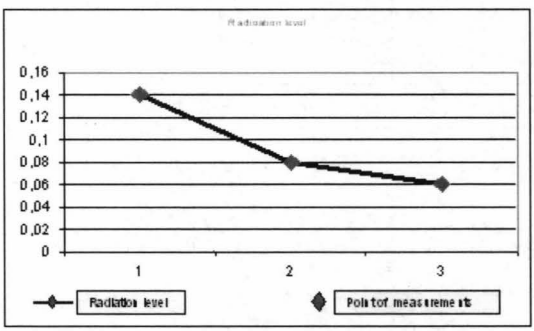


Fig. 8: Track number 3



Point	Radiation level (mR/h)
1	0,14
2	0,08
3	0,06

Fig. 9: Measurements inside the coal silo

Point	Height	Coordinate		Radiation level (mR/h)	
TRACK 4					
1	165 m	47^0 22,178	22^0 47,824	0,04	
2	168 m	47^0 22,160	22^0 47,844	0,06	
3	169 m	47^0 22,141	22^0 47,862	0,03	
4	169 m	47^0 22,123	22^0 47,881	0,05	
5	170 m	47^0 22,105	22^0 47,901	0,05	
6	170 m	47^0 22,087	22^0 47,920	0,05	
7	170 m	47^0 22,070	22^0 47,940	0,03	
8	171 m	47^0 22,054	22^0 47,960	0,05	
9	168 m	47^0 22,038	22^0 47,982	0,05	
10	169 m	47^0 22,024	22^0 48,006	0,05	
11	168 m	47^0 22,008	22^0 48,028	0,04	
12	168 m	47^0 21,990	22^0 48,047	0,06	
13	168 m	47^0 21,972	22^0 48,066	0,04	
14	168 m	47^0 21,955	22^0 48,085	0,04	
15	165 m	47^0 21,935	22^0 48,108	0,04	

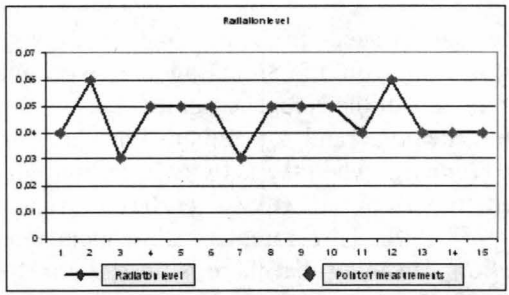


Fig. 10: Track number 4

The radioactivity of the Sărmăşag lignite

The measurements performed inside the Laboratory of Physics belonging to the Environment Science Faculty of Babeş-Bolyai University in Cluj-Napoca, carried on a lignite sample originating from Sărmăşag, pointed out the following characteristics:

- the coal test sample tested was collected from the coal bed exposed in the open pit, in an amount of 100 g;
- the sample was divided in halves and dried (after drying the weight reduced to 40g);
- the specific radioactivity of the coal sample was measured and the following radioactive elements could be found: ^{238}U, ^{226}Ra, ^{210}Pb, ^{232}Th, ^{40}K;
- the measurements revealed the following quantities for the radioactive substances:

- $U^{238} = Ra^{226} = 27$ Bq / hg
- $Pb^{210} = 30$ Bq / hg
- $Th^{232} = 42$ Bq / hg
- $K^{40} = 180$ Bq / hg

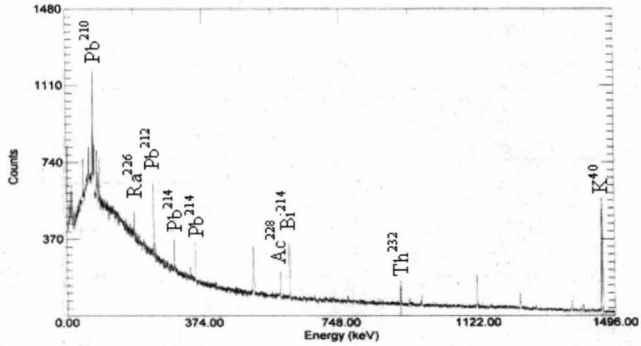


Fig. 11: The radioactivity of Sărmăşag coal

Conclusions

According the data issued from our measurements, the radiation level accumulated by the population from the Sărmăşag area is originating from the natural background, including the one of the Neogene lignite.

The values for the dust and air radioactivity in our country, reveal the following level limits: *caution* – when the activity has minimum values of 185 Bq/m^2 /day; *warning* – when the radiation activity reaches the value of 370 Bq/m^2 /day according to SR ISO 9978/1996. Therefore, as main conclusion, our measured values are under the caution limit, meaning that there is no risk for the human health in the area.

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SOME DATA CONCERNING THE CLOSURE AND ECOLOGICAL REHABILITATION OF URICANI COAL AFTERTREATMENT STATION

Andreea BRAŞOVAN[1], Vlad CODREA[1]

Abstract. This contribution outlines several trends referring to the closure and ecologic reinsertion of the coal aftertreatement station in Uricani, located on the left bank of the Western Jiu River. Once the buildings and the already accumulated waste material removed, the station area is to be covered with soil and vegetation.
Keys words: Petroşani Basin, ecological rehabilitation, coal mining.

Introduction

Uricani is a town located in the Petroşani Depression, on the Western Jiu valley, in Retezat Mountains foothills area (Fig. 1). Belonging to Hunedoara district, its position is close to triple districts vicinity: Caraş-Severin, Mehedinţi and Gorj. This territory is scantily populated, on its whole 25, 461 ha area. Its limits are: Tusului and Vacii valleys to the east, the Retezat National Park to the West – more precisely the line made up of the Custura (245 m), Piule (2081) and Coada Oslei (1899m) peaks. The last of these peaks already belongs to Vâlcan Mountains. To the north, the limit is on the watershed line of Custura (245 m), Lazărul (2282), Tulişa (1782) and Dealul Mare (1509) peaks – all of them belonging to Retezat Mountains. The southern limit is the watershed line of Coarnele (1789 m), Siglăul Mare (1682 m), Arcanul (1760 m) and Coada Oslei peaks. All these peaks are belonging to Vâlcan Mountains. These mountains separate the depression and its surroundings from Gorj and Mehedinţi territories.

A branch of the national road D.N. 66 Deva – Petroşani –Tg. Jiu provides the access to this locality.

Geological setting

The Petroşani Basin is part of the post-laramic generation of sedimentary basins in South Carpathians. It started to outline in the Early Cenozoic. The basin involves a metamorphic basement and the molass filling, recurrent both in Paleogene and Neogene.

The basement refers to rocks on various degrees of metamorphism, belonging to the Danubian Units (Marginal Dacides) and Getic Nappe (Median Dacides; Săndulescu, 1984).

The Cenozoic molass is exposed as narrow strips, parallel with the basin borders. It begins to accumulate in Oligocene. Moisescu (1980, 1983) outlined the following lithostratigraphic units:

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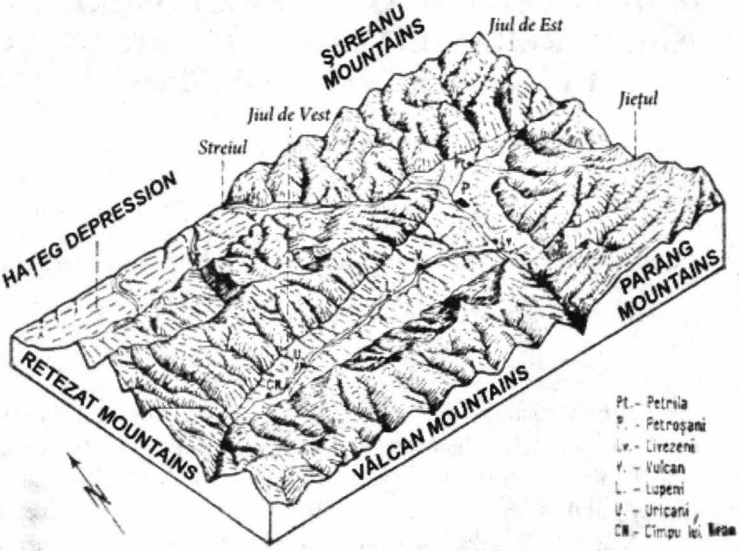

Fig. 1: Block diagram of Petroşani Basin (according Pop, 1993).

- Cimpa –Răscoala (Rupelian – Early Chattian), a continental formation transgressing the pre-Cenozoic basement. It comprises conglomerate interfingering red clay and scarce very fine freshwater limestone, nearly devoid of fossils, related to a Paleogene fluvial system.

- Dâlja-Uricani (Early Egerian), also called as "middle horizon" or "lower productive. The formation concerns interfingering lacustrine (oil shale, coal), brackish (claystone, marlstone, oil shale) and some scarce marine deposits (Givulescu, 1996 a, b, 1997)

- Lonea (upper Chattian) is a dominant clastic formation, with conglomerate and sandstone, associated with scarce violaceous-red and green marlstone, nearly devoid of coal.

The Quaternary is exposed over large surfaces. It consists of terrace deposits, rivers alluvia, and debris fans.

On its western side the Petroşani Basin stress out an asymmetric syncline. There, the coal bearing layers are trended NV-SE, N-S or NE-SV (Pop, 1993).

Works for closure and ecological rehabilitation of Uricani coal aftertreatement station

The coal mined in Petroşani Basin has a caloric power of 7700-8000 kcal/kg, its carbon content ranging between 77 and 80%, while that of ash is between 2.6 and 6.3%, volatile matter ranging between 44 and 50% (Petrescu & Ionescu, 1987).

After mining, the coal quality had been improved by washing in aftertreatement stations, like the one from Uricani. In this manner, its commercial value increased. The Uricani station prepared the crude coal originating from different

mines from the western side of the Petroşani Basin, more precisely the ones from the Uricani, Valea de Brazi and Câmpul lui Neag. After being processed, the coal had been used in metallurgy of iron and for energy.

The Uricani aftertreatement station was operating until April 1990. As a main cause, the plant was shut down due to the diminishing extracted quantities of coal, lesser than the aftertreatement processing capacities, with inconvenient repercussions on the product selling prices.

Closing down the plant, the performing of ecological works at its emplacement had been proposed through the M.E.C.D.G.R.M. resolution nr. 171.603/14.05.2004, approved by the Governmental resolution 1846/2004.

The following closing works have to be carried out:

- cleaning the aftertreatement station area of non-degradable material as electric cables, glass, debris, and large stone blocks;
- stripping the surface of vegetal soil;
- demolition of the buildings (actually there are 23 useless buildings and installations, made-up of ferro-concrete, monolith-concrete and brickwork, some of them 24 meters high (Figs. 2 a; b; c; d);

Fig. 2a: A building for coal siloing

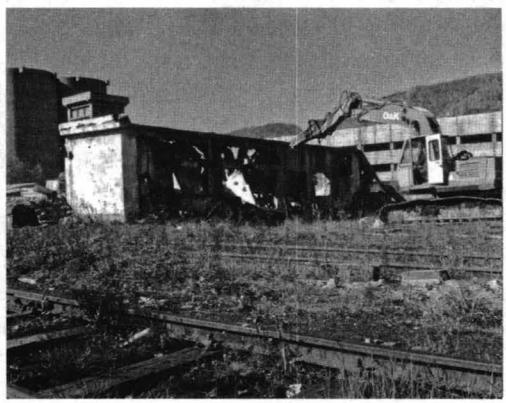

Fig. 2b: Stockyard

Fig. 2c: Compressor and decantation station

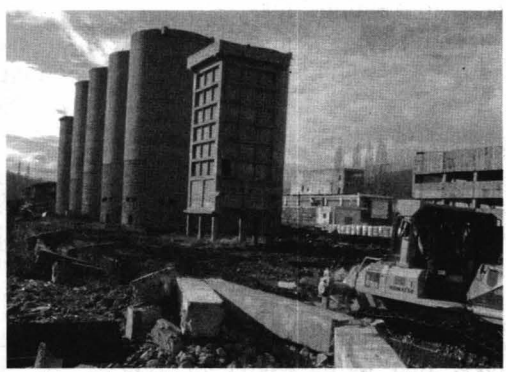

Fig. 2d: Refrigeration tower and coal silo

- capitalization through the selling of the remaining buildings and installations;
- filling of the former buildings foundations holes up to the level of the natural terrain;
- cutting-and-landfill operations for rechamfering and reshaping the terrains that need such interventions;
- platform levelling;
- disposal and transport of the contaminate material;
- demolition of basements and tubs, one meter below the terrain surface, followed by their filling (filling material granulation should vary between 5 and 10 mm) and covering with a layer of vegetal soil;

Rehabilitation implies ecological works in two main areas:

- area A: the main precincts (Uricani aftertreatement station) on 18.65 ha
- area B: the rock waste outside the aftertreatement station.

The ecological rehabilitation works for the area A imply:

- adjustment works (filling the basement holes, cleaning the surface, digging and scattering the soil, levelling the surface);
- amelioration and re-using the harmed soil, by adding fertilizers, namely of N:P:K fertile compound in the following proportion: N-70-80 kg/ha, P_2O_5-50-65 kg/ha and K_2O-65-70 kg/ha;
- reahabilitation works for draining the rainwater inside the aftertreatement precincts, in oder to be collected into the existing sewerage system.

The ecological rehabilitatoin works for the area B imply:

- filling the foundations holes of the demolished buildings, levelling, sowing and cultivation in the funicular area
- erosion-control fencing and gabion protection in the area of the rock waste outside the precincts, where water produced strong erosion (approximately on 110 meters). The rock waste lies south of the precincts; it covers 2ha of land and its volume is 35000 m^3. Slătioara stream flows at its base.

The release of aerosols is specific for industrial plants using solid and liquid fuels (thermoelectric power stations, housing, thermal power stations, transportation, etc.). These particles are deposited on tree leaves where they temporarily accumulate. Due to rainfall, they are washed away and transported to the soil where they accumulate permanently. The average monthly accumulation of powders in the close neighbourhood of the TPP Paroşeni amounts to 25.7g/m^2 (Rebrişoreanu et al., 2002).

Conclusions

The sources of pollution ceased to action the moment the aftertreatement station activity had been stopped. At present, the main sources of pollution are issuing from the demolition and waste rock rehabilitation works. Due to this project, the air and soil pollutions in the area will have to be decreased. Following the completion of the demolition works, the air pollution will be practically absent. The rain and snow melting waters from the aftertreatement precincts as well as from the opposite side are taken over by the drains and poured into the Jiu River. Finally, the human settlements

from this area will no longer have to suffer harmful effects originating from the air and phonic pollutions.

Acknowledgements. We are thankful to Prof. Călin Filip (Turda) for his help in improving the English version of this contribution.

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GRAVEL PITS MINING IN CLUJ DISTRICT AND THE RELATED ENVIRONMENTAL IMPACT

Doina Alexiana CODREA[1]

Abstract. The mining of the gravel pits in Cluj district had acquired a boom in the last two decades, mainly due to the expanding industrial, civil and transport infrastructure works. This paper mentions a complete record of the existing gravel pits, indicating their locations, owners and where available, the mining surfaces. The main environmental risks related to these mining activities are mentioned.
Key words: gravel pits, Cluj district, environmental impact, Transylvania.

Introduction

Out coming from the social and economic turnovers happened in our country in the last two decades – marking the final crush of the communist regime -, the reinvigoration of economy is more than obvious. In this tendency, the works related to the transport infrastructure (railroads, highways, roads etc), as well as the ones carried on for the new industrial (mainly the new industrial parks) and civil buildings became more and more extended.

Located on the northwestern side of the Transylvanian Depression, Cluj district follows this trend, the interest of several companies for several areas as the ones from Cluj-Napoca, Turda, Jucu, Dej etc increasing in the last years. The economic boom had been accompanied by a rising demography, consequence of migration from rural localities towards the main cities or from the neighboring districts (Sălaj, Alba, Bistriţa-Năsăud).

Therefore, the necessity of raw materials increased. Among these materials, the natural rocks as well as the gravel play an outstanding position. A number of open pits accrued their production, while other areas had been surveyed in order to open new ones. In spite of these circumstances, Cluj district is far to be near the European tendencies in using the local raw materials, as its peculiar natural stones. The use of such rocks could confer a specific fingerprint on each settlement, leading to more friendly ambient compared to the ones where concrete and prefabs are the dominating materials. In the district area, large amounts of limestone, volcanic tuff, other magmatic rocks etc could be easily mined, but this potential is far for its real valorization.

The mining of the natural rocks involves a series of hazards with harmful consequences on the environment. In Cluj district, there are not to many such hazards, if comparing to other Romania regions where the consequences against environments and/or settlements had been calamitous (e.g. the salt mining at Ocnele Mari; Şerban & Codrea, 2002). Even in this situation, the mining hazards should not be underestimated. All these open pits should be supervised, more far as the extracted rocks quantities are raising.

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The gravel pits from Cluj district

The gravel pits, which made the interest of this research, are located along the main river streams flowing in this district: Someşu Mic, Someş, Arieş and Călata. The majority of the gravel natural deposits are originating from either in the river terraces (Pleistocene or Holocene), or in the rivers minor bed.

From structural point of view, in Cluj district occur sectors belonging to: Inner Dacides, Western Transylvanides and Transylvanian Basin (including its marginal small satellite basins as Iara and Huedin; Săndulescu, 1984; Ciulavu et al., 2000). Each of these units is bearing peculiar rocks and formations, which was in Pleistocene and Holocene source-areas for the clastic rocks reworked by rivers into terraces and detrital fans.

The Inner Dacides are involving here the Bihor Unit (also called the "Bihor Autochthon") and the Codru Nappe System, both extended on large areas in the northern Apuseni Mountains. From these two structural entities the first one is by far dominating, while the other is exposed only on restricted areas.

The Western Transylvanides, part of the southern Apuseni Mountains are exposing in the Cluj district only their northeastern ending, covered by the transgressing Cenozoic of the Transylvanian Basin. Under this cover, they are continuing as part of the basin basement, passing into the Pienides towards northeast.

The Transylvanian Basin is represented only by a northwestern restricted sector, with post-laramic Latest Cretaceous, Paleogene and Miocene formations. The Late Miocene, as well as the Pliocene is missing in this region.

The main gravel and sand actually mined have fluvial origin, accumulated on the river terraces as consequence of Pleistocene and Holocene processes. As a matter of fact, the reserves depended on basement lithology, the river stream power, or large-scale different influences on the sedimentary area, as recent tectonics, which could directly influence the subsidence. Bandrabur et al. (1971) and Rădulescu et al. (1996) stressed out some regional sinking tendencies in Romania. According these maps, for the northeastern area of the Apuseni Mountains, one can notice an uplifting tendency, while the Neogene western basins close to this orogene are rather stabile (obvious for the Şimleu Basin, but for the northwestern side of the Transylvanian Basin too). Such a pattern reflects the erosion process active of the northern Apuseni side, associated with the accumulation of clastic rocks on the foothills located in the Neogene post-tectonic basins, nearby the orogene.

One can presume that same tendencies –or anyhow, similar- operated in Pleistocene and Holocene too, when the majority of the river terraces accumulated. Even across the stable epochs at the end of Cenozoic, the Transylvanian Basin had a low position compared with the Apuseni, acting as a trap for the eroded clastic rocks.

In Cluj district, the majority of the gravel pits are located in the alluvial plains of Arieş and Someşul Mic (Fig. 1). Once, several gravel pits existed also on older river terraces, but later they had been abandoned. Therefore, one can point out that the sand and gravel deposits now used for buildings are originating from very active, dynamic

sources area, which are still discharging the fresh clastic input arriving from uphill, into the Transylvanian Depression.

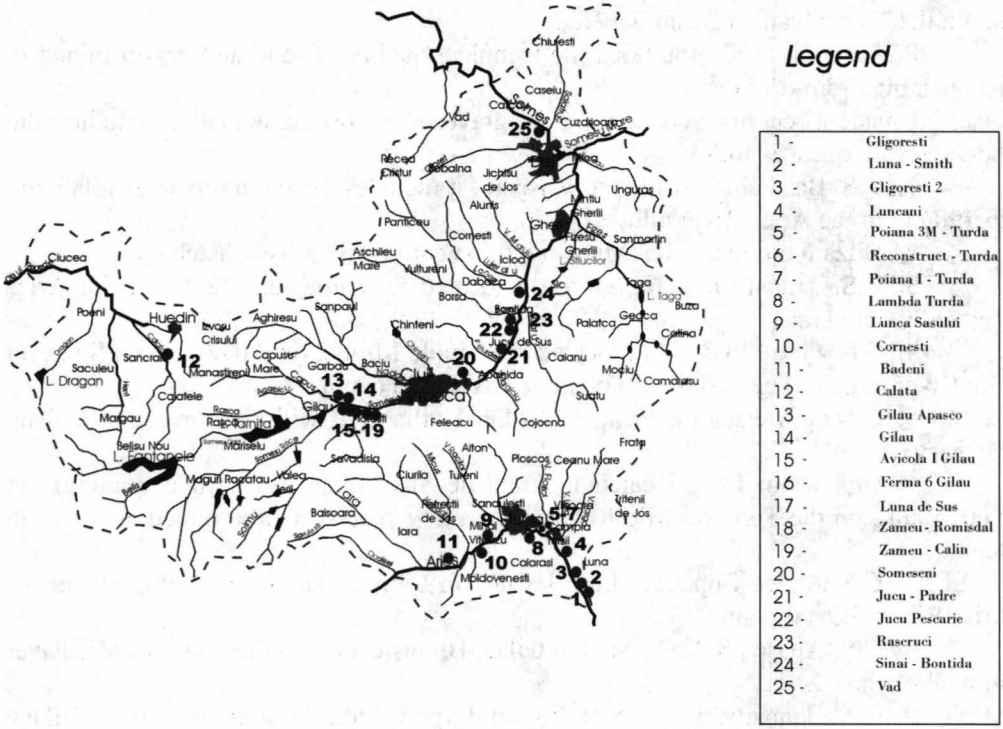

Fig. 1: Location of the gravel pits mined in Cluj district in 2008

Some of the sand and gravel features are interesting to be observed, as their lithology, source-areas, technical quality, or age of accumulations. These clastic rocks are originating mainly from the Inner Dacides for the Someşul Mic hydrographic basin, or both Inner Dacides and Western Transylvanides for the Arieş River. Therefore, one can find metamorphic rocks belonging to Someş Series (mica schist, amphibolites, paragneiss, microcline gneiss etc) and Biharia Series (metabasic rocks, metatrondjenite, metadolomite, black quartzite, metaultrabasite; Giuşcă, 1960; Mârza, 1969; Dimitrescu, 1988). The magmatic rocks (granitoids, associate with satellite dyke of pegmatite with muscovite and potassium feldspars, or aplite) from Muntele Mare batholite participate too to this clastic input. Other magmatic rocks refer to the ofiolite forming the basement of the majority of units belonging to the Western Transylvanides.

Besides these old rocks that could be reworked on several hundreds of kilometers, there are also lithoclasts of sedimentary origin, issued from the alpine

sedimentary covers (Permian and Mesozoic) of these structural units. There are siliceous sandstones, microconglomerate, various limestones etc.

More recent rocks can be find in these gravels, but their participation is meager: they refer to the Paleogene and Middle Miocene sedimentary rocks cropping out on the Transylvanian Basin borders.

Pârvu et al. (1977) outlined the technical quality of sand and gravel mined in the open pits from Cluj district.

I made a repertory concerning the gravel pits working actually, including the most relevant ones, as follows:

1. C.S. Basarabia; located in Viişoara, it includes three mining areas totalizing 46,790 m2 in the Arieş River alluvial plain.
2. Huza Ioan; located in Mica, it will be convert on a fishy hatchery.
3. C.S. Transilvania Impact Ltd.; located in Turda, on 7.2 ha in the Arieş River alluvial plain.
4. C.S. Free Minds Ltd.; located in Jucu de Mijloc, on 0.0274 m^2 on Someşul Mic River terrace. The ballast will be mined as 2 m in depth.
5. Crişan Alexandru; located in Mahal village, it will be convert on a fishy hatchery.
6. C.S. Călin Ltd.; located in Luna de Sus village (Floreşti commune), on 0.0076 km^2, on the Someşul Mic River terrace. The ballast will be mined as 4.5 m in depth.
7. C.S. Radec Construct Ltd.; located in Câmpia Turzii, on 24000 m^2, in the Arieş River alluvial plain.
8. C.S. Apasco S.A.; located in Gilău, Branişte area, in the Someşul Mic River alluvial plain.
9. C.S. Transilvania Impact Import Export Ltd.; located in Bădeni village (Moldoveneşti commune), on 5,200 m^2, in the Arieş River alluvial plain.
10. C.S. Bum Construct Ltd.; located in Răscruci, on 10,200 m^2, in the Someşul Mic River alluvial plain. The ballast will be mined as 2.5 m in depth.
11. C.S. Premaco S.A.; located in Glogoreşti village (Luna commune), on 22,000 m^2, on the Arieş River terrace. The ballast will be mined as 2 m in depth.
12. C.S. Axial Construct Ltd.; located in Gilău, on 29,000 m^2, on the left bank of the Someşul Mic River. The ballast will be mined as 2.5 m in depth.
13. C.S. Ben & Ben Ltd.; located in Jucu-Pescărie, on 72,000 m^2, on the Someşul Mic River terrace. The ballast will be mined as 3 m in depth.
14. Rusu Sergiu Horia; located in Jucu de Sus, on the Someşul Mic River alluvial plain: It will be converted on a fishy hatchery.
15. C.S. Dermatin Construct Ltd.; located in Valea Sicului, Sântejude village. Afferent to the improvement of the Borzeşti Lake.
16. C.S. Aurovas Ltd.; located in Luna de Sus (Floreşti commune), on 30,000 m^2 on the Someşul Mic River terrace. The ballast will be mined as 5.75 m in depth.
17. C.S. Aramis Automobile Ltd.; located in Fizeşu Gherlii, on 2.1 ha, it will be converted on a fishy hatchery.

18. GTH Construct Ltd.; located in Răscruci, on 11,510 m^2, on Someş River terrace.

19. C.S. Transilvania Impact Ltd.; located in Luna, on 47,329 m^2. It concerns the punctiform mining of the sand and gravel. The ballast will be mined as maximum 3.30 m in depth, without exceeding the river bed.

20. C.S. Transilvania Impact Ltd.; located in Luncani, on 8,746 m^2, in the Arieş River alluvial plain. The ballast will be mined as maximum 3.30 m in depth, without exceeding the river bed.

21. C.S. Transagroplast Ltd.; located in Valea Groşilor.

22. C.S. Padre Ltd.; located near the Jucu bridge on DN1C road, on the left bank of the Someşu Mic River.

23. C.S. Denvak Construct Ltd.; called Avicola I ballast open pit.

24. C.S. Reconstruct S.A.; located in Turda town, on the left Arieş River terrace, on 0.78 ha.

25. C.S. 3 M AGC Ltd.; located in Turda town, Poiana 3 M ward.

26. C.S. Globe Trotters Ltd.; located in Turda town, Poiana 3 M ward. It will be converted on a fishy hatchery.

27. C.S. Lambda Investment Ltd.; located in Turda town, on the Arieş River alluvial plain.

28. C.S. Aurovas Ltd.; located in Gilău, on 2,800 m^2, on the Someşu Mic River terrace.

29. C.S. GTH Construct Ltd.; located in Gilău, on 4,352 m^2, on the Someşu Mic River terrace.

30. C.S. Smith Rotrans Ltd.; located in Luna, on 20,000 m^2, on the left bank of the Arieş River. The ballast will be mined as maximum 1 m in depth, without exceeding the ground water table.

31. C.S. Romisdal Ltd.; located in Luna de Sus (Floreşti commune), on 2,900 m^2, on the upper terrace of Someşul Mic River.

32. C.S. Somtrans S.A.; located in Vad, lower terrace of the Someş River.

33. C.S. Fad Aranjament & Design Ltd.; located in Câmpia Turzii, on 314,449 m^2, on the alluvial plain of the Arieş River.

34. C.S. Tirrena Scavi Ltd.; located in Mihai Viteazu, on 24,185 m^2, on the Arieş River alluvial plain.

35. C.S. Călin Trans Ltd.; located in Luna de Sus (Floreşti commune), on the terrace of Someşu Mic River.

36. C.S. Rabexim Ltd.; located in Călata, on the Călata River alluvial plain.

37. C.S. Hidrocons Ltd.; located in Vad, on the lower terrace of the Someş River.

38. C.S. Sinai Comimpex Ltd.; located in Bonţida-Sinai, on the Someşu Mic alluvial plain.

39. C.S. Ben & Ben S.A.; located in Cornești, Mihai Viteazu commune, on the terrace of Arieş River.

40. C.S. Vegyepszer Ltd.; located in Cluj-Napoca-Someşeni, on the Someşu Mic alluvial plain.

41. C.S. GTH Construct Ltd.; located in Bonţida, on the Someşu Mic alluvial plain.

42. C.S. CCCF-Bucureşti-Filiala Drumuri Poduri ; located in Cluj-Napoca.

43. C.S. Agregatul Impex Ltd.; located in Bonţida, in the lower terrace of the Someşu Mic River.

44. C.S. Delgatt Construct Ltd.; located in Luna de Sus, Floreşti commune, on the terrace of the Someşu Mic River.

45. C.S. Paraconstruct Ltd.; located in Fundătura, on DN1 road at 33 km, on the Someşu Mic River terrace.

46. C.S. Noamy Impex Ltd.;located in Nima village.

47. C.S. Samus Construcţii S.A.; located in Valea Luncii, Mica commune, on the Someşu Mare lower terrace.

48. C.S. Derma Universal Ltd.; located in Nădăşel, Ţaga commune. It will be converted on a fishy hatchery.

49. RADJ Cluj Napoca, 216 Traian Vuia Str.; located at Viişoara.

50. RADJ Cluj Napoca, 216 Traian Vuia Str.; located at Cetan.

51. RADJ Cluj Napoca, 216 Traian Vuia Str.; located at Iara.

52. RADJ Cluj Napoca, 216 Traian Vuia Str.; located at Călata..

53. C.S. Radec Construct Ltd.; located in Câmpia Turzii, 18 Laminoriştilor Str., ballast open pit called CAEN 1421.

54. C.S. Padre AG SRL, Cluj-Napoca, 99, S. Albini Str.; located in Răscruci, Bonţida commune, on the Someşu Mic lower terrace, on 59,600 m^2.

55. C.S. Padre AG SRL, Cluj-Napoca, 99, S. Albini Str.; located in Livada-Hăşdate, on the Someşu Mic lower terrace, CAEN 1421.

56. C.S. Trans Agro Plast Ltd., Dej, 60, Crângului Str.; located in Valea Groşilor village (Vad commune), CAEN 1421.

57. C.S. Smith Rotrans Ltd., Apahida, Sânnicoară; located in Luna, CAEN 2670, 1421; on 17 ha.

58. C.S. Minagre Prodcom Ltd., Luduş, 26, 8 Martie Str.; located in Luncani (Luna commune), CAEN 1421.

59. C.S. Raum Cons Ltd., Gilău, Principală Str. ; located in Răscruci, CAEN 1421.

60. C.S. Laval Construct Ltd., Livada 253; located in Răscruci, on 38,000 m^2.

61. C.S. Prodmin Ltd., Jucu de Mijloc, w.nb. ; located in Jucu, CAEN 1421.

62. C.S. Reconstruct S.A., Turda, 2, Petru Maior Str.; located in Turda.

63. Transilvania Impact Import Export Ltd., Turda, 45, Mihai Viteazu Str.; located in Plăieşti, CAEN 1412.

64. C.S. Vasrom Ltd, Dej, 30, Valea Jichişului Str.; located in Mica, CAEN 1421.

65. C.S. Holcim SA; located in Gligoreşti, on the Arieş lower terrace, on 500,000 m^2. It will be converted on a fishy hatchery.

Think trough, the actual mining activities from the Cluj district gravel pits have not major harmful impact on the environment. The majority is located far from the settlements and doesn't disturb the daily activities. The mining technologies do not involve polluting gears, which could induce heavy air, water or soil pollutions.

However, some aspects should not be minimized as the influences of the gravel pits on:

- changing of water streams dynamics. The extraction of large quantities of rocks, leads to riverbed non-uniformities, changing the flow regimes (intensity and/or directions). The effects could be visible trough different erosion rates on the riverbanks, but also with harmful consequences on the bridges or dams. Therefore, continuous monitoring of these areas is useful in revealing any beginning of riverbed degradation.

- a series of pollutions of the underground aquifers could whenever happen. They could originate in leakages of oils or combustion fuels used by the combustion engines of the mining gears. These engines should be permanently watched.

- the gravel mining could have influences on the local biota distribution. It would be difficult to deny that the gravel mining doesn't chase away, at least for a while, several plant and animal –mainly fish- species. In this manner, the biocoenosys are disturbed and could even change their compositions. However, such details had never been studied in Cluj district. These hydrobiological studies exceed the aim of this study, but they would be necessary in future.

- ultimately, I want to underline the value of sand and gravel reserves. Obviously, the natural input replacing the already extracted quantities has its limits, peculiar for each river stream. It would desirable to calculate the gravel reserves for each hydrographic basin and the extraction do not exceed the natural rates of regeneration. It is well known that in a series of European countries the gravel reserves became restricted, due to a too extensive mining. Some alluvial sand and gravel have also another value, as the one from Arieş River, which contain alluvial gold. It stands to reason this gold should be extracted before the common use of these rocks.

Conclusion

With few exceptions, the gravel pits actually working in Cluj district are of medium and small sizes.

The environmental impact refers mainly to the potential pollution of the soil and underground waters. The soil could be polluted by the dust dispersion, which could generate contamination halo of various geometries, controlled by human activities or winds. The underground aquifers could be polluted trough leakages of oils or combustion fuels used by different combustion engines.

The quantification of these pollutions is for instance difficult to evaluate, because of lack of monitoring data. Obviously, it should be a priority target in the near future.

Acknowledgements. I thank Prof. Vlad Codrea (Babeş-Bolyai University Cluj-Napoca) for his comments and useful suggestions.

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COSTINEŞTI SHORELINE EVOLUTION BETWEEN 1924-2005

Ştefan CONSTANTINESCU[1], Marius BUDILEANU[2]

Abstract. The evolution of Costineşti shoreline was investigated using the data from the first carthographical document (1924) to the latest satellite images from our database. The methodology imployed shore perpendicular profiles comparation and graphical representation of the level changes. Until 1960, the sea-cliff shore sector evolved under natural regime dispaying small amplitude, alternative erosional and accretional sectors, with shoreline mobility rate of ±1m/yr. Several factors like reduction of sediment input from the Danube into the Black Sea, sea level rise and port dykes, changed the morphodynamic regime, after 1979, into a predominant retreating one (maximum rates of -3m/yr).
Keywords: Costineşti, erosion, Black Sea, sea-cliff

General characteristics of Costinesti coast

The study area is a 9 km long sea-cliff coast situated in the southeastern part of the Romanian littoral zone. Two different capes define the limit of the shore, Tuzla to the North and Tatlageacul Mare to the South. The principal characteristic of this area is the presence of four capes with three bays in between (Fig. 1). Three years ago, the sea-cliffs were totally naturals. Since than, a number of hard protection structures were built causing important changes of the slopes shape. The cliffs consist of a main loess layer (10-15m thick) in the upper part, and Villafranchian clay level and Sarmatian limestone at the base. Presence of clay induced important cliff slides especially in the northern and southern parts of the coast. Limestone layer height differs alongshore, rising above sea level up to 1,7m at the Cape Tuzla and to 0,5-1,5m in the southern part of the coast. The shore platform is generally narrow, irregular, displaying the largest widths (up to 5-7m) just southward of Forum Hotel. Solution pools and potholes represent the main morphological features that create a particular aspect of the platform.

Costineşti Lake was in Antiquity a shallow water bay, which has been progressively transformed into a creek, by the longshore currents action, which lead to the creation of a littoral barrier. The catchment area is the smallest from entire Romanian sea cliff coast, of just 21,25 km^2 (Ariadna Breier, 1976). Archeological investigations had proved the presence of a small port activity for Greek's ships (Rădulescu,I., 1958). The rivers that flow into the lake have temporary regime and relief energy less than 50m. We used the names of these rivers from the first cartographical representation that we have (1924), all of them being Turkish in origin (Constantinescu, St., 2004). *Mangea Punar* is the principal valley with two tributaries: *Cealac Dere* and *Arnaut Bostan Dere*.

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Methodology

Using different kind of topographical maps and satellite images, we created a GIS database for the study area. All of them have been transformed in the same cartographical projection, Stereo 70, using ground control points for reference. In a previous article it was investigated the Lambert-Cholesky projection system for the first map that we used in our study and the transformation to Stereo 70 (Bartos E. Z. et al., 2007). A synthesis table is present below with the materials that we used.

Map ID/ Satellite images	Year	Scale	Map projection
Tuzla 5639	1924	1:20000	Lambert-Cholesky
Costineşti K-35-10-A-b	1960	1:25000	Gauss-Kruger
Costineşti K-35-10-A-b	1978	1:25000	Gauss-Kruger
LandSat TM	1989	30m resolution	UTM 35N
LandSat TM	1992	30m resolution	UTM 35N
LandSat ETM	2000	15m resolution	UTM 35N
Aster L1B	2002	15m resolution	UTM 35N
Aerial image	2005	0,5m resolution	Stereo 70

Using cross-shore profiles (spaced alongshore at 200m intervals), the evolution of the shoreline was analyzed for the last 81 years. As our investigations have been performed within a general context, for the entire Romanian sea-cliff shore, the profiles begun at Cape Tuzla from kilometer no. 46,800 and ended at Cape Tatlageac with kilometer no. 53,600. Each profile has a unit ID expressing the kilometer order and a distance from the base line to the intersection with shoreline. The procedure was automatically repeated for different maps and images. Finally, we create a difference of distance for every profile, as a new field in the database.

Results

Costineşti shoreline has an overall erosive evolution with rates that increased after 1980. In Fig. 2 the "0" line represents the shoreline reference position in 1924. Starting with this position, the other shorelines (1960, 1979, and 2005) had represented. The nomenclature used in the graphic express the bays longshore distribution, from north to south: B1, B2 and B3. Shoreline mobility rates were small between 1924 and 1960 (-1m/yr), and increased during the second interval up to -3m/yr. Accumulative processes occurred just within Bay 2, during 1960-1979 interval, with rates of 3-4m/yr. An average mobility rate for each morphological area is illustrated in Fig. 5 using the same time intervals. A progressive regime installed for just 20 years, after which many factors led to a general retreating behavior: sea-level rise, new Constanta port structures, (offshore-deflected longshore current, diminished river discharge due to the dams building (especially after 1980), etc.

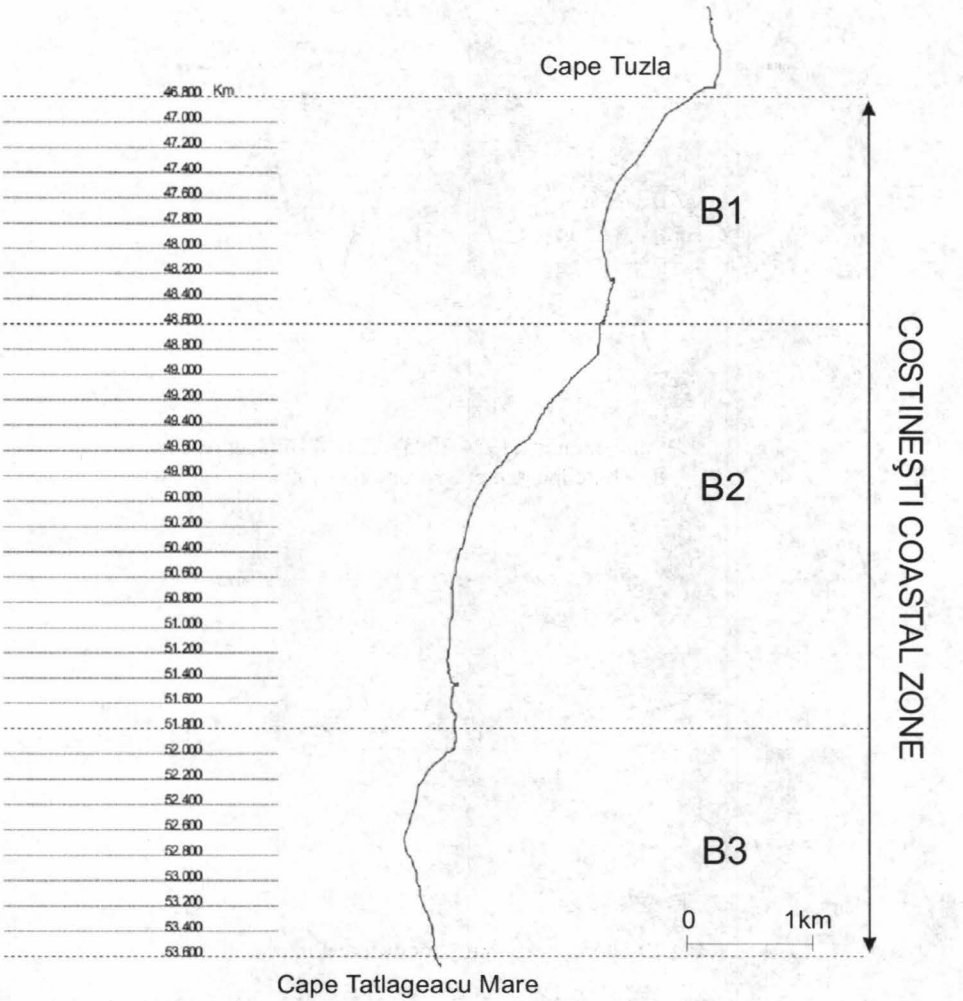

Fig. 1: Cross-shore profiles reconstructing the shoreline evolution

New coastal restoration activities were undertaken in the last few years, the most important being represent by the cliffs set up. In natural regime, the slope had almost a vertical profile in the upper part, with a natural talus in base. The human intervention resulted into a uniform slope, which is not a reliable solution even for few years. In Fig. 6 there are two photos showing natural cliff profile (left) and anthrophical shaped cliff profile (right). The vegetation cover provides a significant image to cliff slope stability. After 2006, a new management plan was developed, including here a new protection dyke within the B2 area and a connecting channel between the lake and the sea.

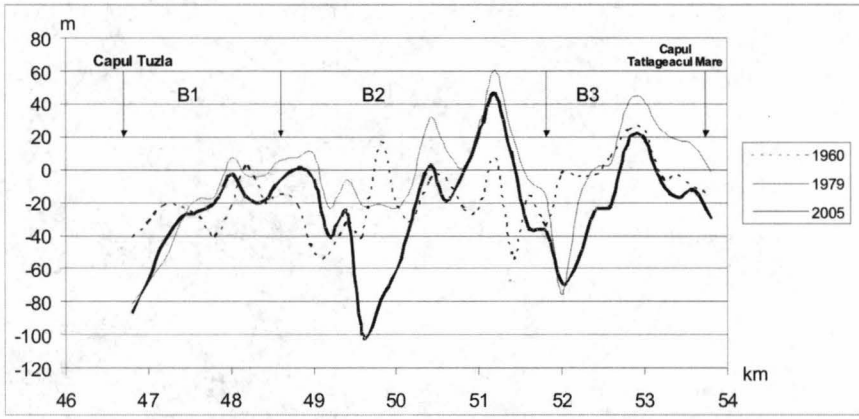

Fig. 2: Shoreline mobility (1924-2005). The "0" line represents the shoreline reference position in 1924

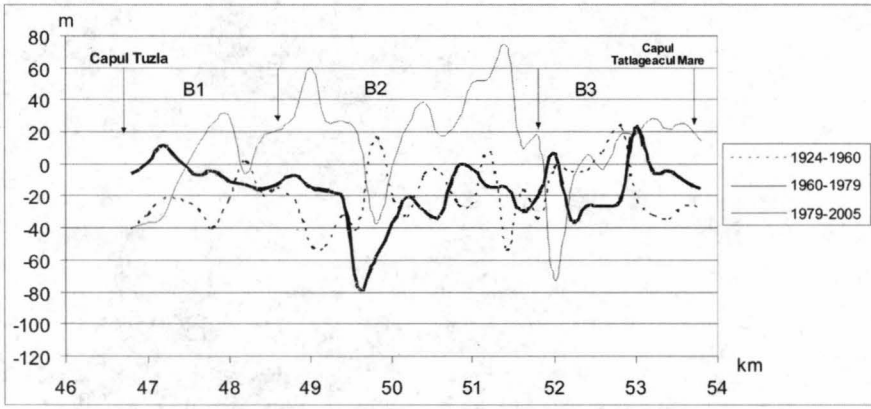

Fig. 3: Shoreline mobility for different intervals

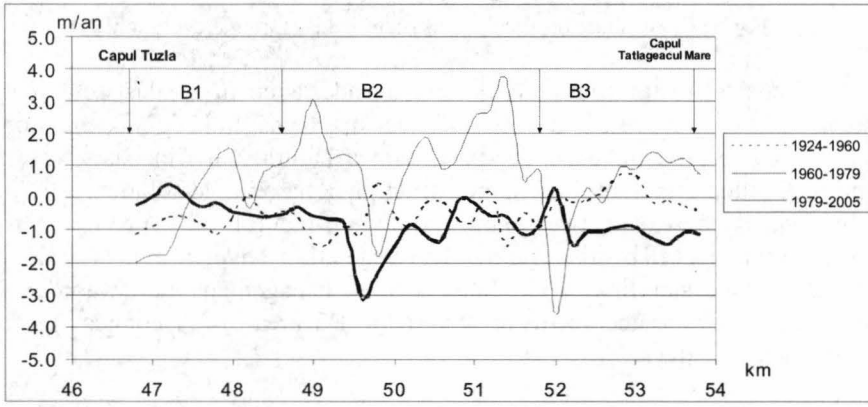

Fig. 4: Rates of shoreline mobility (m/yr)

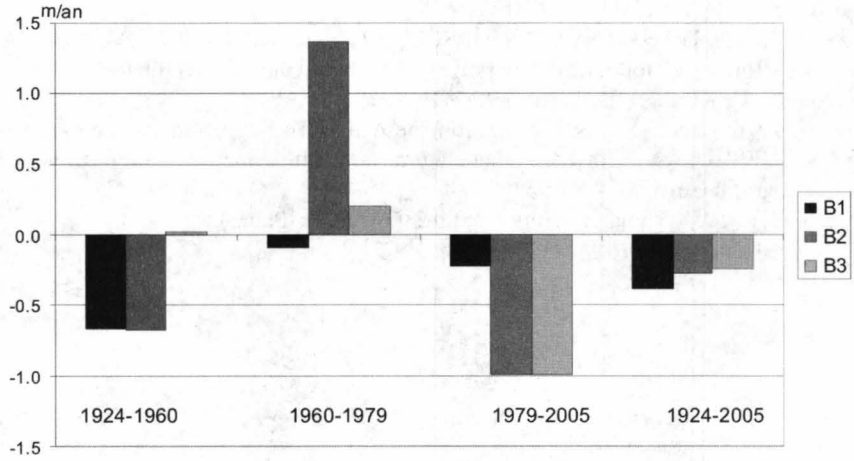

Fig. 5: Rates of shoreline mobility in bays (m/yr)

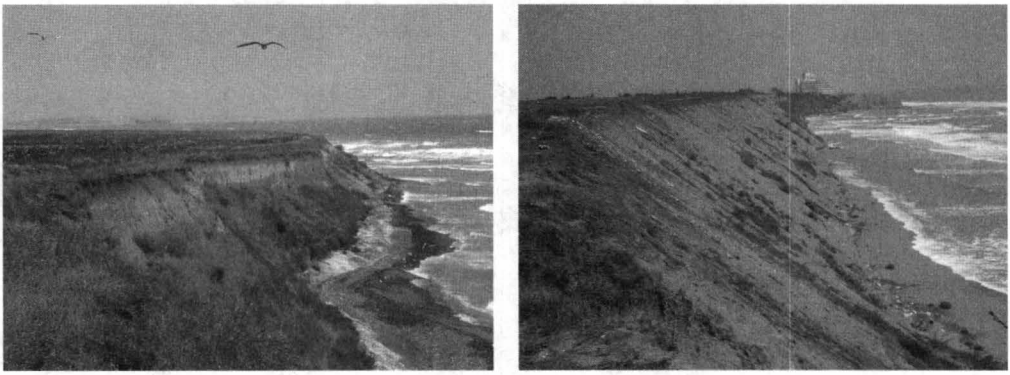

Fig. 6: Natural (left) and anthrophical (right) sea-cliff

Conclusions

At the present, Costineşti shoreline is actively retreating , with a maximum rate of erosion by -3m/yr, within the central bay (B2). Under natural conditions, until 1960, an alternation of erosion/accretion sectors with rates between -1 +1m/yr occurred longshore. Dams buildings within the Danube basin reduced the sediments inputs into the western part of the Black Sea littoral zone. Coupled with the extension of port dykes and sea level rise, the erosion was intensifying in the last 25 years for the entire shoreline. New reconstruction works of the sea-cliff proved to be inefficient even for few years.

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WEB-BASED GEO-INFORMATION SYSTEM FOR TRANSBOUNDARY FLOOD MANAGEMENT

Vasile CRĂCIUNESCU[1] , Gheorghe STĂNCĂLIE[2], Ştefan CONSTANTINESCU[3], Ionuţ OVEJANU[4]

Abstract: In the latest years floods and accompanying landslides, occurred quit frequently in Romania, some of which isolated, others-affecting wide areas of the country's territory. One region, which suffers from flood damages on a regular basis, is the transboundary area of the Crisul Alb, Crisul Negru and Kőrős River. An important objective of the NATO SfP 978016 project "Monitoring of extreme flood events in Romania and Hungary using Earth Observation data" is the development of a dedicated sub-system based on remote sensing and GIS technology (FLOODSAT), in order to improve the flood management and implementation of mitigation programs, in the mentioned area. The FLOODSAT sub-system is web-based with a distributed architecture and consists in a core server, which handles the interactions between the various modules, the end-users management, the display and manipulation of data. The GIS database interconnected with the modeling modules, integrates the hydrological and hydraulical models into the sub-system. The main functions of the FLOODSAT are the following: acquisition, storage, analysis, management and exchange of raster and vector graphic information and related attribute data for the flood monitoring activities, as well as updating the information, data restoring, elaboration of thematic documents and generation of value-added information. The distribution of the spatial and tabular attribute data over an Internet Web-based network represents a powerful and effective communication method that overcomes the disadvantages of the classical approach.
Key words: remote sensing, GIS, flood management, Internet web-based network

Introduction

Floods are the major disaster affecting many countries in the world year after year. From Romania perspective, floods are among the most hazardous natural disasters in terms of human suffering and economic losses. The big floods occurred in spring and summer of 2005, the worst ones in more than 40 years, have affected large regions of Romania: in the Timis county (floods of 19 –23 April) over 1300 homes have been damaged or destroyed, 3800 people have been evacuated and about 30,000 hectares of agricultural land flooded; in five counties situated in eastern Romania (floods of 10 –14 July) 482 villages, towns and cities have been flooded, 11,000 homes inundated, 8,600 people have been evacuated, 53,000 ha farmland flooded, 379 bridges damaged or destroyed.

Flood management evolves and changes as more knowledge and technology becomes available to the environmental community. Satellite imagery can be very effective for flood management in detailed mapping that is required for the production of hazard assessment maps and for input to various types of hydrological models, as

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well as in monitoring land use/cover changes over the years to quantify prominent changes in land use/cover in general and extent of impervious area in particular (Nirupama and Simonovic, 2002). Geographic Information System (GIS) can be used to extract some types of information, which are otherwise difficult to access by traditional methods, particularly for flood forecasting and floodwater movement. GIS is also considered a vital tool for making use of remotely sensed data for disaster mitigation. Lanza and Conti (1994) have discussed the potential of joining remotely sensed information and hydrological oriented GIS structures to assist in flood forecasting. The remaining issues include different resolution scales, which are associated with data observed by the available sensors and their hydrological interpretation. The joint use of the various sensors is proposed in order to address the problem of quantitative precipitation forecasting at the small scale. The GIS data handling capability plays also a major role in supporting the effectiveness of automated procedures developed for flood hazard control.

The decision process starts with the collection of observed data that supports the creation of information through modeling, the information evolves into knowledge through visualization and analysis, and finally the knowledge supports hydrological decisions. The decision makers are concerned with identifying the hazard events (which appear because of natural events and/or hydraulic and terrain configurations), determine their impact on the elements at risk and then adopt mitigation measures. It is nowadays accepted that the main component of the conceptual framework for flood management is a decision support system (DSS). In determination of DSS for flood risk assessment, it is of utmost importance to apply the most efficient methods in flood forecasting and warning system associated with real-time data collection system (Saders and Tabuchi, 2000).

The fast developing web-technology has prompted the scientists to start developing web-based decision support tools that allow planners and other government decision makers to improve the flood management. Simonovic (1999) coined the concept of Virtual Data Base (VDB) for the management of floods making use of the Internet technology. The design and Web technology part was done using ArcView and Map Server GIS software, Java, Java Script, HTML and Avenue programming.

The flood forecast and defense related information provided by Romania to Hungary is presently based mostly upon the ground-observed data, which are mostly collected by non-automatic hydrometrical stations. Such data are somewhat limited in terms of spatial distribution, temporal detail, and speed of collection and transmission, and these limitations should be remedied.

Recognizing the threat of floods and the need for further improvement of flood management in this area, at the initiative of the Romanian Meteorological Administration, an international team was formed, with representatives of Hungary, Romania and USA, and proposed a project on "Monitoring of Extreme Flood Events in Romania and Hungary Using Earth Observation Data" to the NATO Science for Peace (SfP) Programme. The project aims to provide to the local and river authorities as well as to other key organizations an efficient and powerful flood-monitoring tool, which is

expected to significantly contribute to the improvement of the efficiency and effectiveness of the action plans for flood defense. The distribution of the graphic and cartographic products (derived using the GIS facilities and based on satellite data, maps and field surveys) to the interested authorities, media and public is an important issue in the framework of this NATO SfP project. These products will contribute to flood-preventive activities for land development and special planning in the flood-prone areas, and will optimize the distribution of flood related spatial information to end–users (Brakenridge et al., 2003).

The paper presents the design and the main function a dedicated on-line sub-system, based on remote sensing and GIS technology, for flood related geo-spatial information management (FLOODSAT), as well as the preliminary results of the implementation.

Study area: Crişul Alb, Crişul Negru and Kőrős basin

The study area is represented by the Crisul Alb/Negru/Kőrős transboundary basin spanning across the Romanian–Hungarian border, with a total area of 26,600 km^2 (14,900 km^2 on the Romanian territory).

In Romania, the basin (Figure 1) includes mountainous areas (38%), hilly areas (20%) and plains (42%). About 30% of the basin is forested. On the Hungarian side, the basin relief is made up of plains. The annual precipitation amount ranges from 600-800 mm/year in the plain and plateau areas to over 1200 mm/year in the mountainous areas of Romania ((Povara, 2004). This precipitation distribution can be explained by the fact that humid air masses brought by fronts from the Icelandic Low frequently enter this area. The orography of this area (the Apuseni Mountains) amplifies the precipitation on the mountain chain's western side. Thus, the Crisuri Rivers Basin frequently experiences large precipitation amounts in short time intervals and the frequency of such events seems to have been increasing in recent years. There is a marked difference between high rates of mountain runoff and low rates of runoff in plains; thus, runoff flood waves formed in the Romanian part of the basin move rapidly to the plains in the Hungarian part of the basin, which is characterized by relatively slow flows and a potential for inundation.

The list of significant floods includes the events of June 1974, July-August 1980, March 1981 and December 1995-January 1996, March 2000, April 2000 and April 2001. The spring 2000 flood caused on the Romanian territory damages of more than $US 20 million included damages to houses, roads and railways, bridges, hydraulic structures, loss of domestic animals, and business losses. On the Hungarian territory, a particularly notable was the flood of summer 1980, with total losses of $US 15 million, including destruction of farmhouses and large losses in agriculture.

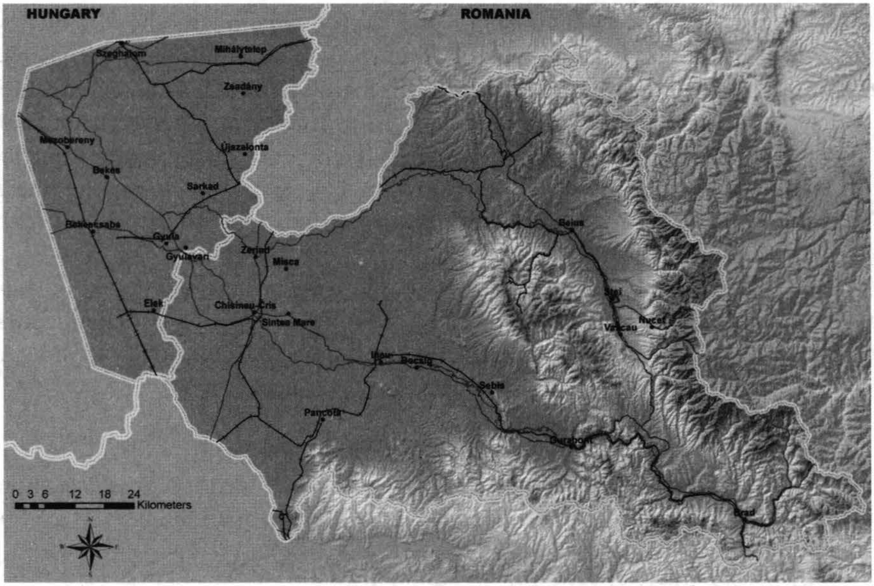

Fig. 1: Study area: the Crisul Alb - Crisul Negru - Kőrős transboundary basin, crossing the Romanian – Hungarian border.

The floodsat sub-system

Among non-structural methods, modern flood forecasting in association with real-time data collection systems have increasingly found favor with countries prone to flood hazards, like Romania and Hungary. A flood forecasting and warning system is already active in the study area. The existing system does not include a spatial component of the phenomena both in the pre- and post-crisis phases. FLOODSAT is a dedicated on-line sub-system, based on satellite data and GIS technology, for flood related geo-spatial information management. The main goal of FLOODSAT is to contribute to regional quantitative risk assessment for monitoring and hydrological validating risk simulations, in the Romanian – Hungarian transboundary test-area. Also an important result will be the preventive consideration of flood events when determining land development and the special planning of the flood-prone areas (Brakenridge et al., 2004). The main functions of FLOODSAT are:

- acquisition, storage, analysis and interpretation of data;
- management and exchange of raster and vector graphic information, and also of related attribute data for the flood monitoring activities;
- handling and preparation for a data rapid access;
- information updating (temporal modification);
- data restoring, including the elaboration of thematic documents;
- generation of value-added information (complex indices for flood prevention, risk maps);
- distribution of the derived products to the interested authorities, media, etc.

The FLOODSAT sub-system has been developed following a distributed architecture and end-users can access the system using a simple web browser (like Internet Explorer or Mozilla Firefox) to display, query, analyze and retrieve information's.

The key components of the sub-system are as follows:

Core Server: is the core component of the system since it handles the interactions between the various modules, the end-users management, the display and manipulation of data. The server-side of the sub-system application consists of a Web server and a mapserver software programme. The Web server consists of a powerful computer and software that contain information to be distributed over the Web on request from one or many clients by HTTP. As the Web server software is not able to do geo-processing, it is able to communicate with the mapserver software to pass on requests from the client for geo-processing;

GIS Database: is the component that handles all databases of the system; it stores the data and extracts data as needed;

Modeling modules: integrates the various hydrological and hydraulical models into the system; it applies the model on a defined data set, monitors the progress and the status of the processes (needed since flood models can sometimes run for several hours) and sends the results to the rest of the system.

Figure 2 presents the FLOODSAT sub-system with data flows and links with the data suppliers and end-users.

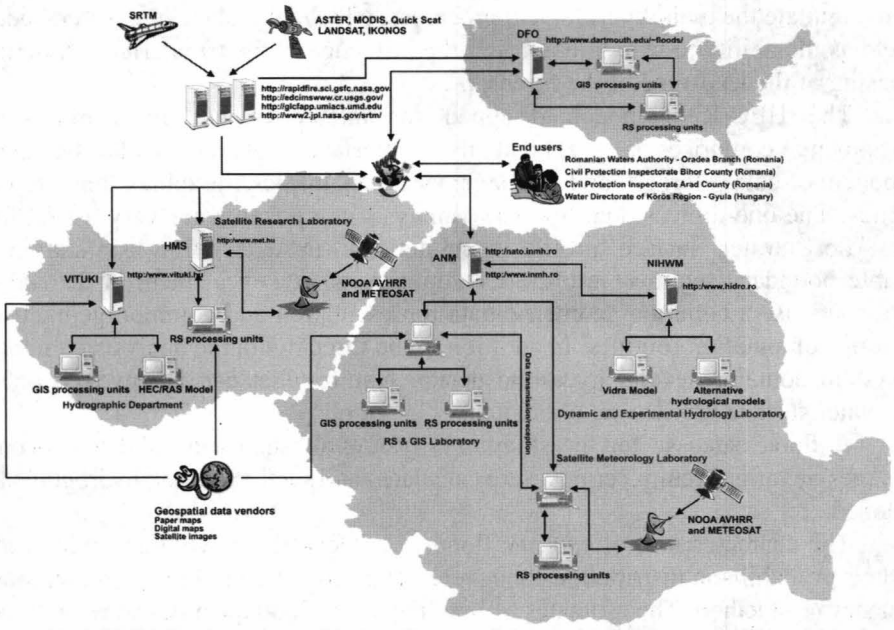

Fig. 2: FLOODSAT sub-system with data flows and links with the data suppliers and end-users in Romania and Hungary.

The preparation of the various GIS coverages has been performed outside of the dedicated sub-system through satellite images processing and analysis, vectorisation or data base manipulations. Once the various datasets have been prepared, they are stored as standard shape files in the GIS database and from then on are used as the need arises.

Two types of models are used in the project – the hydrological forecasting VIDRA model on the Romanian territory and the output hydrographs from this model will be routed in the Hungarian part of the basins by the HEC-RAS model of the U.S. Army Corps of Engineers. The VIDRA model achieves the simulation of the basin rainfall-runoff process, following the main steps: sub-basin snow-melt water estimation, using the degree - day method; computation of the average rainfall in each sub-basin, using the weighting of the rainfall and the snowmelt water data measured in the meteorological network; calculation of the effective rainfall over each sub-basin by subtraction of infiltration and evapotranspiration losses from the average water inflow, using the deterministic reservoir model PNET; integration of the effective rainfall on the hillslope and in the primary river network finally resulting in the discharge hydrograph formation in each sub-basin, using as a transfer function of the hydrographical system the instantaneous unit hydrograph; superposition of the floodwaves formed in each sub-basin and their routing along the riverbed, using a non-linear model based on the analytical solution of the Muskingum model; flood wave attenuation through the reservoirs, using the reservoir co-ordinated operation method. The VIDRA model has a variable computational step (from one to 24 hours) and is able to simulate the main hydrological processes, which take place in a watershed. This model has the ability to take into account the influence of the tributaries and permit an increasing of the lead-time of the forecast.

The HEC-RAS model, designed for interactive use in a multi-tasking environment, comprises a graphical user interface, separate hydraulic analysis components, data storage and management capabilities, graphics and reporting facilities. The one-dimensional hydraulic analysis components are very useful for the steady flow water surface profile computations; unsteady flow simulation; and movable boundary sediment transport computations. A key element is that all three components use a common geometric data representation and common geometric and hydraulic computation routines. In addition to the three hydraulic analysis components, the system contains several hydraulic design features that can be invoked once the basic water surface profiles are computed.

A flood database for the study area was established and validated, maximum discharges of various return periods were calculated and synthetic flood hydrographs were developed.

The characteristics of extreme floods, i.e., peak flows, volumes and durations, and their probabilistic distributions and were determined by the Flow (Q)-Duration (d)-Frequency (F) method. The estimates of low-frequency flood quantiles were produced by the GRADEX method, in which maximum rainfall distributions are used to extrapolate hydrometric data.

For each flood event, characteristic flows were determined, partial duration series of these variables were fitted by the exponential law, and extrapolated to lower-than-observed frequencies.

Synthesized flood hydrographs, constitute the inputs into the hydraulic models, the resulted outputs being used to establish the flood risk maps. These hydrographs consist in two segments: the linear rising limb with a time to peak $\leq$ D, (where D is the median value of flow durations corresponding to the 10-year flood peak) and the falling limb, determined from threshold discharges of same occurrence and various durations. The Synthetic Mono-Frequency Hydrographs (HSMF) are well suited to the demands of risk flood management. Deducted from $Q_L(d, T)$ relationships, the HSMF represents for a given occurrence, the succession of the threshold discharges of various durations susceptible to occur on the basin. Qd is the threshold discharge continuously exceeded during the duration d ($D/2 \leq d \leq 5D$) and T is the return period ($0.5 \leq T < 20$ years).

Construction of the GIS database

The structure of the dedicated GIS database has been planned for the study, evaluation and management of information (related to flooding occurrence), as well as for the assessment of damages inflicted by flooding effects. In this regard the database represented by the spatial geo-referential information ensemble (satellite images, thematic maps, series of the meteorological and hydrological parameters, other exogenous data) is structured as a set of file-distributed quantitative and qualitative data focused on the relational structure between the info-layers. The GIS database is connected with the hydrological database, which allows synthetic representations of the hydrological risk using separate, or combined parameters (Brakenridge et. al., 2004, Stancalie and al., 2003).

It has been decided to develop a GIS database for the whole study area of the Crisul Alb, Crisul Negru and Kőrős basins using different cartographic documents at the scale 1:100 000. The construction of this GIS is mainly based on classical mapping documents, particularly represented by maps and topographic plans. Most of the thematic layers have been extracted from this classical mapping support. Due to the fact that, in most of the cases, the information on the maps is old-fashioned, it is imposed to update it on the basis of the recent satellite images (e.g. the hydrographic network, land cover/land use) or by field measurements (e.g. dikes and canals network). The topographic maps at 1: 100,000 in Gauss-Kruger projection (zone 34) present the necessary information to serve as support for the construction of the GIS database for the whole study area.

The GIS database contains the following info-layers:

- sub-basin and basin limits;
- land topography (90 meters DEM);
- hydrographic network, dikes and canals network;
- communication ways network (roads, railways);
- localities;

- weather stations network, rain-gauging network, hydrometric stations network;
- land cover/land use, updated from satellite images.

In the Figure 3 the GIS info-layers related with the hydrographical network, the road and railways network for the Crisul Alb, Crisul Negru and Kőrős basin are presented.

The preparation of the info-layers that constitute the digital geographic information database or the geo-spatial information was achieved by:

- identification of the reference points;
- scanning of the cartographic documents (on paper);
- integration of the geo-spatial information in the thematic info-layers;
- association of attributes for different geographic objects (watercourses, meteorological and hydrological stations, villages and towns, roads and highways, etc.).

For the acquisition of the digital geographic data it has been necessary to define the specifications of the information layers related with:

- the scale of the cartographic documents or image data;
- the type of the geographic objects, which constitute the layers (represented by layers in vector, tin or raster format);
- the attributes which characterizing them;
- the file format and geographic system of coordinates.

For the most considered flood vulnerable area, situated in the plain of the Crisul Alb/Negru/Kőrős basins, limited at its Eastern part by the Ineu –Talpos Rivers and at its northern part by the Crisul Repede basin (Figure 4), a more precise GIS database was constructed using 1:5.000, 1:10.000 topographic plans and IKONOS satellite images (1m resolution).

One of the most important products obtained for this vulnerable area is a precise digital elevation model (DEM). For this purpose the shape with elevation information's extracted from individual map sheets has been merged and corrected and then interpolated to obtain the (DEM).

The interpolation methods produce a regularly spaced, rectangular array of Z values from irregularly spaced XYZ data. The term "irregularly spaced" means that the points follow no particular pattern over the map extent, consequently being many "holes" where data are missing. The interpolation fills in these holes by extrapolating or interpolating Z values at those locations where no data exists (Lee, 1980, Isaaks, 1989).

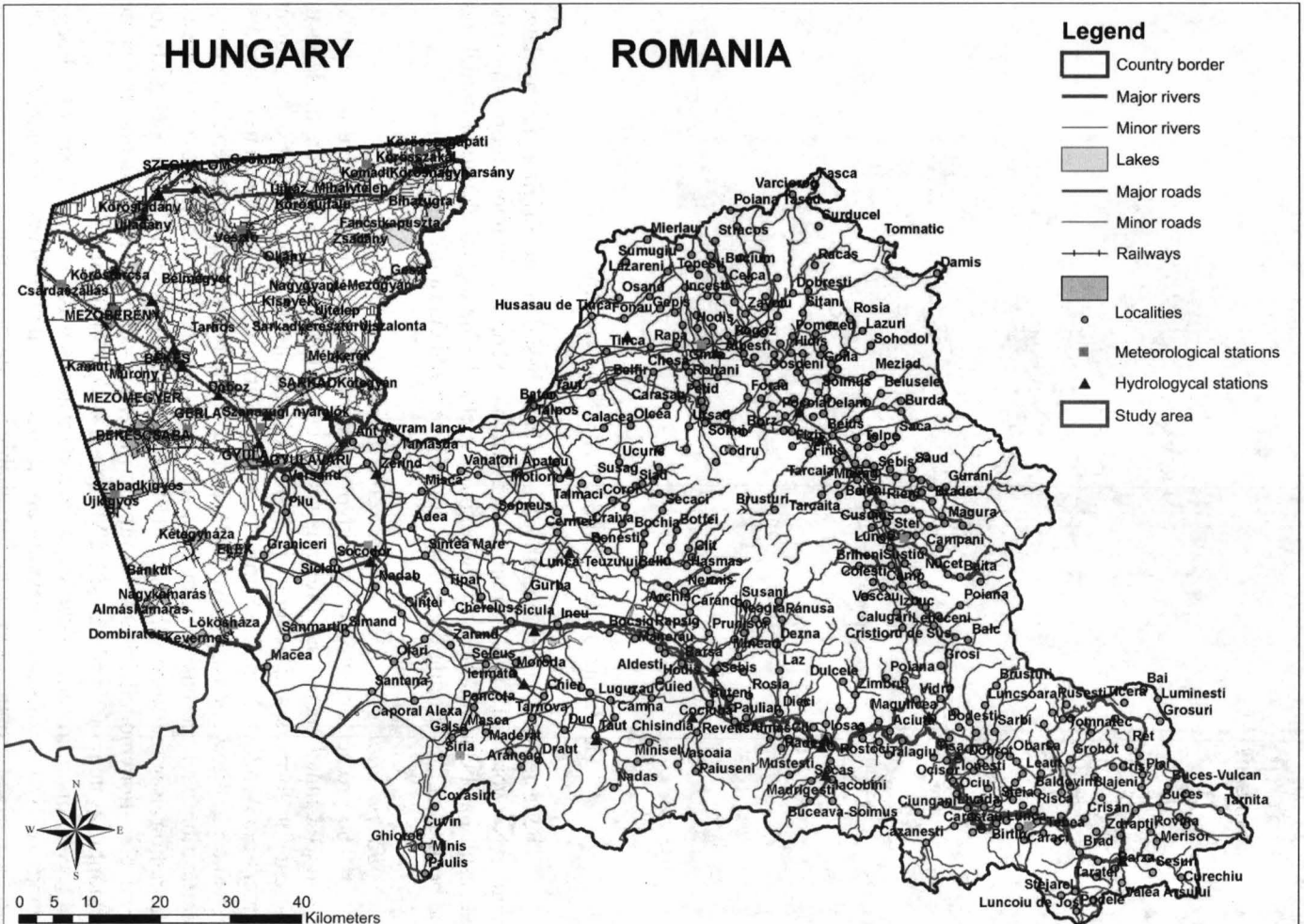

Fig. 3: GIS info-layers for the Crisul Alb, Crisul Negru and Kőrös basin

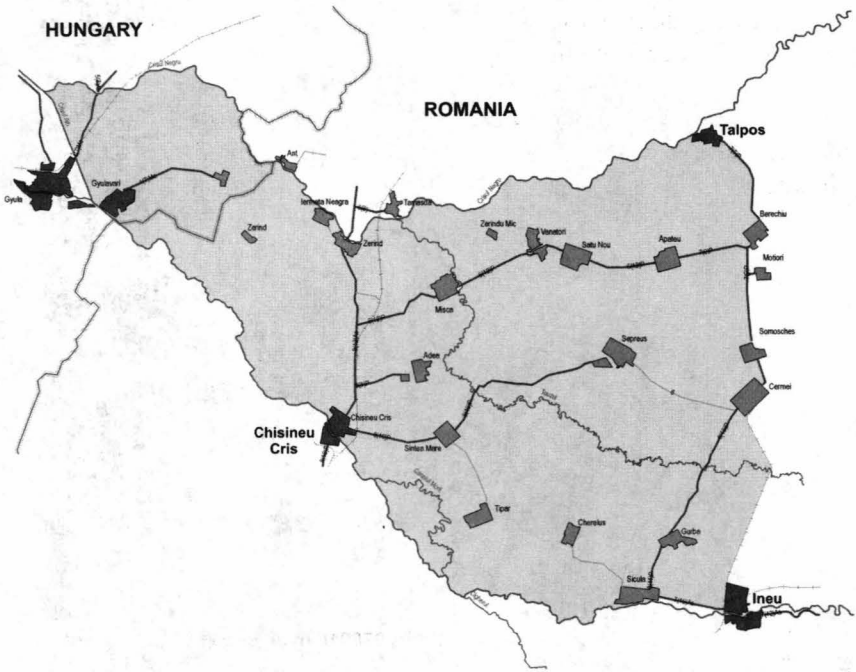

Fig. 4: Vulnerable area in Crisul Alb, Negru and Kőrős basins

The tested interpolation methods have been based on the Kriging, Triangulated Irregular Network (TIN), Minimum Curvature and Natural Neighbor algorithms. The best result has been obtained for the Kriging method. The digital elevation model has then been used for deriving the terrain slope, aspect and curvature maps.

Preparation of spatial data for rapid access

The project objectives have involved working with different types of spatial geo-data (scanned maps, satellite images, vector files, digital elevation models) in different file formats and geographic system of coordinates, processed by the project partners on Window, Linux, Solaris computing platforms and software environments. To make all the work easily available to the participants and end-users, a detailed specification package has been developed. These ensure the fact that every piece of information uses the same file format (ESRI shapefile for vector data; ESRI grids for digital elevation model; ERDAS .img for maps and satellite images) and the same geographic system of coordinates: UTM Zone 34/WGS84 (Figure 5).

At this point one of the most important tasks was to build a Satellite Image Database (SID), to gather information about the raw satellite scenes available as well as of the derived products and make it available in a simple format.

The SID has been build in MySQL and is available on-line on a server, being updated as new satellite images are acquired. Each record of the database describes the characteristics of each satellite image: platform, sensor, date & time of data acquisition, duration of pass, spectral band, coordinates of the covered area, projection, calibration, size, bits/pixel, image file format, physical location (machine, directory), origin of data, type (raw/processed), type of processing applied, algorithm used, quick-look available, cloudiness. Queries are very easy to conduct using the web interface.

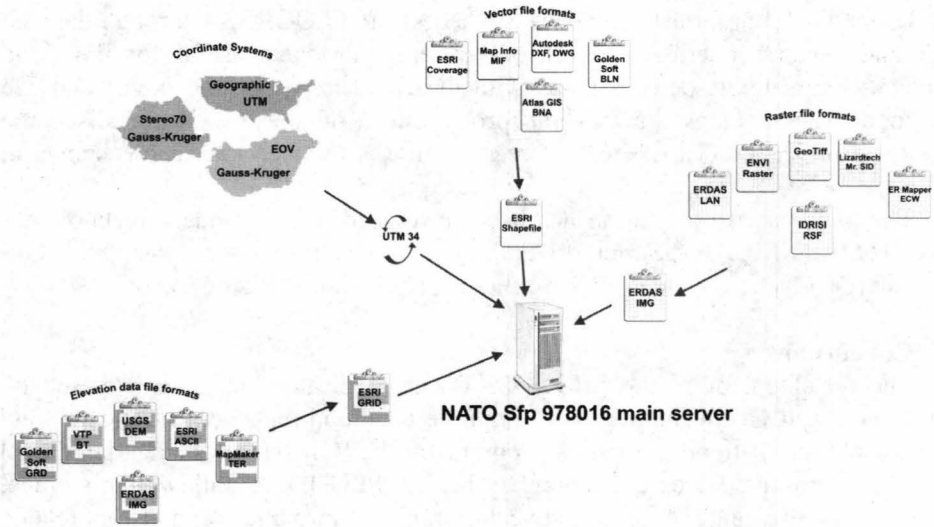

Fig. 5: Preparation of spatial data for rapid access

Spatial data dissemination

One of the most important functions of the FLOODSAT involves distribution of the project results to the participants, end-users and public. The easiest way to distribute the spatial and tabular attribute data is by setting up a FTP server where the information could be stored and accessed. From the end-user's point of view, this approach has two major disadvantages:

- when the database grows the relevant information is more difficult to find;
- the data is stored in a common GIS file format and this implies special software and training of the user for reading and analyzing the information.

Another option is to distribute spatial and tabular attribute data over an Internet Web-based network. This is a powerful and effective communication method that overcomes the disadvantages of the first approach. Thus, all interested agencies and end-users can have access to data without being a technical expert.

Viewing GIS data on the Web, generally involves a three-tiered architecture:

- a spatial server that can efficiently communicate with a Web server and is capable of sending and receiving requests for different types of data from a Web browser environment;
- a mapping file format that can be embedded into a Web page;

- a Web-based application in which maps can be viewed and queried by an end-user/client via a Web browser.

Publishing the data on the Web using this approach would not change the existing data workflow – how the data are created, maintained, and used by desktop applications (Hendry, 2004). This means that the mapserver dynamically generates maps from the files stored in a certain folder every time a user sends a request.

All hydrological and hydraulical models results are translated to maps in a GIS environment, diagrams and tables for further analysis.

Users with appropriate privileges can access the FLOODSAT through the web browser and perform queries, and retrieve different products useful for the flood management like satellite-derived maps with the flooded areas, land cover/land use maps, flood hazard maps for several probabilities of the maximum discharge occurrence, flow related charts, etc. A screen capture of the web interface is shown in Figure 6.

The Web-based application has been developed using standard technologies such as HTML, XML, JavaScript, PHP, SVG, COM and supports the Open GIS Consortium (OGC) and the Open Web Services specifications (Figure 7).

Conclusions

The development of the FLOODSAT as a dedicated sub-system, based on remote sensing and GIS technology will improve the flood management and will aid the implementation of flood mitigation programs in the Romanian – Hungarian Crisul Alb, Crisul Negru and Kőrős transboundary basins. FLOODSAT allows the storage, management and exchange of raster and vector graphic information, and also of related attribute data for the flood monitoring activities.

Data of various nature (topographic, hydrologic) and different acquisition techniques (ground survey, and satellite remote sensing) are fused and integrated in specific GIS database to be used in the different modules.

The GIS database for the study-area has been implemented at local operational hydrological services in Oradea Crisuri Rivers Authority (Romania), Körös Valley District Water Authority (KOVIZIG) in Gyula, (Hungary) as well as at the District Inspectorate for Emergency Situations - Bihor and Arad in Romania.

Some of the key characteristics of the FLOODSAT are that it is a web-based with a distributed architecture system. The information communications from the core server (located at the National Meteorological Administration in Bucharest) to the end-users in Romania and Hungary use the FTP or the e-mail for the simple mail transfer protocols to upload and download data and other geo-spatial information. Visualization capabilities have been implemented and end-users can observe the results in terms of graphs, tables, maps, etc on the web or can download them for further analysis.

This dedicated information sub-system will contribute to regional quantitative risk assessment (using flood hazard and vulnerability characteristics) for monitoring and hydrological validating risk simulations. An important result will be the preventive

consideration of flood events when determining land development and in special planning of the flood-prone areas.

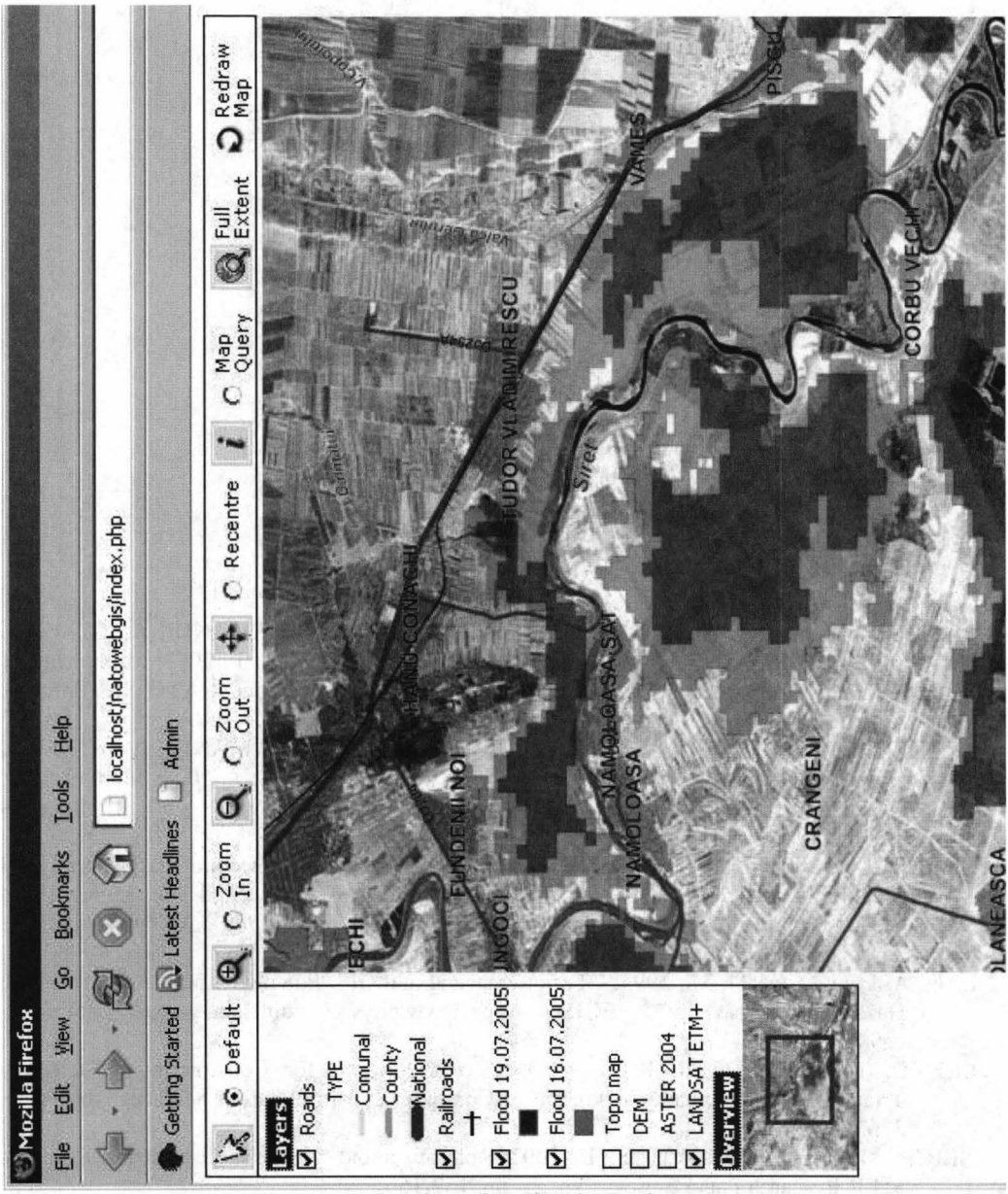

Fig. 6: Web interface of FLOODSAT sub-system

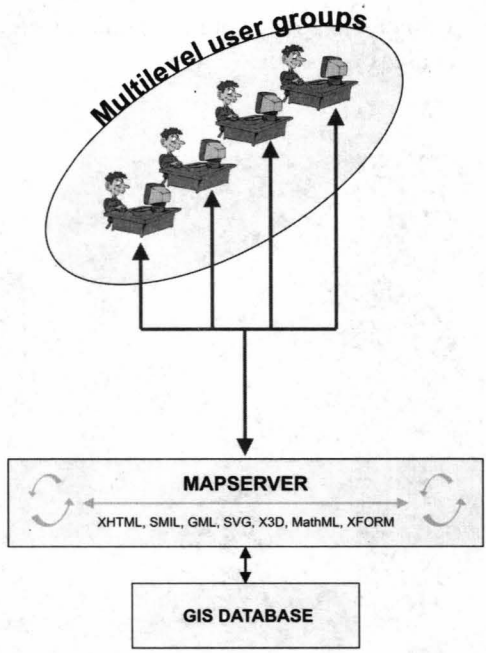

Fig. 7: Spatial data distribution over the Internet

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STRUCTURAL-AESTHETIC ORGANIZATION OF RURAL-AGRICULTURAL LANDSCAPE AND ITS MIRRORING IN THE PERCEPTION OF RURAL POPULATION IN THE VILLAGES BETWEEN TĂŞADULUI HILLS AND PĂDUREA CRAIULUI MOUNTAINS (ROMANIA)

Iulian DINCĂ [1], Dana SALA [2]

Résumé: L'organisation structurale-esthétique du paysage rural-agricole et le reflet de sa perception par la population rurale des villages entre Les Collines de Tăşad et Les Monts Pădurea Craiului (Roumanie). Acception comme part d'un potentiel programme national de naissance de la conscience et d'éduquer l'inclination de la population pour tourisme, disposée pour la valorisation du potentiel paysager, cet étude socio-géographique oppose le pour et le contre les termes d'une réalité géographique, aussi les éléments de définition spécifique aux individus ruraux, les deux étant subordonnés à la perspective du paysage rural-agricole. Basé sur l'interview des sujets de quatre villages en s'appuyant sur un questionnaire, résulte un mosaïque d'idées, rédactions et orientations, mais qui rendent le genre de l'architecture et de l'influence esthétique du proche paysage, correspondant au niveau culturel, a l'éducation et à leur âge. Au point de vue patrimonial, la plupart des sujets ont compris le paysage de leur village comme résultat de l'engrenage élémentaire, simple, de quelques composantes (en prévalant la végétation cultivée et les formes environnantes de relief), un surplus de fraîcheur et de soin à la jeune population. En compensation, surprend la manque presque permanente en ce qui concerne la nominalisation du champ labouré, des terrains agricoles en général, part d'inventaire patrimonial de leur paysage. Au point de vue fonctionnel-esthétique, le paysage rural-agricole d'interférence colline-montagne est perçu également de la population locale par l'entremise des attributs qualificatifs ou par des formules orales appropriées, aussi souvent en comparaison avec des modèles paysagers considérés impressionnants. Même si on remarque aux ruraux indigènes un bon goût pour beau et esthétique, ils ne font aucune référence aux éléments d'image appropriés au relief et pour usufruit agro-cénologique de leur paysage. Il y a encore des opinions qui s'orientent vers une certaine personnalisation du type de réflexion au sujet du fonctionnement et de l'aspect esthétique du paysage rural-agricole, sans tenir compte des critères employés en enquête.

Mots-clé: enquête socio-géographique, villages, perception, population rurale, paysage rural-agricole.

Key-words: socio-geographical survey, villages, perception, rural population, rural-agricultural landscape

1. The Grounds of the Study

The present study carries forward the in-depth analysis of the set of opinions expressed by rural population from two morphological units hill-mountain type, regarding the way landscape is viewed (Dincă, 2004, 2005) on the basis of a modern and broad method of inquiry (Dincă, 2007). Data collection and processing about how rural inhabitants perceive their landscape(s) interests us insofar as national programs of various orientations can be constituted (Luginbühl, 2001) or subsidization with a tangible outlet in making the most of rural-agricultural landscapes in rural tourism,

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ecotourism, cultural tourism and theme tourism. By resorting to analyzing the opinions of the inhabitants, the level of structural-functional architecturing and the aesthetic organization of the landscape in the village of the interviewees become displayed to the researcher in a frank way, without pretences or sophisticated formulations. Comparing the opinions with the real situation of the landscape(s), the researcher can assess the level of interviewees' perception and can submit training schemes so as to educate and motivate those in charge of bringing out local landscapes in tourism. In the countries with a former socialist agriculture, greater ecological consciousness will require re-education for all users of the landscape as well as more adequate land-use documentation to ensure that business intentions are properly harmonized with the landscape potentials of the area (Turnock, 2003).

2. Geographical localization of the case-study site

The research has been focused on hill-mountain interference area situated in the West of Romania – fig. 1 (contact between south-eastern part of Tăşadului Hills and part of north-western facade of Pădurea Craiului Mountains), also because of the proximity of this area to the two polarizing urban centers (Oradea municipality and the town of Aleşd, both less than 30 km away), which could have possibly influenced the optics of the rural focus group of inhabitants. (fig. 2). The reasons for the choice of this site are: the accessing of physical features and of anthropic usage of the two forms of relief and the certain aspects derived from the inhabitants' local customs and mentality. The study-site comprised four villages, framed with their hearths and estate in the interference landscape area, regardless their administrative allegiance (fig. 2). To the village of Copăcel belong the settlements Poiana Tăşad, Surduc and Bucuroaia, whereas to the village of Vârciorog belongs Şerghiş.

3. Research Methodology

The results were obtained by applying a specially conceived questionnaire (I. Dincă, 2007). Based on it, a socio-geographical survey was undertaken, allowing us to know how the respondents view the landscape and utilize its resources. The manner of collecting data has respected the sociological canons, meaning that the subjects were chosen regardless their age, sex, education and level of general knowledge. 56 questionnaires were used, every fifth house being selected, where nobody lived in that house, we went to the following. The demographic size of the village was important; the questionnaires were distributed taking this into account, too. Another part of the present study was constituted by the field data collection, obtained according to the specific principles and stages of work pertaining to physical and human geography. As stated by Karl F. Nordstrom, a continual reinterpretation of conceptions, methodologies, and ethical contexts of landscape use and perception is required by the very process of landscape evaluation over the years (Nordstrom, 1993). The cartographic support in our study is displayed as maps drawn with ArcGis 9.2 – ArcMaps.

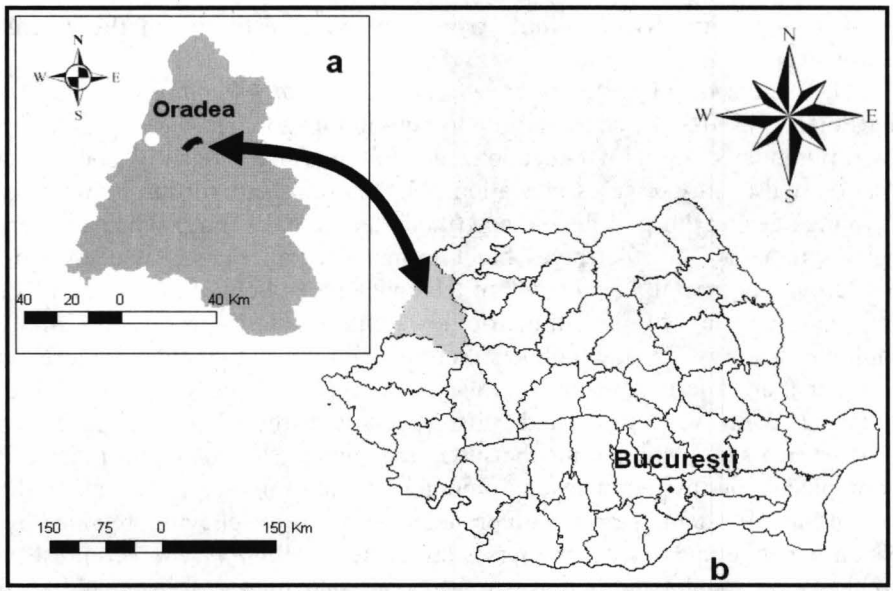

Fig. 1: Geographical localization of the research-site within Bihor County (a) and within Romania (b)

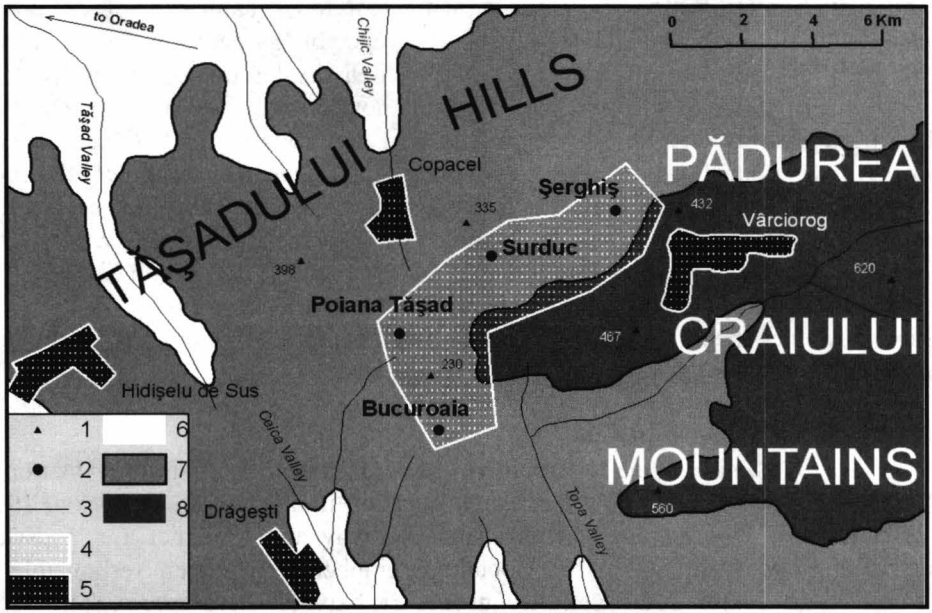

Fig. 2: Physical units including the site of research: 1- altimetric quotas; 2 – settlements of research; 3 – permanent water courses; 4 - analyzed interference landscape; 5 - villages; 6 - plain step; 7 - hilly step; 8 - altimetric lowered mountain step

4. Geographic details about structuring and aesthetics of the researched landscape area

The analyzed villages *have a reduced number of inhabitants,* about 200-600 people (Poiana Tăşad and Bucuroaia), up to 500-600 inhabitants (Şerghiş and Surduc), with a differentiated level of education and culture (predominantly poor access to information and apathy towards education), showing a disproportion between groups of the young age and those of the old age (the latter are prevailing). The slow versants, with glacis remains, the interfluves blunt forms, with alternance of deep and large valleys define the general *morphology* of the contact area between medium hills (200-300 m) and the step of the altimetric lowered mountain (under 500 m). Other morphologic features for the helmets Şerghiş and Surduc (situated more on the northern part), are a large corridor of valley with versants inclined to 7-8° up to over 20° (photo 2), with wave slides and cells especially at their left, altering 2-3 terrace levels or terrace shoulders. As for the little settlements Bucuroaia and Poiana Tăşad, they are placed on two immense promontories, interfluves, and separate through erosion, in East, West and North, with pronounced fronts of relieving, retained by little valleys on which temporary water courses are centered. *The land use* is represented by the arable land used for cultivating straw cereals and maize, as well as hay fields. There is also a closed forest of quercinea in co-dominance with beech trees, few orchards, un-modernized roads, villages with individual habitat displayed at the highway or on almost perpendicular streets. The vegetable gardens, the cereals and the hayfields follow a certain order, in the sense of their display on rectangular patterns, mostly in the direction of the level curves for the northern villages Surduc and Şerghiş and in a longitudinal direction for the villages on the western façade (Bucuroaia and Poiana Tăşad – photo 1). From an aesthetic perspective, we witness the configuration of a captivating landscape, vigorous, full of energy and peaceful, all these features being rendered by vision axis and depth angles with appreciable values, with the main attraction elements well defined as volume, and as frame (Şerghiş and Surduc), then also by the often changes of landscape planes and structural axis, through ordering and harmonizing the space placement of the fundamental and auxiliary components (Bucuroaia and Poiana Tăşad).

5. The obtained outcome

The outcome of the quantitative research into the visual evaluation of landscape shifted the nature of the research question in a subtle way (Burton, 1999). Researchers now focused on questions such as 'why and for what are landscapes valued?' and 'who values them?' Social geographers have been responsible for developing and adapting different techniques to explore these issues. The social, cultural and heritage values of landscape have been investigated using qualitative methods adapted from sociology, anthropology and cultural studies (Ibidem: 239). According to the undertaken theme of this study, i.e. the structural and aesthetic organization of the local landscape, a set of opinions and orientations are inosculated

by means of the received responses. A relevant vision of the image and judgment people have about the landscape surrounding them emerges.

The following were taken as criteria for analysis: 1. *the age of the subjects;* complementarily, there are also taken into account factors like education and the objectivity of the subjects given by information sources and their access to intellectual orientation, 2. *the pertinence of the subjects to a certain administrative entity (the analysis on villages).*

Photo 1: Hilly landscape area slowly sloping with garden hay fields, arable land lots and hedges

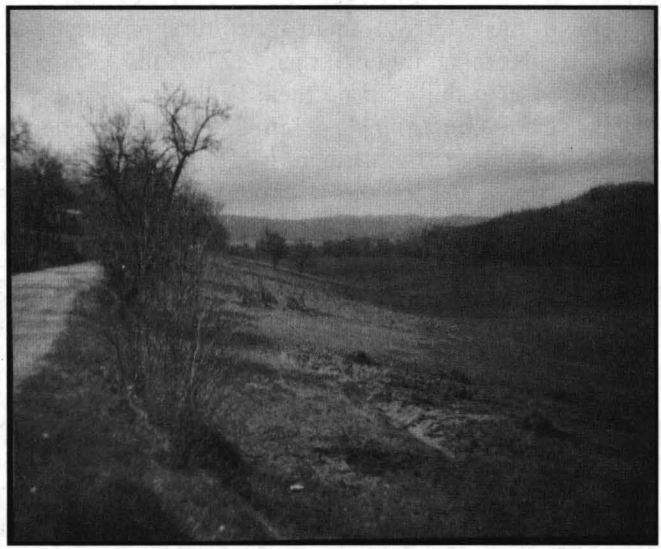

Photo 2: Landscape ensemble of river meadow and low hill interference utilized in agriculture and rural transport

5.1. Question types and their responses

Landscape models are, by definition, spatially explicit (Constanza, Voinov, 2004). In order to achieve the aims of the issues raised in this study, three questions of the questionnaire were addressed. The first question is placed number 5 in the questionnaire (*Which part -element, component – **of what you call landscape** do you find as the most important in the landscape ? Are there more elements, objects, parts equally important?*), whereas the second analysis deals with the questions placed under the number 6 and 7 in the questionnaire (*Does the attractive, beautiful, spectacular landscape mean something farther away from home? In what way?* and *Is there something beautiful that you would fit into your home landscape? Or is your home landscape the dream landscape?*).

5.1.1. *Which is the most important component of the landscape? Or are there more elements, objects, parts, equally important?*

5.1.1.1. Analysis of responses on village level

The state of responses about the structure of the landscape components in the researched villages is relevantly different, but also shows similarities from one entity to another:

- For **Şerghiş Settlement** (fig. 3) the interviewees responded in equal and majoritary percentage (33%) about components classifiable in the morphology section (the interviewees respond as follows: "*the form of relief*; *the mountain*; *the emplacement*; *the valley*; *the plane*"; the answers point to the natural land attachment of the interviewed) and in the land use section(the subjects give answers such as "*forest*; *agricultural land for cultivation*; *natural vegetation*"; the explanation of these answers resorts to the belonging of the elderly group to agricultural or forestry activities). Those with generalizing opinions form an important part, (27%) answering: "*all components*" denoting a good knowledge of the intimate local landscape by the youth. The rest of 7% give irrelevant answers „*I don't know*", pointing to their unacquaintance.

- For **Surduc Settlement** (fig. 4) there is a proliferation of opinions about the structure of their landscape, most of the interviewed (40%) showing through their answers preferences for land use section (the subjects give answers such as: "*forest and vegetation*", the explanation being the attachment of the subjects for the vegetation part of the landscape). Through the two groups with 20% of all answers, the people in Surduc differentiate from the people in Şerghiş, although the geographical conditions are almost similar. Thus, the subjects responding: "*forest and valley*; *trees, grass and valley*; *the plane and the wheat field*" rank at morphology + land use (explanation: they come from a landscape ambiance increasingly complex, perceived by them as such) and irrelevant or fantasy responses (responses such as: "*the life*; *the ozone*; *the humaneness*"; explanation: the poor education level of the subjects). Scant percentage, 6-7% of all respondents have answers which rank at category morphology (answers focused more on the element „plane"; explanation: the subjects size in the relevance of a valley sector with a large water meadow, in the form of a plane), generalizing

opinions (such as: "*water, wood and water*") and the element-built-by-man responses (answers such as "*the church, the community cultural centre and the school*", having as explanation the relevance of the buildings as institutions-providers of education and culture and their position in the landscape).

- For **Bucuroaia Settlement** (fig. 5) the majority of interviewees (58%) favor the category of land use (the subjects give answers such as: "*the forest*; *the agricultural land for cultivation*; *the orchard*; explanation: the primordial importance of these components as perceived by the interviewees). An important class of subjects (21%) stop upon answers includable in morphology (such as: "*the shape of the land*; *the valley*; *the plane*; explanation: the awareness of their belonging to a form of relief) and irrelevant or fantasy answers (16%) (such as: "*the sun*; *the seasons*; *no answers*. Explanation: lack of education and excessive religiousness of the elderly and very elderly). The least of responses (5%) can rank at generalizing opinions with answers such as: "*all components*". Explanation: the youth have good knowledge of their intimate landscape area.

- For **Poiana Tăşad Settlement** (fig. 6), after interpreting the responses, the result is a better engagement of the respondents within the entirety of the local landscape area. Therefore, the first position is divided between three categories of components joined in answers about morphology + land use (42%, where the subjects answer things like: "*beautiful plane and forests*; *hills, forests and rivers*"; explanation: the subjects size in a more complex ambiance, but, at the same time, the emplacement of their habitat allows them to recognize the highly-ranked elements of landscape image); morphology (29%, where respondents say: "*the hill*; *the mountain*"; explanation: their special interest for the surrounding forms of relief as recognized parts of the local landscape); land use (29% of respondents answer: "*forest*;" explanation comes from their attachment to the forest and their closeness to it).

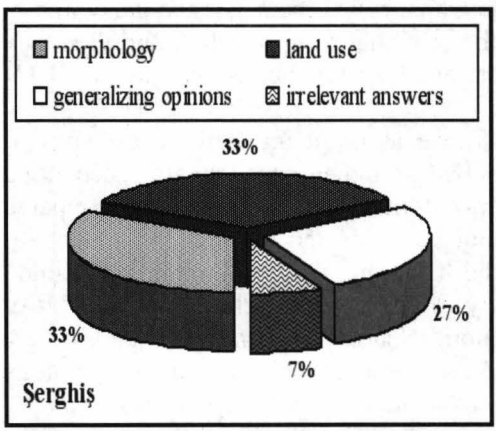

Fig. 3: Percentage of opinions of Şerghiş inhabitants about the structure of the components of their landscapes

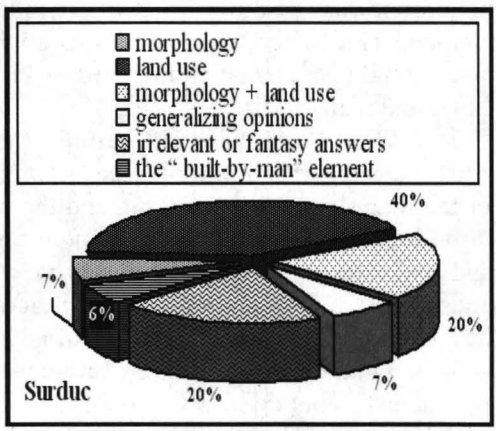

Fig. 4: Percentage of opinions of Surduc inhabitants about the structure of the components of their landscapes

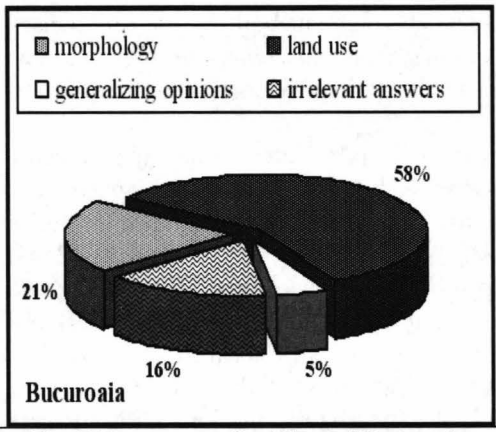

Fig. 5: Percentage of opinions of Bucuroaia inhabitants about the structure of the components of their landscapes

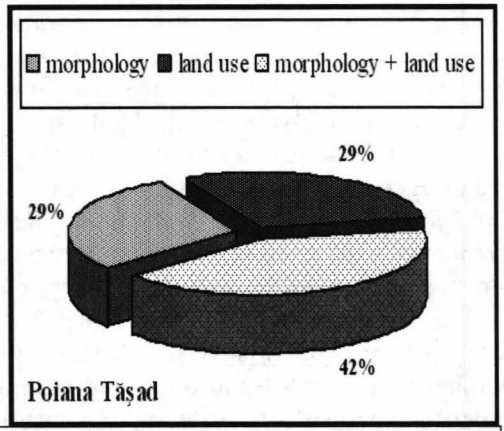

Fig. 6: Percentage of opinions of Poiana Tăşad inhabitants about the structure of the components of their landscapes

5.1.1.2. Analysis of responses on the level of age-groups

- **The age group of 18-year-olds and younger** (fig. 7) situation of responses is relatively simple, reflecting the youthful specific perspective of their landscape. Therefore, the opinions about morphology (the subjects live in the center of the settlement, they define the physiognomy of the relief through fragmented forms, they are well informed about it from literature, novels, documentary broadcasts on TV) and land use (the subjects are rather discrete people, poor culture and education mainly through TV shows, radio and pulp fiction, with rather isolated habitat) divide between themselves the 25% percentage groups. The majorities are generalizing opinions (50%) with responses such as: "*the forest, the house, the water and the valleys*". The reason: the interviewees live in the part of the village which offers them a visual panorama of components mélange, with line forms after the proximal form of relief, and then they have a good documentation imposed by history and literature books, they watch all TV shows and many films.

- For **19-45 year-old group** (fig. 8) we assist at an increase of types of structural categories of their landscape, as resulted from their questionnaire, accounting for the maturity of their thinking and the extra-information they possess, as compared to the previous group. This time, more opinions are directed towards components of land use category (32%-the subjects view the landscape mainly through agricultural lands, forest, which shows their main activity at their age, the closeness to forest of their habitat, the intermediate level of education). Nearing as number (18-23%), there is an important part of opinions pronounced for elements includable at: morphology (the subjects point directly to the form of relief the subjects "*hill, emplacement, valley*", fact explainable through their level of studies, and their knowledge of the impact of the form of relief on the configuration of the proximal landscape; morphology + land use (the subjects respond: "*hills, forest; forest and plane*"; explanation: a more serious

propensity of the population under 35 to know the phenomenon of interference between relief and vegetation); irrelevant or fantasy answers (such as "*what men like*; *the ozone*"; explanation: poor education level and the frailty of their value systems). The least of them, 9% of all, orient themselves towards generalizing opinions about the componential structure of the landscape of the interviewees. The explanation: they have a higher aesthetical perception and art tastes sufficiently elevated, (reading, writing, show, TV, and others) and they can appraise the landscape ambiance.

- The group of interviewees **aged between 46-60 years** (fig. 9) expresses „another settlement" of the answers compared with the other interviewed groups, reflecting a sustained maturity. The majority of opinions (31% of all) can be grouped in morphology + land use, with answers: "*beautiful planes and forest*" etc. Explanation: the respondents are situated in a geographical frame with combined elements, therefore the subjects let themselves influenced by it. One fourth of all answers belong to the categories: morphology (the subjects designate directly the form of relief "*mountain*; *hill*; the explanation being given by the special training and degrees of the subjects in agriculture and forestry, or by a deep sense of appertaining to the places) and land use (with the dominance of vegetal element in answers such as: "*the forest*, *the flowers and the trees*", etc., the explanation coming from the fact that the subjects are more in touch with their sensitive side due to religious readings and soap operas). The fewest are the answers of generalizing opinions (ex. "*vegetation, buildings and monuments*", etc.; explanation coming from a better education of the subjects, with notions of architecture and literature) and irrelevant answers, explainable through the very low interest of some interviewees for information and for studies.

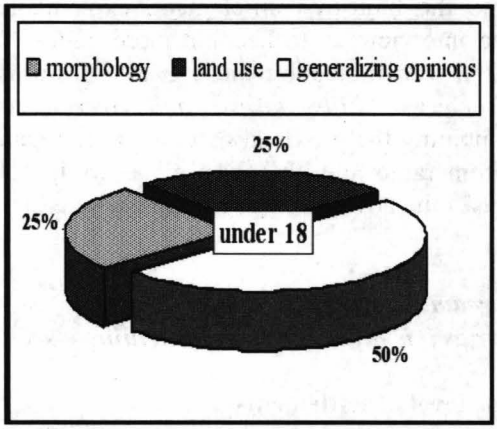

Fig. 7: The percentage of opinions of the subjects younger than 18 about the the structure of the components of their landscapes

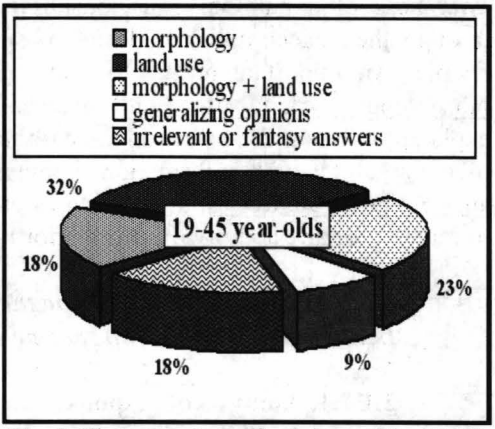

Fig. 8: The percentage of opinions of the 19-45 year-olds about the structure of the components of their landscape

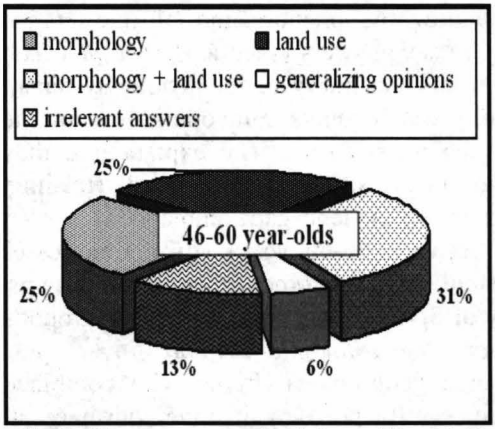

Fig. 9: The percentage of opinions of the 46-60 year-olds about the structure of the components of their landscape

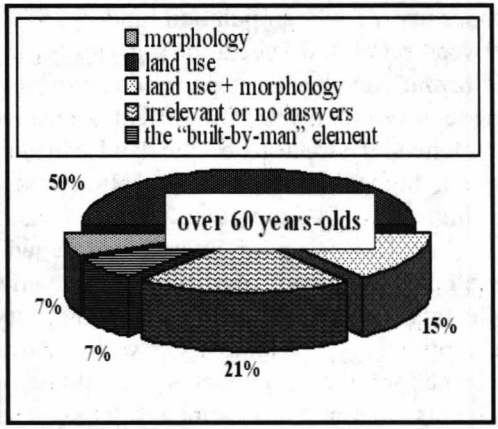

Fig. 10: The percentage of opinions of the 19-45 year-olds about the structure of the components of their landscape

- For the group of **over 60 year-olds** (fig. 10) there comes first the group of responses suggesting a certain type of attachment on land use (50% of total), with answers such as: "*the forest and the flowers*; *beautiful green field*". Explanation comes from the importance of the wood to this group and their feeling of attachment to it. Almost insignificant (7%) are the intentions of subjects expressed through modalities includable in morphology (through nominating an oronym, for example the Hill of the Cornel Trees, the explanation being given by a propensity towards story-telling and awareness of a national consciousness) and the built-by-man-element, explainable through the unaccomplished desire of some interviewees to become more educated people. An important array (15 and 21%) is constituted by those biased towards morphology + land use (with answers such as: "*hills, forests and rivers*", as explanation being the effect of mentally combining the proximal natural environment of their habitat with information coming from radio and TV), as well as irrelevant answers or no answers at all (having as excuses the advanced age together with a lack of interest for any activity of information).

5.1.2. *Is your home landscape the dream landscape? Is it attractive, beautiful, spectacular as it is or does it need something else?*

5.1.2.1. Analysis of responses on the level of settlements

The manner of respondents to show how acquainted and how attached they are to their landscape is coated in different forms, without always having ties dependent on the settlement and on geographical-sociological conditions. Therefore, the answers in the aesthetic categories can be divided as follows:

- For **Bucuroaia Settlement** (fig. 11) the biggest share of opinions (63% out of total) focus on the so-called type of constancy or local patriotism, the answers coming

from the groups of over 60 year-olds and 46-60 year-olds). A third of the formulated opinions (32%) focus on discontent or other expectations type of expression, with answers coming mostly from the young and very young groups of population, with more refined expectations about the beauty and spectacularity of the landscape. The least of all (5%) are includable in the group defined by apathy, answering "*may it be better for us*", coming from an isolated group, without too much education or information.

- For **Poiana Tăşad** Settlement (fig. 12) the situation of opinions expressed about the aesthetics of the landscape is biased in a great percentage (57%) towards utterances of idyllic opinions (answers coming from a mixture of individuals, with an absolutely admirable location of their habitat, and with a surprisingly good level of information through mass-media). The rest of percentage is divided between opinions expressing discontent or other expectations (participation of 14%, the answers coming mostly from the group of the elderly, with little travelling and weak connections to the exterior of their place) and constancy and local patriotism (with participants of 29%, where most answers come from elderly and very elderly, people finding satisfaction in their attachment to the beloved places).

- For **Şerghiş Settlement** (fig. 13) the primacy regarding the manner of expressing the aesthetic level of the local landscape is given by the opinions ranked at constancy or local patriotism (47%, the answers come mainly from the group of the elderly and the group of very young, both deprived of instruction). The young and adult group of population, being in touch with landscape other than their home environment, expresses discontent or other expectations, 33%, whereas the rest of the interviewees in this village express themselves about the beauty or attractiveness of the landscape through apathy or idyllic opinion.

- For **Surduc Settlement** (fig. 14) orientation of opinions is rather different, especially through how much they account for (40% out of total answers), the two categories of 40% being rather antagonist regarding the significance given to the aesthetic expression of the landscape. Thus the group of the elderly, with reverberation on their freedom and the amiability of life in their local landscape area) express the idyllic opinion, while the group expressing discontent or other expectations is made of young and very young people, educated, with frequent contact with real and virtual world). The rest of 20% of all answers are given by subjects of young age, rarely adults. They pronounce for constancy or local patriotism.

5.1.2.2. Analysis of responses on age-groups

At research questions 6 and 7 from the questionnaire, the subjects, grouped on age categories, presented a different facet of landscape comprehension from an aesthetic point of view, according to their position in life and career, assisting to a simplification of the ways in which the specificity of the aesthetical aspect of configuration is shown.

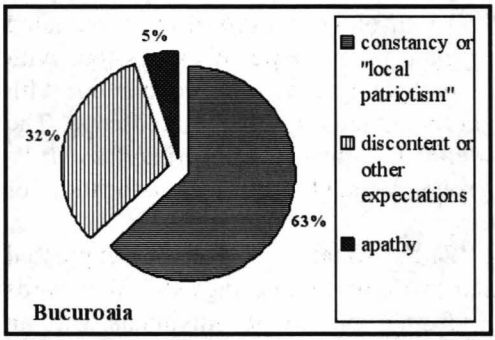

Fig. 11: Modalities of aesthetic expression of landscapes in the opinions of the interviewees in Bucuroaia

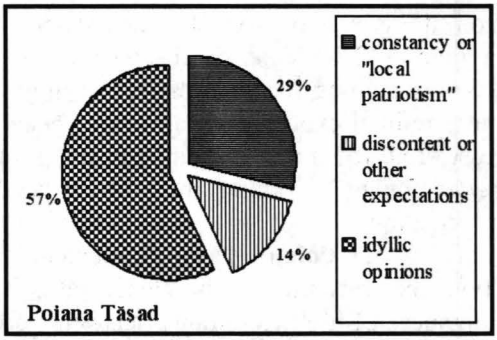

Fig. 12: Modalities of aesthetic expression of landscapes in the opinions of the interviewees in Poiana Tăşad

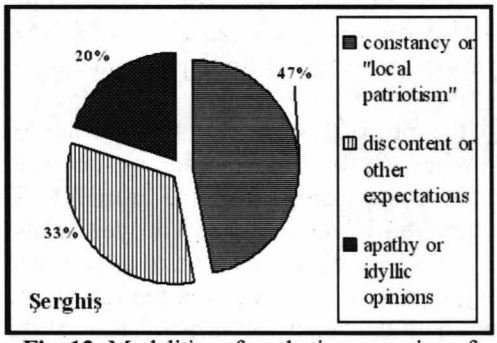

Fig. 13: Modalities of aesthetic expression of landscapes owing to opinions of the respondents in Şerghiş

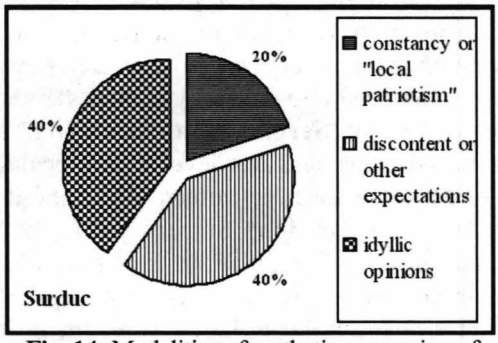

Fig. 14: Modalities of aesthetic expression of landscapes owing to opinions of the respondents in Surduc

- For the interviewees **younger than 18** (fig. 15) there is a uniformity of answers regarding the aesthetization of the landscape, expressed in the category of discontent or other expectations, the subjects responding: "*there are other more beautiful landscapes*; *what we have here are only hills; landscapes should have mountains and fir-trees and fish*".The explanation comes from their connection with new requirements for education and culture from the youth and their easier outlining of a landscape as complete from componential, organizational and aesthetic points of view.

- The group of respondents **between 19-45 years of age** (fig. 16) displays the same uniformity in what they convey, with the difference of bringing two extra categories where their perception about the attractiveness of their landscape is formulated. So, 55% of the interviewed answer at the category constancy or local patriotism: "*I am satisfied with it, I was born here*". Explanation being given by a good level of education, of information through radio and TV and of possibilities to compare with other places). The rest of 45% of the opinions belong through theme to the category of discontent or other expectations (the subjects respond: "*There is always*

something that could be done to beautify the landscape; I would like to live in the city, this area is dry"). Explanation: a more profound integration in the systemic comprehension of local components of the landscape or landscape components from other areas, as a consequence of a better education (mass-media, TV) and of more intense ties with the city (2-3 times a week), as well as of a desire for emancipation.

- As for the group of respondents **aged between 46-60** (fig. 17) there is the same simplicity in categorizing the judgments on the beauty and attractiveness of the landscape proximal to the subjects. Through the 81% out of total of oral formulations of opinions of this array, there is a clear generality in stating constancy and local patriotism (the subjects attest that: "*there is nothing more special than here; this is the landscape*"). Explanation: an intermediate level of education, the feeling of belonging to the village by birth, strong memories and family and land ties of the interviewed. Only 19% out of the total interviewees – people with a more acceptable level of education, with frequent contacts with the civilization of the city (once-twice a week), with skills of getting information and culture through different channels – manifest their taste for the attractiveness and beauty of their landscapes in terms of discontent or other expectations. The subjects answer: "*there is no beautiful landscape here; if only there were mountains here, or delta, or if Poiana Braşov Resort were closer*".

- For the group of subjects **aged over 60** (fig. 18), despite the acknowledged limits in their judgments of the landscape, it is to be noticed a simple yet consistent mental universe of the way landscape can be marked through attractiveness. 64% of all opinions for this array state constancy, the subjects respond that: "*Here it is where I like to be, I like everything that is near my house*". The answers denote habitude, a type of conservationism, and also incongruence, because the questions 6 and 8 of the questionnaire aim at the following places for landscapes: *"mountains, forest for picnic, mountains covered with snow and fir-trees"*. Other 29% dof the interviewees see their landscape as beautiful, interesting, but they are mentally focused on phantastic landscapes, the explanation being given by the lack of education, apartenece to a strict religiuos group, their way of thinking: "*let it be like in heaven*", or "*I can't pronounce*", they emphasize the idyllic opinions category. The last 7% of the respondents think the aesthetic dimension of their landscape in terms of apathy. They respond: *it's common*. They show flaws in education and inclinations towards cheap literature.

6. Conclusions

Visual vocabulary in designating landscape is an important tool in managing the environment (S. Bell, 2004) since the actions of both inhabitants and landscape-planners affect landscape. Analyzing the results of the interviewing the rural inhabitants of contact area between Tăşadului Hills and Pădurea Craiului Mountains about the structural and aesthetical organization of the landscape(s), several relevant aspects are to be inferred:

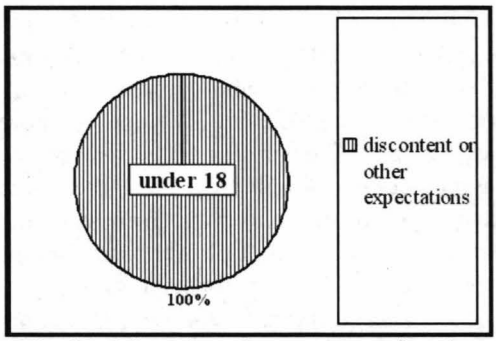

Fig. 15: Orientation of answers regarding the aesthetic organization of landscape, given by the under 18 group

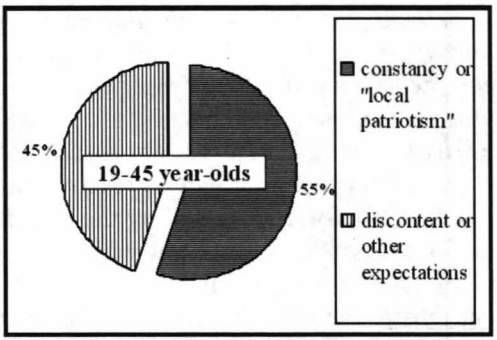

Fig. 16: Orientation of the answers given by the 19-45 year-olds about aesthetic structuring of the landscape

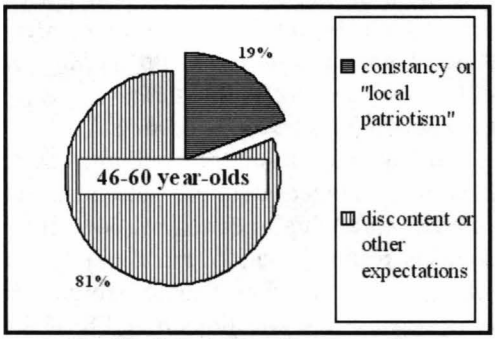

Fig. 17: Orientation of answers given by the 46-60 year-olds regarding the aesthetic structuring of their landscape

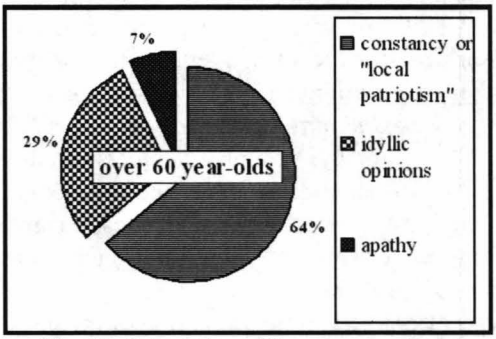

Fig. 18: Orientation of the answers given by the over 60 year-olds about aesthetic structuring of the landscape

- Even if our expectations of a rigorous analysis of the set of components in the landscape are not fully met by the respondents, we can say that from a structural point of view, the landscape of the interviewees is characterized best by people in Şerghiş and Poiana Tăşad. This can be due to the set of components admitted as satisfactory by the respondents, or because of their stronger knowledge about nature and landscape implicitly. As for the same analysis distributed on age-groups, there is a more serious and accurate perception of the group between 46-60 and a weaker perception of the group under 18, as a natural consequence of the difference between the level of information and life experience. Overall, although there are responses speaking about forms of relief (mountains, plains, hills), the structural configuration of hill-mountain interference landscape is not as obvious in the perception of the respondents as we would have expected.

- From an aesthetic point of view, we assist at a suprinsing interest for the exploration of aspects of attractiveness, beauty and attachment to the values of landscapes pertaining to the respondents, even if they do not always name specifically what we expect as researchers (especially the elements of image which can draw

accurately the aesthetical features of the landscape). Almost all age-groups have high and very high values at formulating constancy and local patriotism. Even the idyllic opinions or the discontent as type of aesthetic expression of how good resources for improvement and information. At the level of analysis on villages, the most aware of their surroundings are the respondents in Surduc and Poiana Tăşad.

- Although the overall level of education and access to culture of the interviewees in the researched villages is not very high, there are hopes that in the near future things will be improved. By means of environmental assistance and management, of training schemes for rural inhabitants, the process of European integration shall find enough subjects ready to make the best of their tourist landscape potential.

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HABSBURG GEODETIC AND CARTOGRAPHIC ACTIVITIES IN THE OLD ROMANIA

Timár GÁBOR[1]

Abstract. The Habsburg military cartographic survey (Militär-Geographische Institut) carried out the major surveys outside of the Habsburg Empire in the Old Romania. In the frame of the First Military Survey a 20-50 kilometer wide stripe was mapped around the Transylvanian border of the Empire, providing the first systematic topographic surveys of these areas. During the Crimean War, the Austrians occupied the Danube Principalities, and the MGI obtained a good opportunity to work in these territories. Between 1855 and 1857 a whole triangulation network, consisting several hundred first- and second-order base points were developed from the Carpathians and Transylvania to the Danube and the Black Sea. The paper gives the main metadata of this survey, the Molodensky-type displacement parameters of the network on the Walbeck ellipsoid and their error. This network was the first systematic triangulation of an extent area in the Old Romania.

Introduction

To the second half of the 18th century, the Habsburg Empire has reached approximately its final extents in the Eastern flank of the Balkans. As a result of a series of wars against the Ottomans, they conquered Bukovina, incorporated Transylvania to the Empire and the borders were fixed along the Danube River between the Banat and the future Serbia. However, the Habsburgs looked to the foreland of their empire as a region of their interest.

In that time, the military science expanded quickly in the field of military topography and cartography. Starting with the famous survey of France by Cassini in the first part of the century, all powers of Europe have started their own military mappings. The Habsburg Empire had the greatest surveyed territory during its First Military Survey, covering the old Austrian empire, the Czech lands, Galizia and Bukovina, Hungary, Croatia, Transylvania, and even the Austrian Low Countries (now it is approximately the country of Belgium). It is less known but this survey covered a strip of the later Old Romania, along the Habsburg borders with Transylvania (Kretschmer et al., 2004).

Fifty years later, the Turkish power in the region of Oltenia, Muntenia and Moldva (henceforth referred to as the Danube Principalities or Old Romania) has weakened. The region offered routes to the Russian armies a few times, the most famous occasion was when they operated against the Hungarian revolution in 1849; a part of the Russian army intervened from the Danube Principalities. When Russia occupied the territory in 1853, the Turco-Russian tension led to the Crimean War. During this war, Austria forced its former ally, Russia, to give up this occupation, and Austrian armies took the occupation between 1854 and the Paris conference resolving the peace at the end of Crimean War. The Habsburg military geographic survey took the time and made a whole geodetic survey in Wallachia (Oltenia and Muntenia) and

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Northern Dobrogea. This survey was the first systematic geodetic triangulation in the Old Romania. A few years later Col. A. Cuza united the principalities, forming the modern Romania, which gained its full independence from the Turcs and also from the Russians at the conference of Berlin (1878). From this point, Romania worked out its own cartographic basis (Dragomir, 1975; Osachi-Costache, 2000; Mugnier, 2001), using also the results of the Habsburg survey. Meanwhile the Austrians (later the Austro-Hungarian Monarchy) issued the series of the so-called 'degree maps' (sheets with extents of one degree on both directions) based on their own surveys in the Empire, the Wallachia and their later triangulations in the Turkish Balkans. The present works reviews the mentioned Habsburg activities, their results and further usage in Romanian cartographic activities.

Extension of the First Habsburg Military Survey to some parts of the Old Romania (1783-86)

The First Military Survey of the Habsburg Empire (after Emperor Joseph it is also called 'Josefinische Landesaufnahme') was carried out between 1769 and 1786. The resulted survey sheets have a scale of 1:28,800. The sheets can be mosaicked but have no real geodetic basis (Hofstätter, 1989; Timár et al., 2007). The survey sheets, however, have a fixed extent; 9600 * 6400 Viennese fathoms (18207 * 12135 meters).

Around the Transylvanian borders of the Habsburg Empire, a 20-50 kilometers wide strip of the Old Romania was systematically surveyed during this campaign, in its own sheet system (zone), an independent one from the other parts of the Empire (Fig. 1).

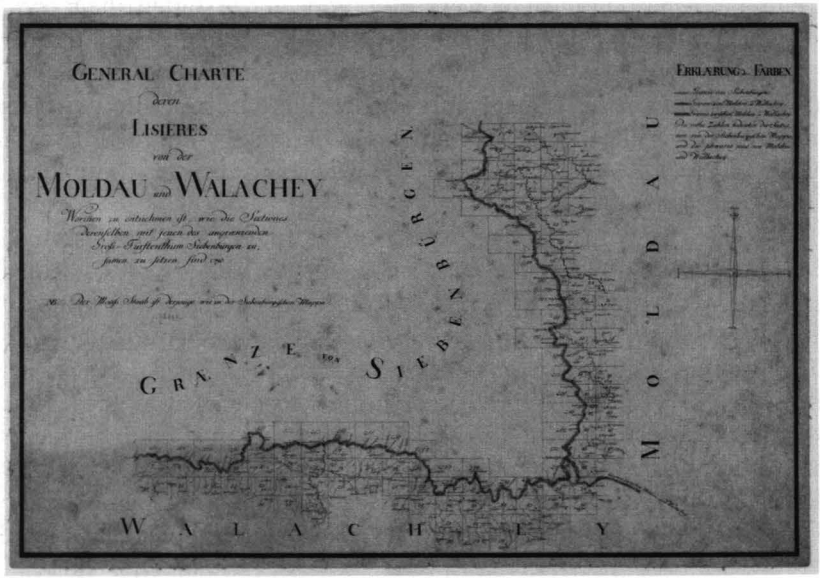


Fig. 1: Overview map of the sheets of the First Military Survey in the Old Romania.

Towns like Piatra Neamt (Fig. 2) or the Southern Carpathians to their edge on the lowland (Fig. 3) are shown with very good accuracy, with respect to the early date of mapping.

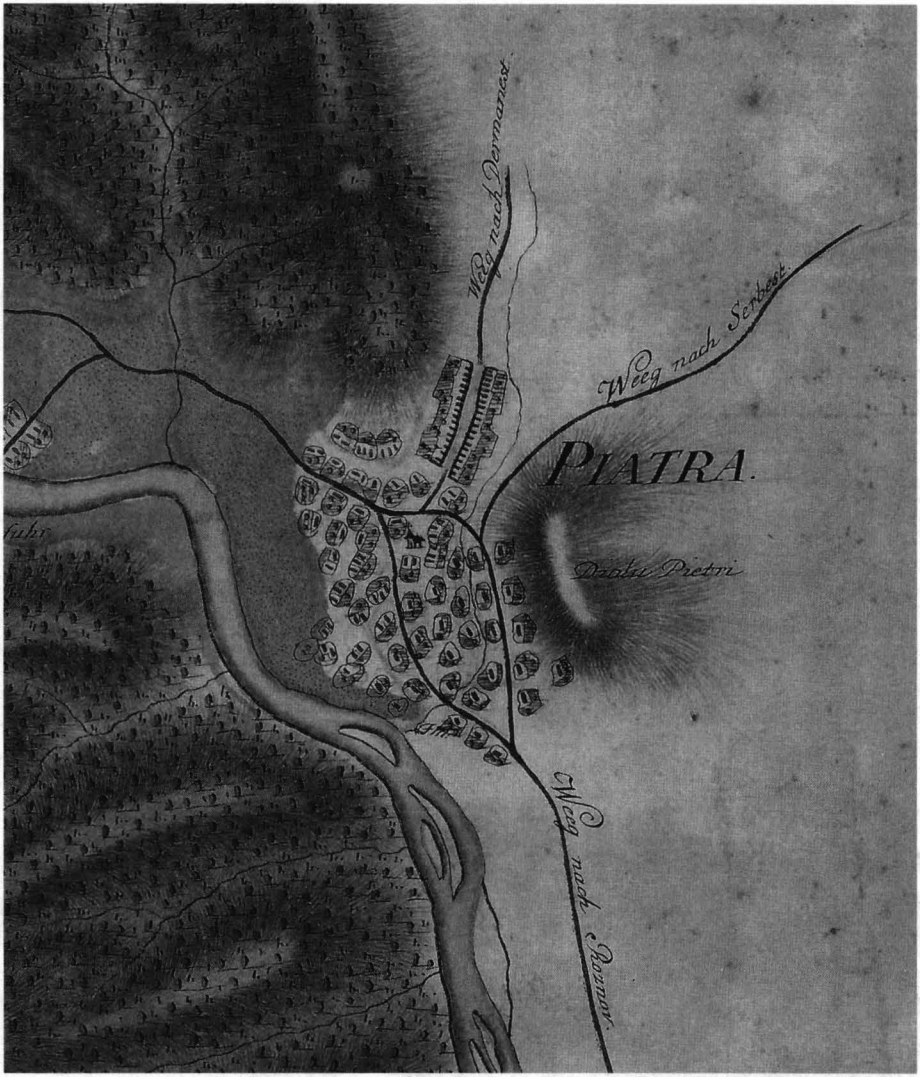


Fig. 2: Map detail of Piatra Neamt (First Military Survey of the Habsburg Empire).

Although the survey had no real geodetic basis, there is a suitable method for geo-referencing the map sheets. We can make a mosaic, containing all of the sheets, and assume that the zone has some real projection, even an unknown one. Thus we can define several ground control points (GCPs) with their image (mosaic) and e.g. Stereo-70 coordinates, then make a quadratic polynomial fitting between the image and the

projected coordinates. If the assumption of a real projection were correct, the errors would remain low, as the quadratic formulae connect all real projections with low error. In case of the Old Romanian zone of the First Military Survey, the errors are quite high, compared to the modern maps: from a few hundred meters to three kilometers (in the extremities).

The sheets, however, can be fit locally more accurate, using just one GCP for a sheet, and shift the content of it without further rotation to the right position (Timár et al., 2007).

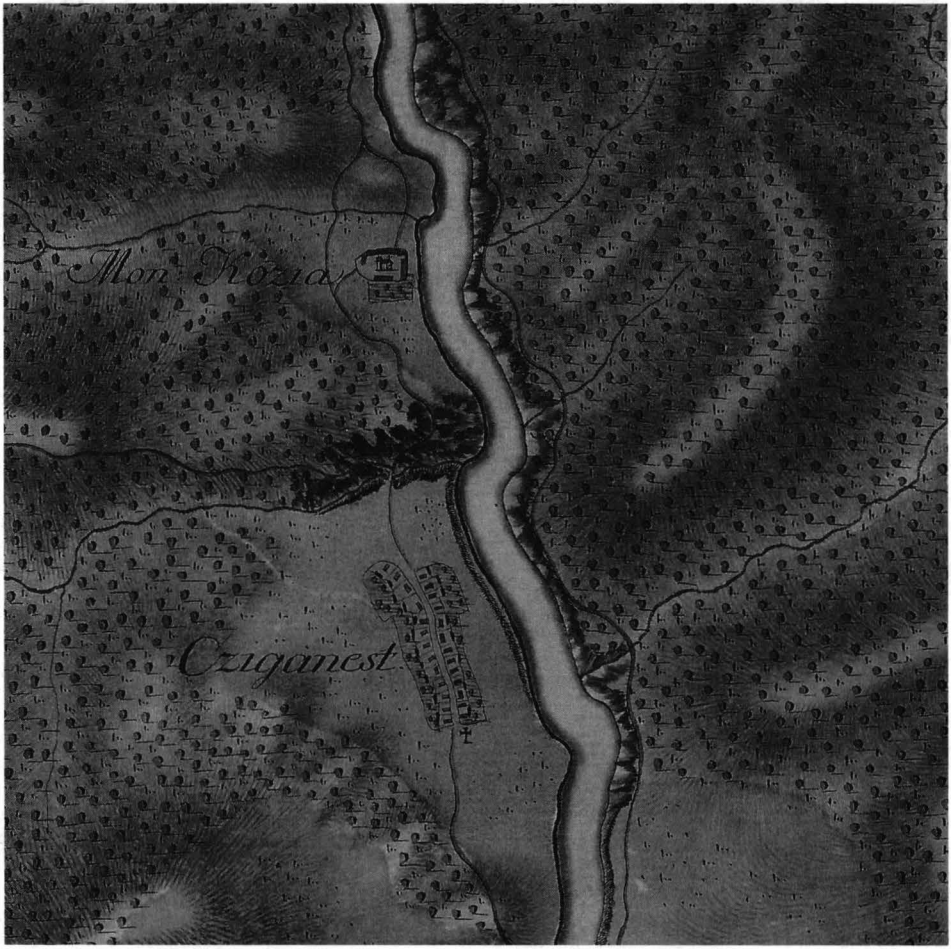


Fig. 3: Map detail around the Monastery of Kozia (north of Rîmnicu Valcea; First Military Survey of the Habsburg Empire).

The triangulation of Wallachia and Northern Dobrogea (1855-57)

As it was told in the Introduction, the Austrian occupation of the Danube Principalities offered a splendid possibility to the Viennese military-geographic

institute of the Austrian army to make a triangulation survey in this area. After the occupation (August 1854) the Austrians began the survey in 1855 (MGI, 1859). A first-order triangulation frame network, consisting 131 base points, was constructed, where the main branches were the following:

along the Danube from the Iron Gate to Dobrogea;
along the Olt River;
along the Dimboviţa River, and
along the Buzau River.

The baseline of St. Anna (Sîntana; north of Arad) in the historical Hungary and the former astronomical observatory on top of Dl. Sibiului (northwest of Sibiu in Transylvania) were also connected to the first-order network (Fig. 4), crossing the eastern Banat and the Făgăraş area. The branch following the Danube consists several points in the modern Bulgaria (southern bank of the river). Their origin is unclear; the author has no information about a possible extension of the Austrian occupation to the southern bank.

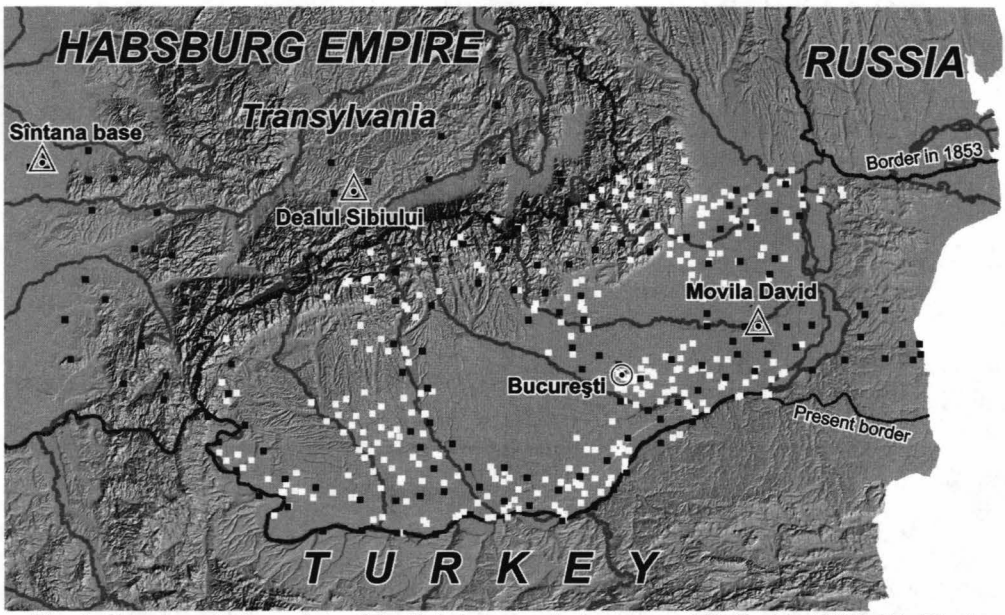
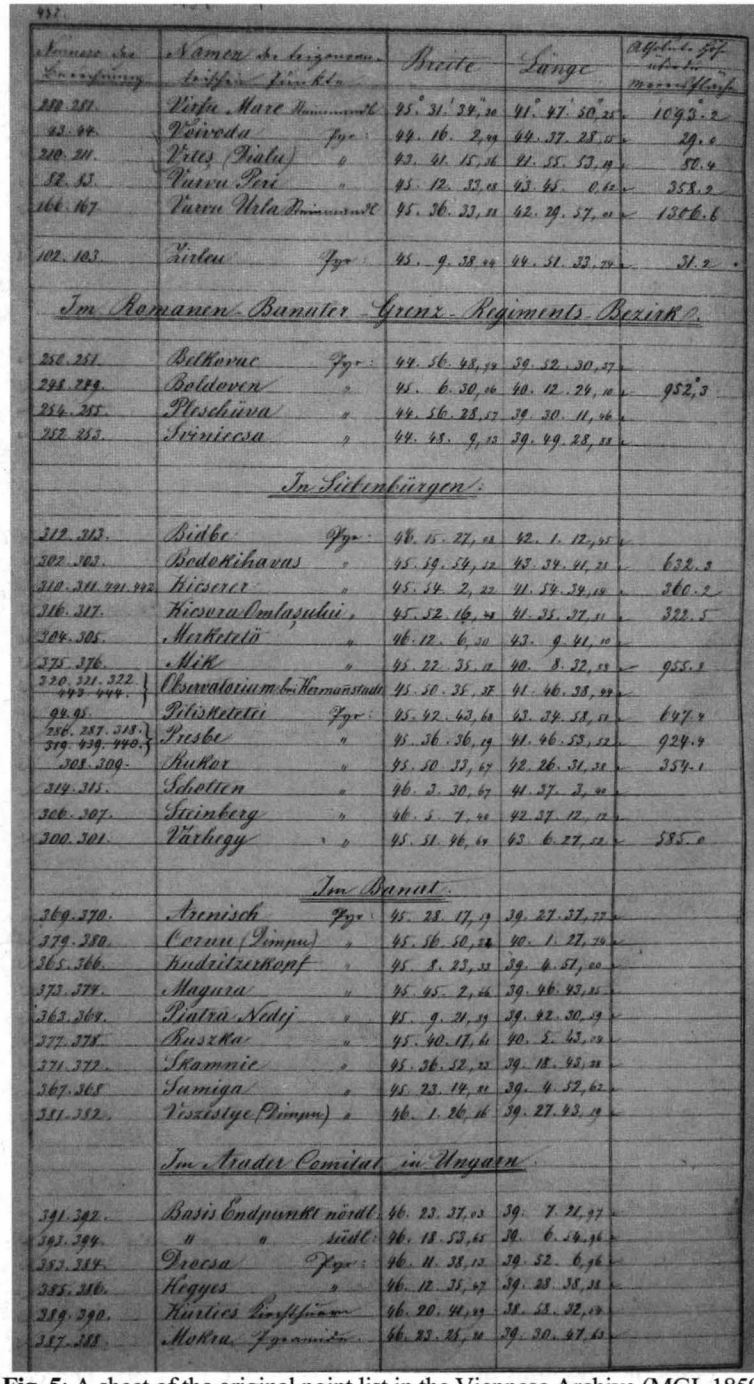


Fig. 4: The triangulation points of the Habsburg geodetic survey of Wallachia (1855-57). Black points: the first-order frame network; white points: second-order points.

The Ferro prime meridian (Timár, 2007) and the Walbeck ellipsoid (a=6,376,896 m; f=1/302.78) were used for the survey (MGI, 1859). The astronomical base point of Movila David (Φ=44° 32' 20,53"; Λ=45° 0' 3" east of Ferro) was selected as fundamental point. The azimuth was set using the Păuna point, from that the Movila David is in direction of 256° 45' 59.02" (MGI, 1859). The coordinates of the points are given with a precisity of hundredth seconds (Fig. 5).



Nummer der Beobachtung	Namen der beigenommenen Höhen-Punkte	Breite	Länge	Absolute Höhe über der Meeresfläche
250. 251.	Virfu Mare	45° 31' 39",30	41° 47' 50",25	1093.2
93. 94.	Voivoda	44. 16. 2,29	44. 37. 28,0	29.0
210. 211.	Vrtes (Dialu)	43. 41. 15,16	41. 55. 53,19	50.4
52. 53.	Vurvu Peri	45. 12. 53,08	43. 45. 0,62	358.2
166. 167	Vurvu Urla	45. 36. 33,11	42. 29. 57,01	1806.6
102. 103.	Zirleu	45. 9. 38,44	44. 31. 33,74	31.2
	Im Romanen Banater Grenz-Regiments Bezirke.			
250. 251.	Belkovac	44. 56. 48,54	39. 52. 30,27	
228. 229.	Boldoven	45. 6. 30,96	40. 12. 24,10	952,3
254. 255.	Pleschiva	44. 56. 28,57	39. 30. 11,46	
252. 253.	Siniecsa	44. 48. 9,53	39. 49. 28,58	
	In Siebenbürgen.			
312. 313.	Bidbe	46. 15. 27,58	42. 1. 12,25	
302. 303.	Bodokihavas	45. 59. 54,52	43. 39. 41,21	632.3
310. 311. 311. 312	Kicsvar	45. 54. 2,22	41. 54. 39,14	360.2
316. 317.	Kicsvar Omlasului	45. 52. 16,58	41. 35. 37,51	322.5
304. 305.	Merkeletö	46. 12. 6,50	43. 9. 41,10	
375. 376.	Mik	45. 22. 35,12	40. 8. 32,53	955.3
320. 321. 322. 443. 444.	Observatorium b. Hermannstadt	45. 50. 36. 37	41. 46. 38,99	
94. 95.	Pilisketetei	45. 42. 63,60	43. 39. 58,51	647.4
286. 287. 318. 319. 439. 440.	Presbe	45. 36. 36,19	41. 46. 53,52	929.4
308. 309.	Rukor	45. 50. 53,67	42. 26. 31,38	354.1
314. 315.	Schetten	46. 2. 30,67	41. 37. 3,90	
306. 307.	Steinberg	46. 5. 7,40	42. 37. 12,12	
300. 301.	Värhegy	45. 51. 46,67	43. 6. 27,52	585.0
	Im Banat.			
369. 370.	Arenisch	45. 28. 17,19	39. 27. 37,77	
379. 380.	Cernu (Pimpu)	45. 56. 50,26	40. 1. 27,74	
365. 366.	Hudritzer Kopf	45. 8. 23,33	39. 4. 51,00	
373. 374.	Magura	45. 45. 2,46	39. 46. 43,25	
363. 364.	Piatra Nedej	45. 9. 21,39	39. 42. 30,59	
377. 378.	Ruszka	45. 40. 17,61	40. 5. 63,09	
371. 372.	Skamnic	45. 36. 52,22	39. 18. 45,22	
367. 368.	Sumiga	45. 23. 14,51	39. 4. 52,62	
381. 382.	Visziolge (Pimpu)	46. 1. 26,16	39. 27. 43,19	
	Im Arader Comitat in Ungarn.			
391. 392.	Basis Endpunkt nördl.	46. 23. 37,03	39. 7. 21,97	
393. 394.	" " südl.	46. 18. 53,65	39. 6. 54,96	
383. 384.	Drecsa	46. 11. 38,13	39. 52. 6,96	
385. 386.	Hegyes	46. 12. 35,47	39. 28. 38,31	
389. 390.	Kurtics	46. 20. 44,23	38. 53. 32,13	
387. 388.	Mokra	46. 23. 25,14	39. 30. 47,63	

Fig. 5: A sheet of the original point list in the Viennese Archive (MGI, 1859). The altitudes are given in Viennese fathoms.

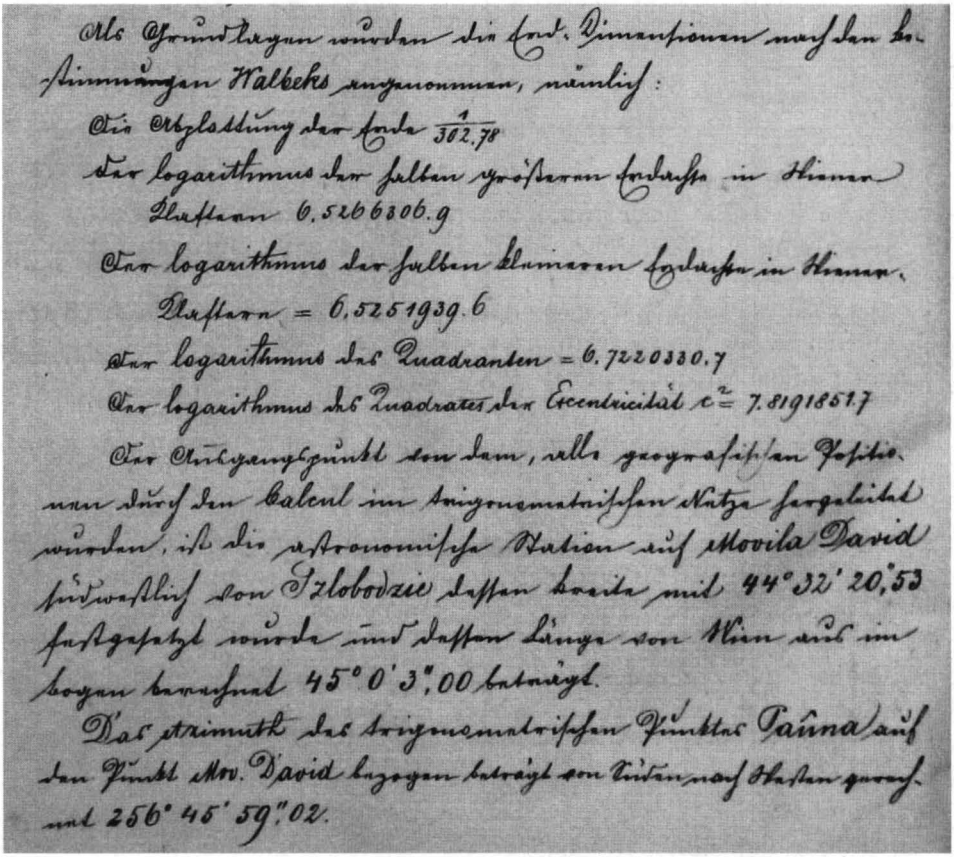

Als Grundlagen wurden die fund. Dimensionen nach den Bestimmungen Walbeks angenommen, nämlich:
Die Abplattung der Erde $\frac{1}{302.78}$
der Logarithmus der halben grösseren Erdachse in Klafter 6.5266806.9
der Logarithmus der halben kleineren Erdachse in Klafter = 6,5251939.6
der Logarithmus des Quadranten = 6.7220380.7
der Logarithmus des Quadrates der Excentricität e^2 = 7.8191851.7
Der Anfangspunkt von dem, alle geographischen Positionen nun durch den Calcul im trigonometrischen Netze hergeleitet wurden, ist die astronomische Station auf Movila David südwestlich von Szlobodzie dessen Breite mit 44° 32' 20,53 festgesetzt wurde und dessen Länge von Wien aus im Bogen betragend 45° 0' 3",00 beträgt.
Das Azimuth des trigonometrischen Punktes Paúna auf den Punkt Mov. David bezogen beträgt von Süden nach Westen gerechnet 256° 45' 59",02.

Fig. 6: The original text describing the Movila David point and its azimuth (MGI, 1859).

The frame network was partially supplemented by a set of 337 second-order base points. Some parts of the surveyed area were well covered by them (between the Jiu and Olt Rivers, around Bucureşti between the Ialomiţa and Buzau Rivers, and also along the original frame branches, see Fig. 4). It can be supposed that the end of the Crimean War and the Austrian occupation aborted the construction of the second-order network.

Comparing the coordinates of points in this network and using their modern coordinates, we can compute the global displacement parameters between the Walachia network and the WGS84. The modern coordinates of the Dealul Sibiului are known (Timár et al., 2004; Kovács and Bartos-Elekes, 2007), its coordinates in the Habsburg cadastral system is given by Marek (1875) and in the Hermannskogel datum by the MGI (1902). The WGS84 coordinates of the 'Clopotniţa' (Bell Tower) at the Palace of the Metropolitan in Bucureşti can be read well from the Google Maps. Computing the Molodensky-type description parameters of the first-order network in the Walbeck ellipsoid, taking into account the geoid undulations from EGM96 model (NIMA, 1997) the results are the followings:

at point	Dealul Sibiului	Bucureşti, Clopotniţa	average
dX (m)	+1331	+1304	+1317
dY (m)	+64	+83	+73
dZ (m)	+351	+364	+357

These two points show good correlation, indicating that the triangulation net was well developed. The mean error of the angles of the used triangles is given as cca. 1,5 arc seconds (MGI, 1857), which value is in the order of the ambiguity derived from the above two points.

Between 1855 and 1857, the northern principality, Moldova was also occupied by the Austrian troops. However, till the writing of this paper, the author has not find any data of a similar Moldovan survey in the Vienna archives.

Further usage of the Habsburg geodetic data on Romanian and Austrian maps

I've also tried to find correlation between the coordinates of this triangulation net and the ones used in the later Romanian Lambert-Cholesky 1:20,000 maps (Bartos-Elekes et al., 2007a; 2007b) but no real and useful results were found. It can be assumed however, that the Habsburg geodetic data was later used in the Romanian Bonne projection maps, which is a good field of further research. The Habsburgs themselves used the coordinates of the Old Romanian survey (and also of their later triangulations in the Turkish Balkans) in the 1:200,000 scale degree maps and the famous 1:75,000 series.

Summary

The Austrian military geographic survey invested a tremendous work into the geodetic and cartographic works in parts of Old Romania, mainly in two waves. First in the second half of the 18th century in the frame of the First Military Survey, then during the Crimean War in Oltenia, Muntenia and Northern Dobrogea, developing a full first-order triangulation net from the Transylvanian border to the Danube and the Black Sea. The network was on the Walbeck ellipsoid and its Molodensky-type displacement parameters are: dX=+1317 m; dY=+73 m; dZ=+357 m, the error of these figures is under 20 meters. The low error shows that the network was very precise at the time of the survey. The Austrian work in the Danube Principalities preceded the main part of the Second Military Survey in Transylvania (or connected to it), perhaps giving a good training opportunity also for that measurement.

Acknowledgements. The author is grateful to the Kriegsarchív of Österreichisches Staatsarchív (ÖStA), Wien, and especially to Dr. Róbert Hermann, the head of the Hungarian delegation at this institute, for the possibility of studying the original survey documentations of the Austrian geodetic works. The sheets of the First Military Survey were digitized in the frame of the joint project of the ÖstA and the Arcanum Database Ltd., Budapest, Hungary.

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LANDSCAPE VULNERABILITY INDUCED BY METEOROLOGICAL, GEOMORPHICAL AND ANTROPICAL PROCESSES IN TRANSYLVANIA DEPRESSION

I. IRIMUŞ, D. PETREA, I. RUS, P.COCEAN[1]

Abstract. The reconstruction of the geographical landscape and of its spatial functions requires, on the behalf of the scientist, an inventory of all the factors with impact in structuring the landscape: geological, geomorphologic, climatic, hydrologic, biopedogeographic, human-made, geopolitical, cultural-historical, etc.
The impact of the climatic and human-made factors is relevant for the Transylvanian factors through a substitution of the landscape functions during the last century. From a predominantly agrarian exploitation of the Transylvanian space (cultivation of cereals, technical plants, vegetables, pasturage, fishing), it turned to an increasing exploitation of construction rocks (lime stones, tuffs, sands and gravels) and wood (deciduous in particular), and also to a touristic development of the salty regions (balneal, climatic, cultural-historic and sport tourism).
The methodology used in elaborating this paper comprises: an analysis of the climatic data on time series; reconstruction of the land usage systems; an analysis of the river beds dynamics as a result of the increasing exploitation of gravels and sands; an analysis of the human impact territorial models.
The correlation between these precipitation values and the geomorphic processes in the Transylvanian environment, arguments the changes in the flowing regime of the rivers, the activation of some old landslides or generation of new ones, the elimination from the productive circuit of large agricultural and forested territories.
The increasing of the primary resources exploitation especially that of wood and gravels, led to a major destabilization of the river-slope system, with long-term consequences. The materialization of impact is felt in the plane spatial dynamics of the Transylvanian river channels, in the mobilization on slopes of the deluvial materials, in the intensification of the linear erosion, in a decrease of the agricultural and forested areas, in a ruderalization of vegetation etc.
Key words: climatic conditions, geomorphological processes, antropic impact, environment, Transylvania

1. Introduction

The Transylvanian space is temporarily articulated through three sets of components: ***the substrate, the hydro- atmospheric environment and the biotic component.*** The substrate is the product of a complex paleogeographic evolution. The structure of the fundament is a result of the Paleozoic and Mesozoic tectonic processes, while the morphology is given by the Neogene's deposits (clays, gyps, salt, tuffs, lime stones), that, through their physical, mechanical and chemical conditions give hints about the sedimentation regime. The tectonics and neotectonics has bothered these deposits, imposing a relief of domes and salt pleats, with the interfluves corresponding to the anticlines and to the diapiric Brachianticlines. The valleys, the corridors and the depressions are located within the diapiric synclinals or within the intradome or interdome cuvettes.

The subsidiary areas suggest an unfinished morphogenetic cycle, reflected in the morphodynamics of the slopes, of the river channels and of the quaternary lakes.

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The contemporary modeling corresponds to the Pleistocene-Holocene sculptural matrix, taking the climatic influences and the plane spatial changes induced by the human factor, mirrored in new relations between the components of the geographic landscape.

The Transylvanian geographic landscape is today defined by resilience to the local regional and global climatic changes, and also by a vulnerability to the geomorphic, hydrologic and human-made processes.

The analysis of the geographic landscape, especially of its spatial functions, requires on the behalf of the scientist to *diagnose* all the factors with impact in structuring the landscape (geologic, geomorphologic, climatic, hydrologic, biotic, pedogeographic, human-made, geopolitical, cultural-historic) and to long term *predict* the evolution of the geographic landscape, that strongly depends on the way of relationing between the geosystemic and sociogeosystemic components.

The changes that have occurred during the last 100 years in the Romanian land usage system reflects, on the one hand, the modification of the human communities request towards the environmental offer, and, on the other hand, the climatic evolution

The impact of the climatic and human-made factors is relevant for the Transylvanian factors through a substitution of the landscape functions during the last century. From a predominantly agrarian exploitation of the Transylvanian space (cultivation of cereals, technical plants, vegetables, pasturage, fishing), it turned to an increasing exploitation of construction rocks (lime stones, tuffs, sands and gravels) and wood (deciduous in particular), and also to a touristic development of the salty regions (balneal, climatic, cultural-historic and sport tourism).

2. Methodology

The methodology used in elaborating this paper comprises: an analysis of the climatic conditions and of the vulnerability of the Transylvanian Depression; an analysis of the river channels dynamics as a result of the increasing exploitation of gravels and sands; an analysis of the slope morphodynamics (the deforestation effect and the torrential character of the slope flowing); reconfiguration of the Transylvanian human habitats (including also the reconstruction of the land usage systems) based on significant case studies.

3. Climatic Aspects and Territorial Vulnerability in the Transylvanian Depression

The geographic location of the Transylvanian space (Fig.1), as an intra-Carpathian area, at the shelter of the Apuseni Mountains (acting as an orographic barrier for the western circulation) and of the Eastern and Southern Carpathians (the first moderating the penetration of the continental air masses coming from East and North- East, while the second ones, also called the Transylvanian Alps by Emmanuel de Martonne, limit the penetration of the Mediteranean circulation from South-West), defines the main characteristics of weather and climate in the Transylvanian Depression and determines a shelter topoclimate.

The average temperatures of the extreme months are quite uniform throughout the depression. *January* presents average values of the of -3 - -4 degrees C in the Western half and along valleys, and -4 - -6 degrees C in the Eastern and Northern part and *July*, the warmest month, has average temperatures of 18-20 degrees C, with some exceptions in the submountaineous depressions from East and South, with an average of 16-18 degrees C.

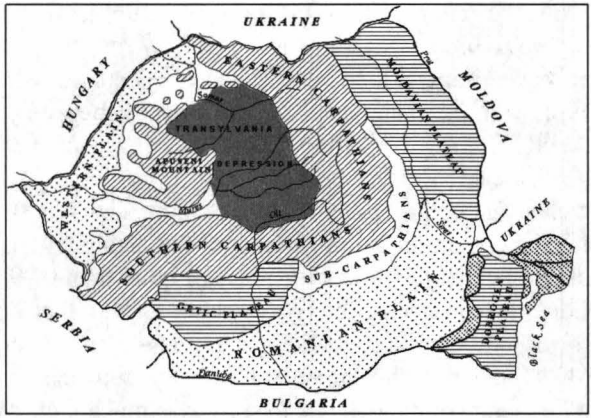

Fig. 1: Geographical position of the Transylvanian Depression

The shelter topoclimate is indicated by the predominance of the atmospheric calm (> 50% from the total observations made between 1961 and 2000) and the generally decreased wind speed (1.6 – 2.0 m/s), higher values being registered only in the Southern and Southwestern parts (2.1- 2.6 m/s).

The atmospheric precipitations (daily, monthly, semestrial or annual), through their regime, articulate the morphodynamics of the landscape. The average multiannual amounts of precipitations vary between 500 and 700 mm/year; values of 500 mm/year and even lower were registered in the Southwest, West and center of the depression, and 700 mm/year in the Northeastern part of the region. The average annual sums of precipitations confirm the same tendency, respectively a growth of the amount of precipitations from West to East and from North to South, process related to the possibility of reformation of the atmospheric fronts in the center, after the descendance on the eastern side of the Apuseni Mountains. The weather observations made between 1961 and 2000 confirm strong deviations referred both to the surplus or deficit of precipitations. The highest registered values have frequently surpassed 800 mm/year and even 900 mm/year in the eastern and Southern part of the depression, while the lowest values decreased much under 500 mm/year, regional values of 250-260 mm/year being registered in the center and Southwest of the depression.

The average values (monthly, semestrial, annual) of temperature and precipitations, could not offer a complete image of the changes induced in the regime of the slope or channel flowing, or of those that affected the ecosystems and the pedosystems,

respectively, it couldn't surprise the vulnerable aspects of the Transylvanian territory to the manifestation of the climatic factors. The deviations from average or the non-periodical variations confer specificity to the evolution of the goemorphosystems and ecosystems.

The analysis of the variation of the precipitations amounts (1961-2000), done with the help of the *cumulative curve for weighted anomaly standardized precipitation* (WASP) (Fig.2) that is used for determining the fluctuations, respectively the excess or deficit of precipitations (in air or soil), highlighted that the analyzed spell started with a deficitary period generalized on the entire Transylvania (1961-1965), being followed by an accumulation period (1967-1985).

The curves have started their descendance (decrease of the precipitations exceeding) since 1986 (Fig.2), maintained their tendency between 1986- 1996, then following a short spell of growth (1996- 1999). Starting April 2000 the exceeding precipitations start to decrease, for the installation of a dry period, whilst by the end of 2000, the values are close enough by the threshold of 0.00. The WASP values highlighted various climatic annual spells on the point of view of the precipitations inputs: years with pluviometric redundancy (30.4%), with curve values of more than 0.99 and which imply a certain level of risk due to the surplus; droughty years (30.2%), that implies a risk due to the deficit, their corresponding curve values being less than -0.99; years without a pluviometric risk (39.4%), when the curve values vary between -1.0 and 1.0. In the analyzed period, the frequency of the risk due to surplus is much higher than the one due to deficit. Even if with lower incidence, the risk implied by the rainy periods (June, summer or spring in the semestrial analysis), could determine important damages. The analysis of the maximal intensity of the rainy periods points out the Northern, Eastern and Southeastern parts of the depression as reaching the highest values.

The analysis of *the maximum amount of precipitations in 24 hours* emphasizes that the highest frequency is registered during summer (June, July, and August). If the analysis is extended to longer periods (1851-1997), we observed that the amounts and frequency of the fallen precipitations in 24 h were much higher than in the case of shorter periods (less than 40 years)(Fig.3). The probability under which the maximum amount of precipitations in 24 h could be reached shows that for a recurrence period of one year the probability for precipitations under 21 mm/24h is of 99.9%, while for one of two years the probable amount of precipitations is 5.7 times higher. For return periods of 10 to 200 years, or even longer (1000 years), the values lie between 52.9- 86.6 mm/24h, these data being registered at the Turda weather station, in the Western Transylvanian Depression.

The Transylvanian depression area is *vulnerable to the manifestation of the weather and geomorphic processes,* through the favor of some torrential rains with high intensities and short length and through the brittleness of the deposits. The shaping of the hillsides through the linear erosion (rain-wash, gully erosion, torrents) and area (landslides, landfall) forming flash-floods represents direct or indirect consequences of the manifestations of the torrential raining.

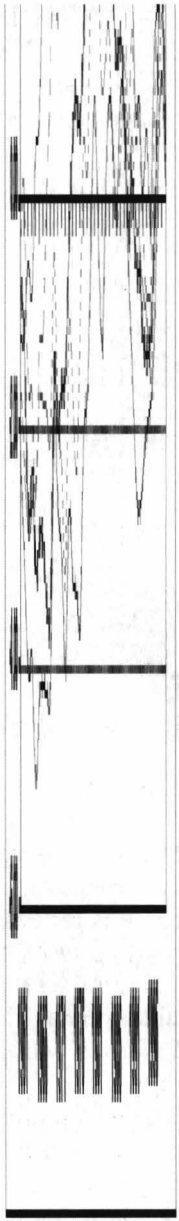

Fig. 2: Cumulative curve for weighted anomaly standardized precipitation (WASP) for the values registerd at the meteorological stations in the Transylvanian Depression (after Croitoru,2006)

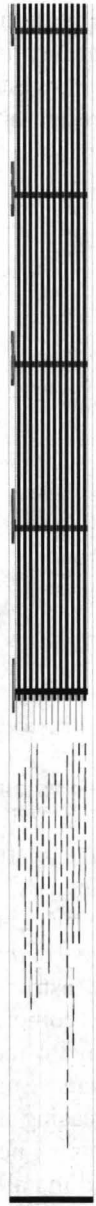

Fig. 3: Amount of fallen precipitations in 24 de ore (1961-2000, after Croitoru, 2006)

The depression joins the steps (Fig.4) of low vulnerability, in the center, average vulnerability in the north west and south east of the depression and on a narrow strip of the western marginal region, whilst in the southern regions, eastern and north eastern present an average to high vulnerability, according to the exposal of the hillsides, remaking the fronts and the orographic convection.

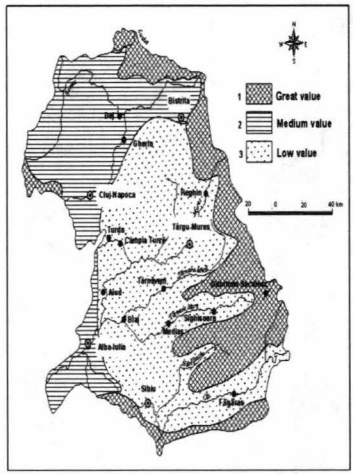

Fig. 4: Landscape vulnerability induced by meteorological and geomorphical processes

4. River channels morphodynamics and the exploitation of the river aggregates

The plane-spatial rivers channels dynamics has been analyzed with the help of some satellite images, while the transversal sections morphodynamics was analyzed through topometric. The assessment of the solid discharge is reflected on the map that refers to *river aggregates reserves and renewal conditions up to 2000* (Fig. 5).

The reconstruction after the Second World War and the electrification process of our country coincided with the Romanian socialist years. The energetic plans included the hydro-technical arrangements in the morphohydrographic basins of Somesul Mare and Somesul Mic, Mures and Olt, while those for the reconstruction implied an increasing in the exploitation of soil and subsoil resources. The ballast-pits the river aggregates necessary in the construction of dams and inhabiting buildings. The dams stored the alluvionary materials transported by rivers and torrents, regulated the downstream alluvial charge, the result being a new configuration of river channels induced by a reduction or sectioning of the meanders, by the modification of the individual properties natural limits, or sometimes of the border lines separating regions or countries. Nowadays we are facing an intensification of the processes within which the natural factors interfere with the human-made ones, especially when referring to river aggregates exploitations. An argument in this respect is the tripling of the ballast pits functioning in the depression, within a context of deficitary environmental

regulations that do not stipulate the rapport between the in situ natural resources and the environmental stability.

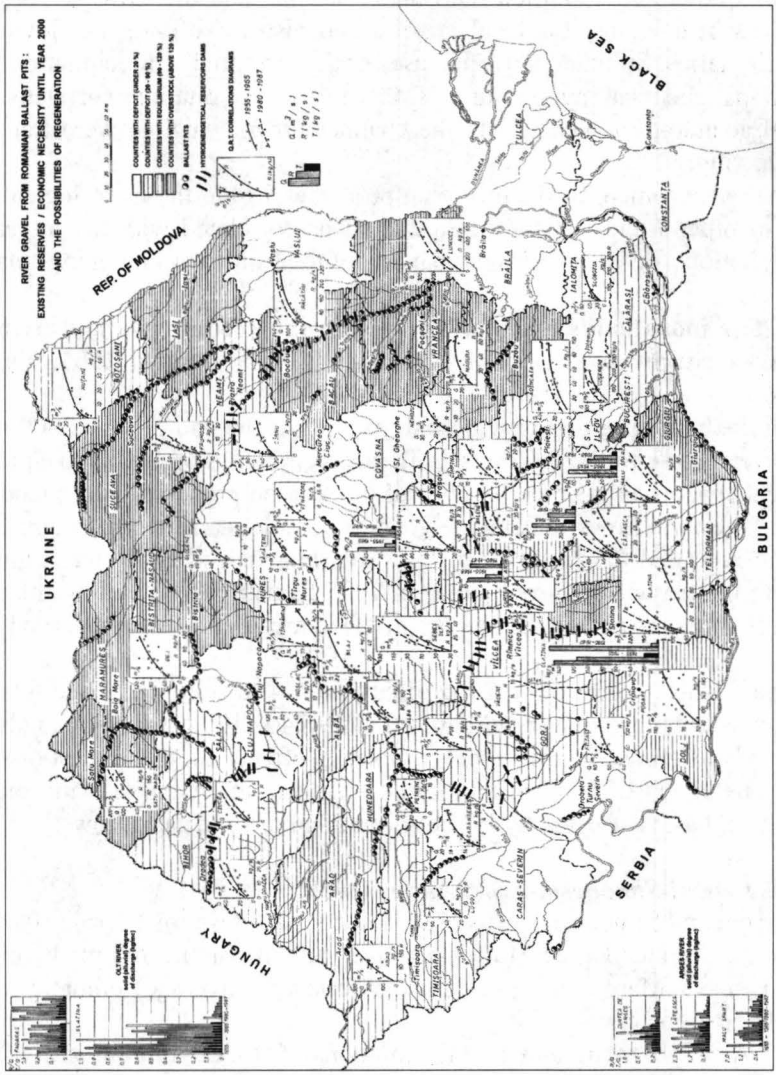

Fig. 5 The map of the river aggregates reserves and their renewal conditions up to 2000

An analysis of the regional "market" of river aggregates indirectly led to a hierarchy of the impact of these resources on the economical evolution of the counties and regions (North-Western and Central ones). The Bistrița-Năsăud, Maramureş and

Satu-Mare counties benefit from extra amounts of river aggregates, while Cluj, Harghita and Covasna are deficitary from this point of view.

While the hydrotechnical dams segmented the longitudinal river's profile, the aggregates exploitations modified the transversal one and the flowing regime, being considered as birth points for local erosion and also modifying the flowing on the upstream tributaries. Stimulated by increases of the torrentiality precipitations index, of the acid rains chemical aggression, of the forest exploitation correlated with an agricultural abandon, the changes in the channel flowing regime were transmitted to the slope flowing.

The enhancement of the erosional processes within the hydrological basins of the rivers of order I and II (Horton-Strahler) was correlated with the increase of the forest exploitations, deforestations or abandon of the fruit-trees and grapes plantations.

5. The morphodynamics of slopes and the reconfiguration of the human habitats area. Study case: Lupeni - Simoneşti, 23-25 August 2005; Târlişua, 20 June, 2006

On the basis of a droughty period installed at the end of year 2000 (the ASPP values got very close to the 0,0 threshold), between 2000 and 2007 the Transylvanian geographical space was affected by a serial of extreme processes and phenomena, the freshets and the earth flows causing the greatest material damages and human losses.

The report of the Ministry of the Environment and of Water Administration confirm that the freshets that took place in 2005 had surpass-regarding the interval of happening (February-September) and the affected areas – the ones recorded in the last 100 years.

The freshets produced in 2005 affected 1734 localities, and the total value of the damages was estimated at 6 milliard lei (1,796.407.100 Euro). The analyzed cases from Transylvania area confirm the cumulated effects of the exceptional climatic manifestations and of the uncontrolled human interventions in the morph-hydrographical basins affected by freshets, running mud and earth flows.

5.1 Lupeni-Simoneşti, 23-25 August 2005

Lupeni and Simoneşti towns are located in the Basin of Feernic (Pârâul Alb or White River), second degree Horton-Strahler subunit in the morph hydrographical Basin of Târnava Mare. This presents the following average, climatic and morph hydrographic parameters:

- Average multi annual precipitations: 550-560 mm in the inferior and middle basin (Simoneşti 568 mm) and 750- 900 mm in the superior basin.
- Average multi annual precipitations in August: 72 mm
- The surface of the hydrographic basin: 199 sq km; the length of the river: 33 km; the altitude of the springs: 901 m; the altitude of the confluence with Tarnava Mare: 385 m; average slope: 15.3 m/km; the slope of the superior course: 40-50 m/km; the slope of the inferior course: 5-10 m/km.

- The average multi annual trickling: 198 mm (48 mm represent the underground trickling)
- Average multi annual Q: 0.909 m3/s

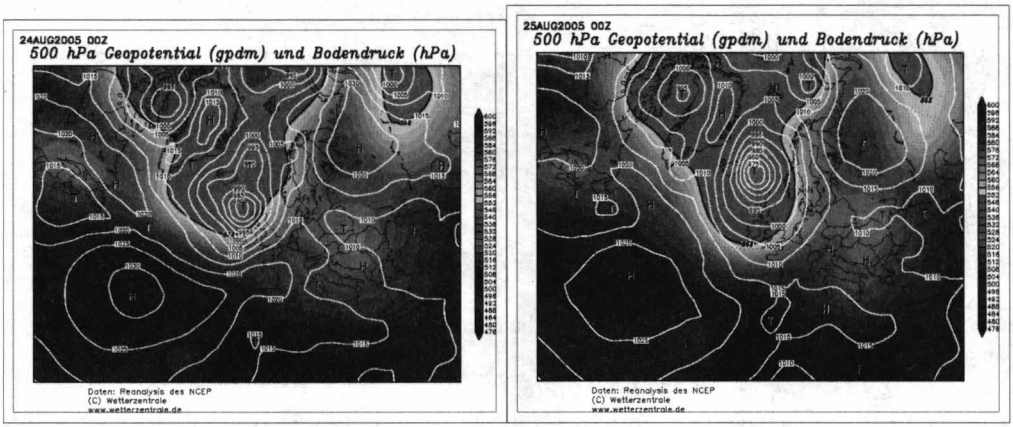

Fig.6 a,b:- The 500 hPa baric field evolution above Europe in august, 24 and 25, 2006.

The freshet produced in the basin of Paraul Alb or Feernic, because of the precipitations from 23 August 2005, has been configured by the following climatic and an tropic conditions:

- The precipitations were determined by the cyclic genesis that started on the 21st of August 2005, confirming a turbulence field and high humidity, from a preexistent cyclone; the cyclic genesis has been caused by the sum of two turbulence centers of the air, well underlined at the level of the surface of 500 hPa (Fig.6 a,b);.
- The forming anticyclones from the east stopped the movement of the cyclone to the east, conditioning in the stopped cyclone, the occlusion of the systems of fronts and the forming of some convergent lines and ways for movement with high humidity;
- The precipitations fields acted through storms and hail in the Basin of Feernic; between 16:30 and 18:30, the precipitations had the value of 201 mm /24.08.2005, at Odorheiu Secuiesc , overtaking 3 times the multi annual value.
- The Qmed of August registered at Simoneşti hydrometric station was 5.99 m3/s, 13 times larger then the multi annual Qmed of August (0.455 m3/s)
- The deposit of the wood material for fire on the superior course of Feernic river during the summer and the under gauging of the bridges lead to the rise of the level of the shock freshet (Lupeni, h=7.6 m) (Fig.7)

The freshet affected 1388 buildings from Lupeni, Şimoneşti, Şicasău, Zetea on the superior course of Feernic and registered the following losses: 3 deaths (Lupeni); the destruction of about 40% from the buildings in Lupeni, Şimoneşti, Şicasău; the entire destruction of 21 bridges and 109 footbridges.

Fig. 7: Flood wave level in the Feernic River basin at Lupeni.

5.2 Târlişua, the 20th of June 2006

Târlişua town is situated in the morpho- hydrographic basin of Ilişua Valley, right tributary river of Someşul Mare, with its springs on the southern hillside of Ţibleş Mountains, at 1200 m altitude. Ilişua is a second degree on the Horton- Strahler scale river, with a morphohydrographic basin opened in the north east of the Transylvanian Depression.

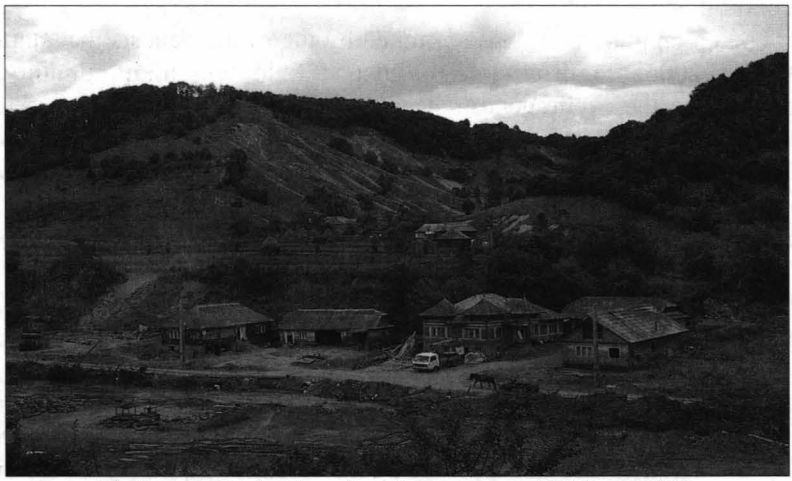

Fig.8: Torrents developed on steep cuestas at Târlişua ,2006.

The parameters that define the morph hydrographic character of the basin confirm a network of dentritic type with low drainage, the torrential organisms belonging to the first degree on the Horton- Strahler scale, that are engraphed on fronts of cuesta (Fig.8) and present medium slopes of 15-35 m/km and their length is under 10 km. Between their springs, located on the southern hillsides of Păltiniş Mountains,

at 1200 m altitude and the confluence with Somesul Mare at 378 m, on a way of 52 km, there is a registered average slope of the trickling of 15.38 m/km.

The freshet from June 20th 2006 started on a synoptic configuration (Fig.9) defined by a field of cyclonic turbulence, with a remnant character, very wet.The quantities of precipitations were appreciated (in the absence of a weather station in the basin of Ilişua) at over 280 mm, in less than 2 hours.

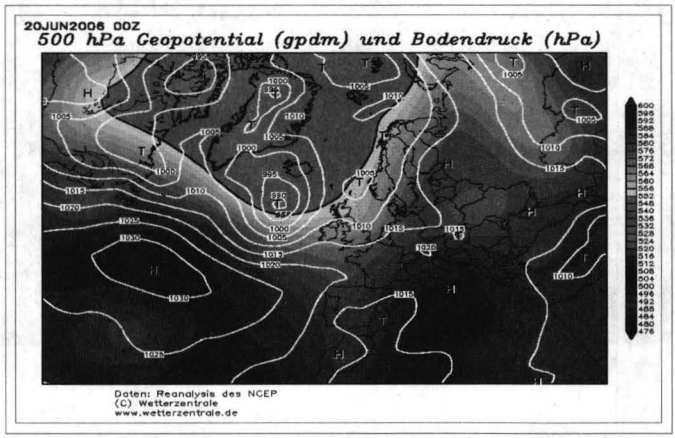

Fig. 9: The Cyclonic turbulence field that determined the flood that occured at Târlişua in 20 June, 2006

The absence of the compact grass and the presence of some areas with massive deforestations, following the intensive exploitation of the wood (which trained by the freshet functioned as genuine skull crackers (Fig.10) in destroying the buildings) themselves in the main causes of the losses made by the freshet: 10 deaths, 3 missing, 23 households totally wrecked, 480 partially wrecked; the serious destruction of the roads, of the special infrastructure(electricity, telephone), flooding and clogging fountains, flooding and destroying the agro cultures; activating or starting some terrain slides(684 ha affected); the sentiment of insecure through the people and starting the state of psychosis vis-à-vis the myth about "The Apocalypse".

6. Conclusions

The climatic manifestations perceived through the context of the modifications or changes in the world's climate, spreads energy capable to irreversibly affect the equilibrium between the landscape components on the regional, local, but also global scale. To the climatic conditionings join the an tropic ones, that can sustain the developing of some risk processes or phenomena, very dangerous, in the absence of some correct measurements taken in the arrangement and administration of the territory resources, in the way of durable development.

Fig.10: Tree trunks river-borned by the flood at Târlişua.

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MODERN SHORELINE CHANGES ALONG THE NILE DELTA COAST AS AN IMPACT OF CONSTRUCTION OF THE ASWAN HIGH DAM

M. TORAB[1] and M. AZAB[2]

Key Words: Mediterranean Sea, Sea Level Changes, Nile Delta Coast, Aswan High Dam.

1. Introduction

The construction of the Aswan High Dam was started in storage Nile Water on 1964, and fully finished six years later. The construction of the Dam has changed the hydraulic regime of the river downstream. The erosion of the Nile Delta coast was first observed in 1898, but accelerated after the construction of the Dam. One of the major environmental problems of the Dam was the potential drop in river channel downstream of the Dam become silt-free water, and coastal erosion in the Nile Delta coast.

Before the construction of the Dam, silt used to be spread over land or carried to the delta coast. It is estimated that each year floods used to deposit 12 million tones of silt on land along the delta and Nile valley north of the High Aswan Dam . The reduction in soil fertility due to the loss of the nitrogenous component of the silt now has to be compensated for by the annual addition less than 13 thousand tones sediments (Frihy, 1988).

The study area is located on the northern coast of the Nile Delta, between Rosetta and Damietta mouths (Fig.1). It has a length of about 170 km., it consists of the following geomorphic units in addition to the barriers unit near the northern coastline of Sinai (out side of the study area):

The mouths unit of Nile Delta braches in Rosetta and Damietta.

El Burullus lagoon unit.

The coastal plain unit.

The coastal dunes unit.

The coastal sabkhas unit.

The morphological changes of the Nile Delta coast have been studied during last century such as: (Lewis, 1931), (Lafond, 1939), (Aki, 1953), (El-Ashry and Wantless, 1967), (Zenkovich, 1967), (Mohamed, 1968), (Moussa, 1973), (UNESCO DTR,1973&1976),(Frihy, 1975), (Manohar, 1976), (Misdorp and Sestini, 1976), (El-Fishawi, 1977), (Hamama, 1978), (Rashed, 1978), (Anwar et al.,1979), (Abdela, 1987), (Frihy, 1988), and (El-Sayed, 2005).

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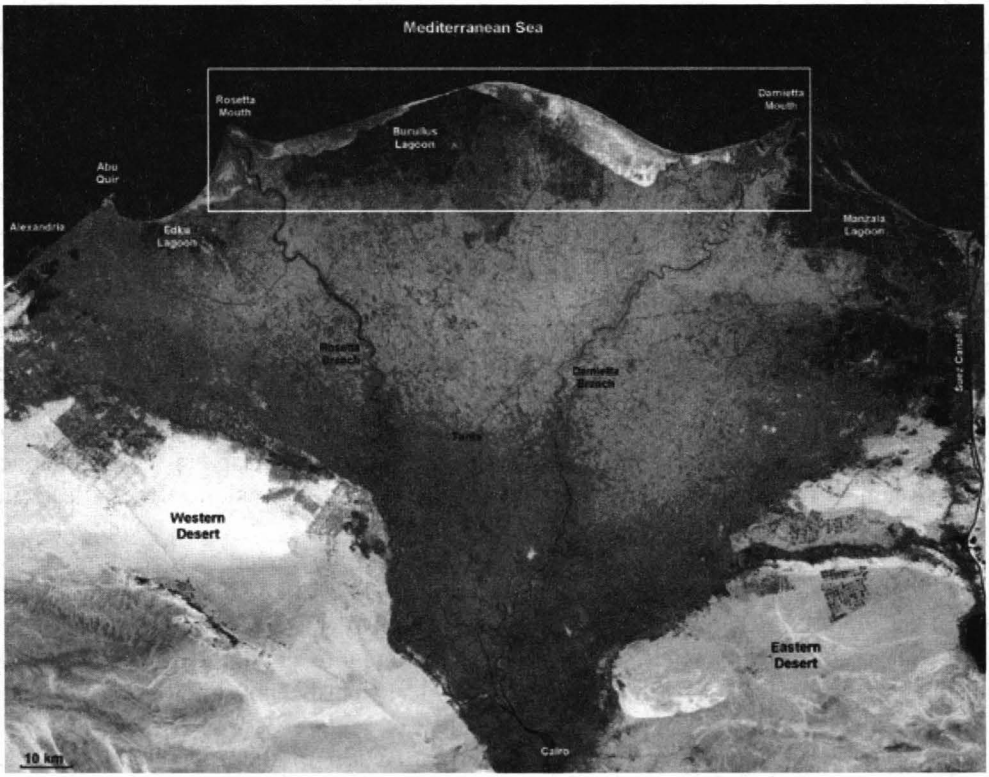

Fig.1: Location of study area

The major objective of this study is to detect the morphological changes of the Delta coast line during last 35 years, and to define coastal geomorphic features along the northern part of the Nile Delta.

Some of the modern Changing shoreline positions along the Nile Delta coast were determined by the following methods:

- Comparing two satellite images (Landsat TM: May1984 & Jul 2001-Resolution 30m,7 bands), aerial photographs taken in 1955 and historical maps in 1900, 1925 and 1970 by using ERDAS IMAGINE 8.4 software .
- Field observation of the study units.
- Sediments samples has been collected for grain size analysis.
- Analyze the collected data by GIS techniques.

2. Results and Discussion

Every year before construction of the Aswan High Dam, water flooded from Nile during August-October through its branches (Rosetta and Damietta), but after building it a huge amount of water and alluvial sediments storage behind the Dam since 1964, the mean annual amount of Nile water is reduced from 34 billion cubic meters to less than ⅓ it's amount before construction the dam, the sediment load is

reduce too from 60-180 million tons to less than 15 million tons after building it , which was the main source of accretion on the coast line and the two promontories of Rosetta and Damietta, but it has removed gradually from this date (Sharaf El Din, 1977). The present study shows that there are some morphological changes of the geomorphic units of the northern portion of the Nile Delta depicted as a result of construction of the High Aswan Dam (fig.2 & Tab.1):

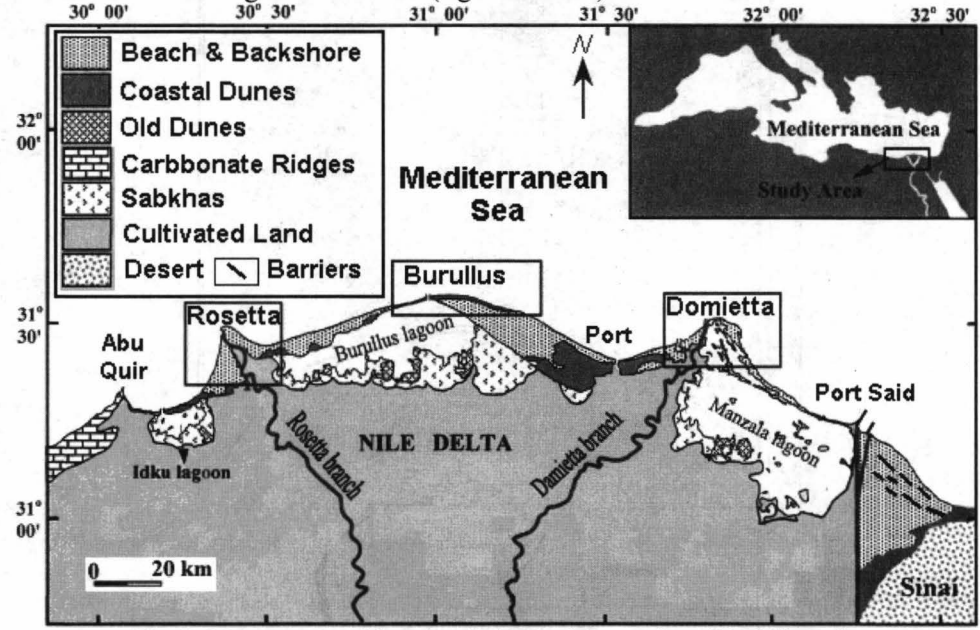

Fig. 2: Major geomorphic units of The northern portion of the Nile Delta

(Tab.1)The evaluation of the major topographic units between 1925-2001(km3)

Topographic Unit	1925	1970	1984	2001
Data Source	Topographic Maps		Landsat TM images	
El Burullus lagoon unit	8658.5	5674.7	553.4	489.8
Lagoon islands unit	43.7	65.6	317.2	292
The coastal dunes unit	1085.6	704.3	1032.8	567
The coastal sabkhas unit	1173	736.4	265.1	59

2-1 The mouths unit of Nile Delta braches in Rosetta and Damietta:

2-1-1-Erosion of the Rosetta promontory began about 1900 after construction the Aswan Low Dam, the western and eastern sides of the mouth lost between 1900 – 1964: 879 and 1282 meters, it's average rate about 13.7 and 20 m/yr. The storage of water Nile started on 1964 at Lake Nasser in the front of the High Dam, it increased the erosion rate between 1964-2006 to 95.3 and 124.8 m/yr (tab.2 & Fig.3).

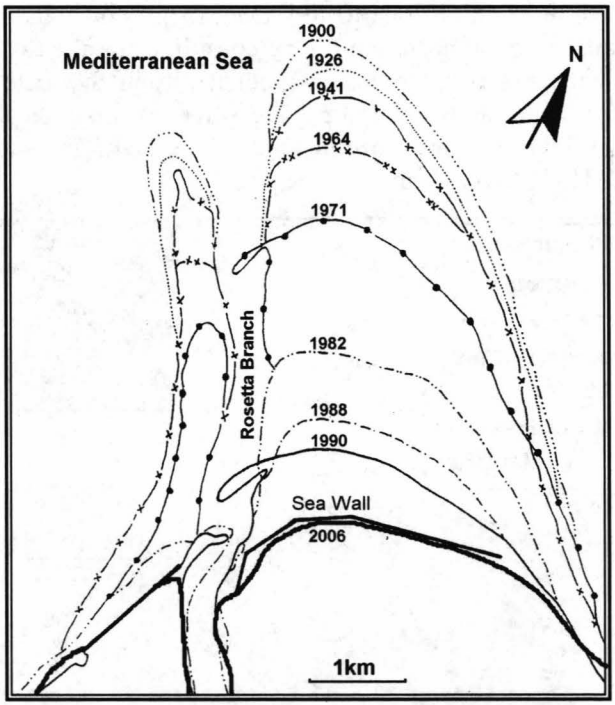

Fig3.: Morphological changes of The Rosetta mouth from 1900 to 2006 (After: Fanos, 1995)

Tab2: Annual rates of erosion on both western and eastern sides of Rosetta mouth (promontory) between 1900-2006.

Period		Western Side		Eastern Side	
		Erosion distance (m)	Erosion Rate (m/yr)	Erosion distance (m)	Erosion Rate (m/yr)
Before construction of the Aswan High Dam	1900-1926	243	9.3	396	15.2
	1926-1941	191	12.7	298	19.9
	1941-1964	445	19.3	588	25.6
	1900-1964 Sub Total	**879**	**13.7**	**1282**	**20**
After construction of the Aswan High Dam	1964-1971	826	118	1555	222.1
	1971-1982	2796	254.2	1652	150.2
	1982-1988	381	63.5	826	137.7
	1988-1990	0	0	318	159
	1990-2006	0	0	890	55.6
	1964-2006 Sub Total	**4003**	**95.3**	**5241**	**124.8**
Total Period		**4882**	**46**	**6523**	**61.5**

2-1-2 Coastline changes of Damietta promontory are similar to those of the Rosetta area. Erosion of the Damietta promontory started about 1900 too, it lost about 3.7 km between 1900-1991 averaged 40.7 m/yr. The average rates of the western and eastern sides between 1900 and 1973 was about 35 and 40 m/yr, but it increased to more than 100 m/yr after construction of The High Dam, although some protected walls and groins have been constructed during this period (Fig.4&5). The W/E currents accreted a 4.5 km long spit near the eastern side of the Damietta promontory, that spit appeared on 1983 aerial photos witch observed and recorded by (Frihy, 1988).

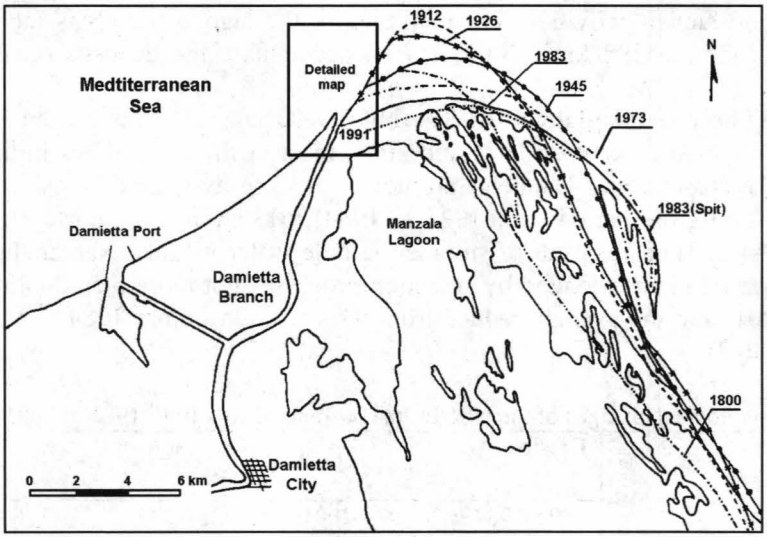

Fig.4: Morphological changes of the Damietta mouth from 1800 to 1991 (After: Fanos, 1995)

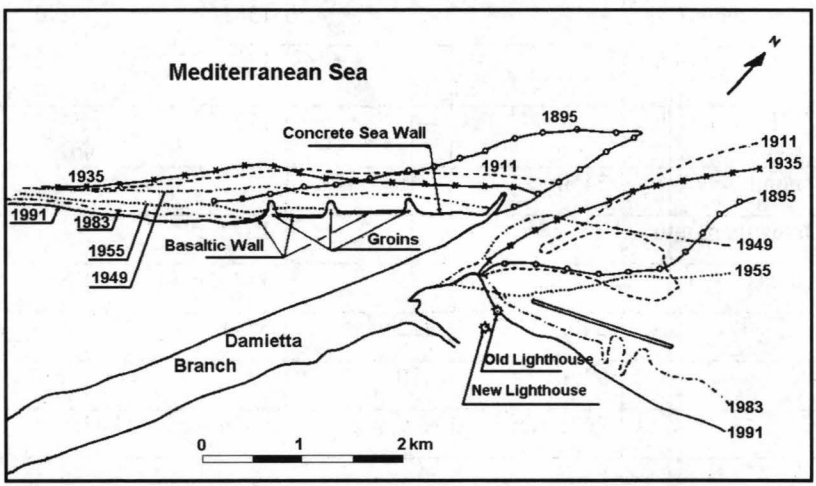

Fig.5: Detailed map of morphological changes of the Damietta mouth from 1895 to 1991 (After: Fanos, 1995)

2-2 El Burullus lagoon unit: it is one of five shallow lagoons along the coastal plain of the Nile Delta (Maryut and Idku to the west of Rosetta Branch, El Burullus in the middle Delta coast and finally El Manzala and EL Bardawil to the west of Damietta Branch. The total area of El Burullus lagoon is reduce during last century from 5600 km3 (1925) to 317.2 km^3 (1984) then to 197.8 km^3 (2001) as a result of the human activities and land reclamation projects, specially after construction of the High Aswan Dam. Some years ago depth of that lagoon was varies between 0.5 and 3 meters, but now it becomes more shallow as a result of sediments accumulation by geomorphic processes and human activities. The total area of the lagoon islands is increase from 65.6 km^3 (1925) to 292 km^3 (2001) due to accumulate the deposits on the lagoon bottom.

2-3**The coastal plain unit:** The Nile Delta coastal plain wasted by erosion more than 30.86 km^2 between 1925 and 2001, most of these areas lies in the western sides of The Rosetta and Damietta promontories. The average of erosion increased from 91.4 during the period (from1925 to 1984) to130.8 acres/yr during the modern period (1984-2001) as a result of storage the Nile water in Lake Nasser. In the other hand the coastal plain extended by accretion processes not more than 24.43 km^2 from 1925 to 2001, and the average reduce from 93.7 acres/yr before 1984 to less than 30 acres/yr (Tab.3).

Tab.3: Morphological changes of the Nile Delta coastline sectors from 1925 to 2001 (in Acres)

Sectors	Erosion		Accretion	
	1925-1984	1984-2001	1925-1984	1984-2001
Rosetta mouth	2952	1682	-	-
East of Rosetta mouth	-	-	1381	270
East of El Burullus lagoon	-	-	1338	152
West of El Burullus lagoon	-	-	1126	-
Damietta mouth	2450	541	-	-
West of Damietta mouth	-	-	1572	-
Separated areas	-	-	114	83
Sub total	5402	2223	5531	505
Annual rate	91.6	130.8	93.7	29.7
Total	7625 Acre= 30.86 k.m.2		6036 Acre= 24.43 k.m.2	

The coastline has been divided into 7 sectors from west to east (Fig. 5), witch show morphological changes of coastline between 1984 and 2001. The Nile Delta coastline is generally convex shape in three promontories at The Rosetta mouth, Burullus lagoon neck and The Damietta mouth, they separated with two concave wide bays, as a result of action of the NW prevailing wind, and W/E longshore currents effects, the eastern sides of these promontories are retrograded by coastal erosion, but accretion took place to the outer eastern sides of these promontories and bays.

2-4 Grain Size analysis:

14 beach samples were collected for grain size analysis, nine samples got from erosional beaches and five samples collected from accretional beaches. The statistical data (Tab.4 and Fig. 7&8) shows that most of the study area beaches are composed from coarse to very fine sand, but erosional beaches are contained more finer grains than accretional beaches, because the dynamic processes can transport fine grains more easy than coarse grains.

Beach type	Sample No.	Weight % of fractions						Grain-Size parameters			
		V.C Sand	C. Sans	M. Sand	F. Sand	V.F. Sand	Silt	Mz Φ	σ1 Φ	Sk1 Φ	kg Φ
		-1:0	0:1	1:2	2:3	3:4	>4 Φ				
Erosion	1	0.21	1.92	8.67	74.88	13.53	0.79				
	4	0.19	3.63	14.15	69.52	11.93	0.58				
	5	0.24	4.22	12.75	69.35	12.85	0.59				
	6	0.28	3.95	13.94	66.52	14.83	0.48				
	7	0.36	3.48	13.17	68.94	13.63	0.42				
	8	0.25	3.21	12.28	66.99	16.74	0.53				
	9	0.31	3.07	13.43	66.84	15.84	0.51				
	10	0.21	2.86	14.53	68.19	13.67	0.54				
	14	0.28	3.75	13.85	67.23	14.38	0.51				
Average		**0.26**	**3.34**	**12.97**	**68.72**	**14.15**	**0.55**				
Accretion	2	0.79	14.52	39.31	41.68	2.52	1.18				
	3	1.38	13.84	35.83	44.52	3.17	1.26				
	1	1.53	12.73	34.58	46.15	3.29	1.72				
	1	1.72	13.17	36.37	42,98	4.17	1.59				
	13	1.83	13.73	37.51	42.30	3.39	1.24				
Average		**1.45**	**13.60**	**36.72**	**43.66**	**3.31**	**1.40**				

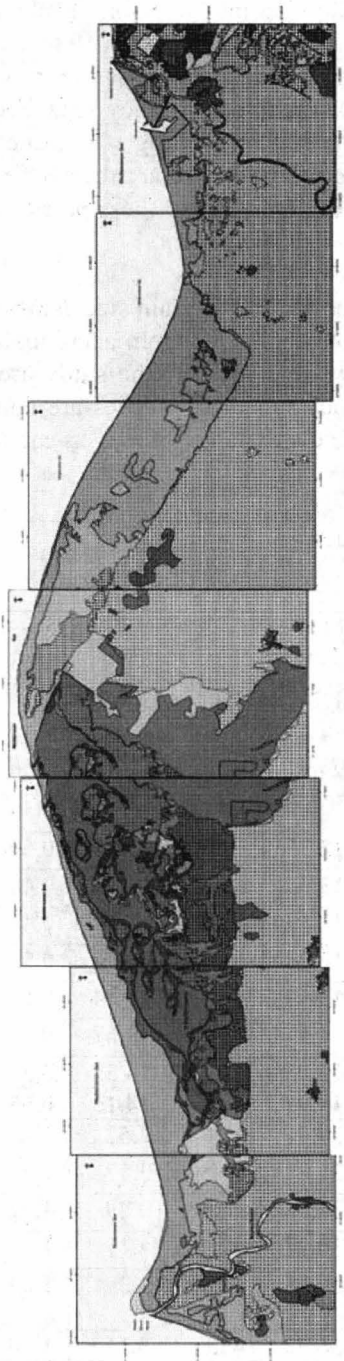

Fig.6: Morphological changes of the Nile Delta coastline between 1984-2001

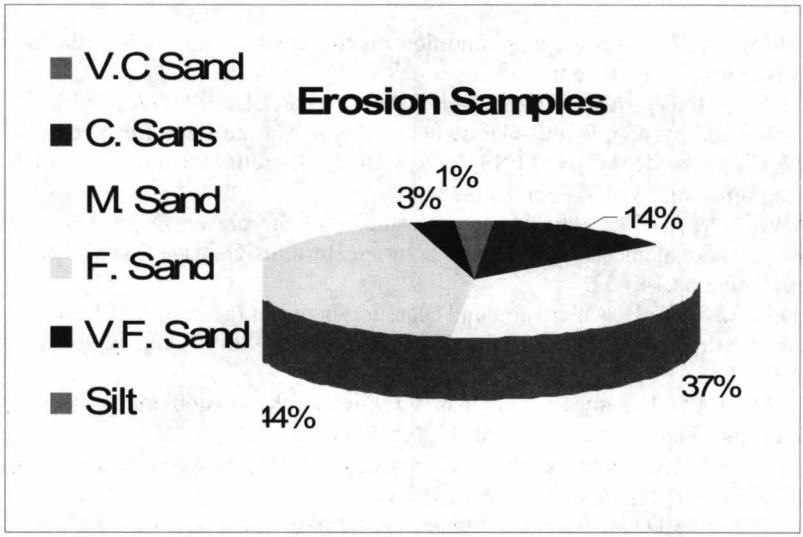

Fig 7: Size fraction of erosional beach samples

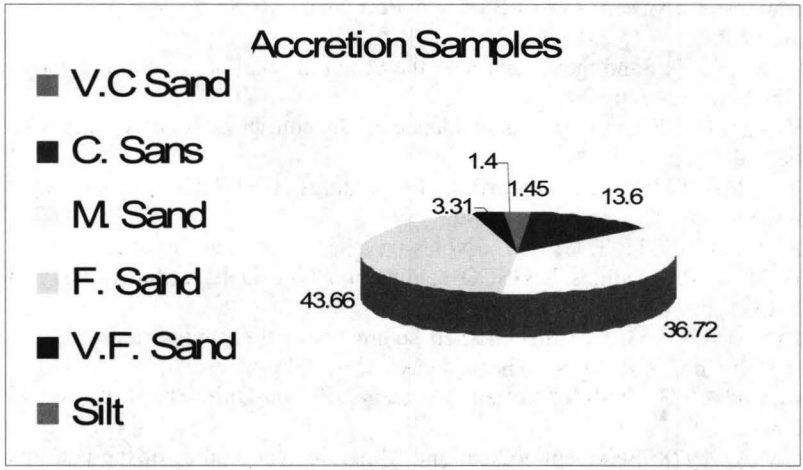

Fig 8: Size fraction of accretional beach samples

3. Conclusions

The Nile Delta coast were determined by comparing satellite images and historical charts with present-day conditions. The analyses identify into two patterns: erosion and accretion shorelines. These two patterns are influenced by transport processes, including sediment provenance from different sources: eroded Nile delta coast, relict sediments from the former Nile distributaries and mouths, and sediment supply by land valleys and from wind-blown sand.

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THE DYNAMIC OF THE AGRO-PASTORAL LANDSCAPE IN THE UPPER BASIN OF THE SOMEŞUL MARE RIVER

Mircea MUREŞIANU[1], Nicolae BACIU[1], Eduard SCHUSTER[1], Simona CREŢA[2]

Abstract. Located in the north of the Romanian Carpathians, the upper basin of the Someşul Mare River is a geographic space in which the agro-pastoral landscape suffered significant changes after the mid 19th century (since the first available information) till now, induced both by the human pressure on the agricultural space and the evolution of the mountain-specific particularities of the local economy.

Introduction

The changes in the society are directly reflected in the landscape's physiognomy, structure and functionality, requiring rigorous studies and new ways of action in order to harmonizing the relations between man and its environment.

As part of the Northern Group of the Eastern Carpathians, the upper basin of the Someşul Mare River lies on the geologic and morphologic contact area between the crystalline rocks of the Rodnei and Suhard Mountains and the sedimentary-volcanic rocks of the Bârgău Mountains. This reflects in the general physiognomy of the morphological landscape, as supporting ground of the agro-pastoral landscape in its temporal-spatial dynamic.

The geographic space of this hydrographic basin has a square-like shape, crossed diagonally by the Someşul Mare River, a true morphological-hydro-geographic and habitat axis.

Extended on over 1000 km^2, the upper basin of the Someşul Mare River is characterized by a downward gradient of almost 1900 m, between the Ineu peak in the Rodnei Mts. (2279 m) and the confluence with the Ilva River (400 m).

The researched territory comprise nine administrative units (eight communes and one town), each of them including belonging villages (excepting the communes Lunca Ilvei and Ilva Mică, formed by one village only), or, in the case of Sângeorz-Băi – the only town in the region, belonging suburban settlements.

The current study was based on the idea that in the future, because of the decrease of the active population that is practicing agro-pastoral activities, large areas of once cultivated areas (with plants adapted to the mountain soil and climate – potatoes, barley, oat, rye, a variety of acclimatized maize) or occupied by pastures and meadows (many of them obtained after century-lasting, large and difficult deforestations) may not be used again as agricultural areas.

By trying to recompose the initial geographical landscapes, we will be able to work out and propose some possible scenarios of the evolution of these landscapes, so that the ecological balance shall not be disturbed.

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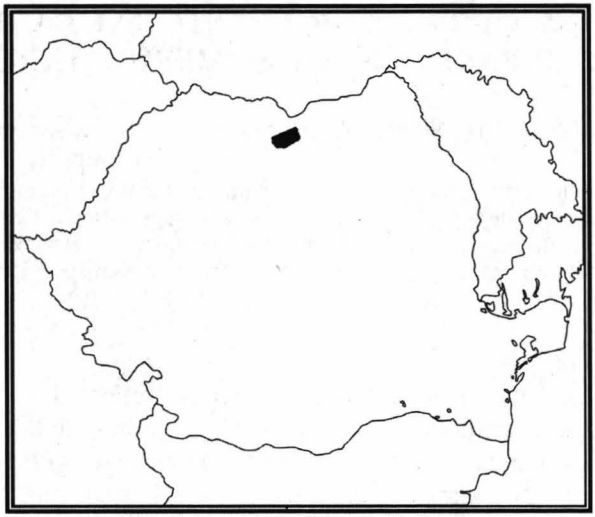

Fig. 1: Location of the studied area

Material and methods

It is known that the concept of landscape is hard to define, because of its rich semantic. In geography, the landscape was defined either as a purely objective unit, or as a subjective unit built by human spirit.

In the present study, we try to avoid, as much as possible, the limitative approach, by realizing observations, analysis, and interpretations based both on the detailed study of the geographical spatial reality and on data from the State Archives in Bistrița and Cluj-Napoca (for the years 1850 and 1938) or the local authorities (for the year 2006).

The quantitative analysis of the agro-pastoral landscape, in its temporal and spatial evolution, covers the land usage as well as the predominant live stock (sheep and cattle) in the region.

Based on this data, linked with the field studies, we realized correlations, analysis, and interpretations which will further allow us to recreate the agro-pastoral landscapes as they existed in the three chosen historical periods.

Results and discussion

After the Austrians took over Transylvania in 1762 by means of late 17th century diplomacy and military force, they established in the upper basin of the Someşul Mare River a border regiment, as a military, political, and administrative entity. This moment has a major importance for the population in this area, because through special laws and ordinances, the imperial military authorities, fearing border-crossing attacks, enacted the concentration of the dispersed housings from the glades in clear shaped settlements. Also in this period begins the distribution of mountain terrain for herbage, large-scaled deforestations in order to extend agricultural areas, followed, in the year 1770, by the introduction of the first land registers. By the end of the 18th

century, the mountain forest-dominated landscape is diversifying through the emergence of the agro-pastoral landscape.

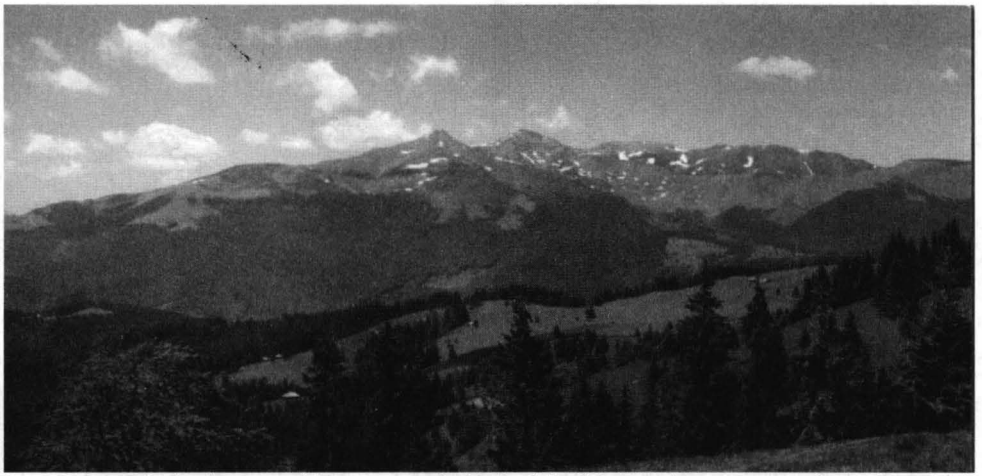

Fig. 2: Mountain landscape, with a compact belt of original forest; the pastures and meadows in the front are a result of deforestations in the 19th century

The doubling of the live stock (cattle, sheep and goats) in less than one century (from the establishment of the Border Regiment in the year 1762 to its denouement 1851) happened concomitant with the triplication of the agricultural area (mostly pastures and meadows, lesser infields).

The forest area, estimated at 75% of the total area in 1762, decreased down to 67% in 1850; in this period, the agricultural area widened by including some drained wetlands.

If we try to evaluate the types of land use for the year 1850, we can observe the wide extension of the forest landscape (67%), followed by the agro-pastoral landscapes, where pastures and meadows occupy 97% of the agricultural area. The actual agricultural landscapes occupy only 2% of the basin's area, because the infields count only 2100 hectares.

Up to the year 1938, the best year in the Interwar period Romanian economy, the evolution of landscapes reveals an appreciable expansion of agro-pastoral landscapes to the disadvantage of the forest ones.

In the area of the upper basin of the Someşul Mare River, the cattle number grows explosively (from 25000 in 1850 to over 35000 in 1938), while sheep and goats increase their number to over 75000, a maximum in the evolution of this sector. The forest area decreases to fewer than 60%, but the forest landscape diversifies, as the Austro-Hungarian forestry authorities begun, after the year 1900, a wide process of replacing the deciduous woods (which formed a compact belt between 800 and 1200 m altitude) with spruce and fir. The agro-pastoral landscapes include now: pasture and meadows – almost 35% of the basin's area; infields – 5% (maximum value, as a result

of massive clearings of medium-declined, favorable oriented flanks, in order to grow barley, oat, rye, and potatoes, due to the food-crisis following the First World War).

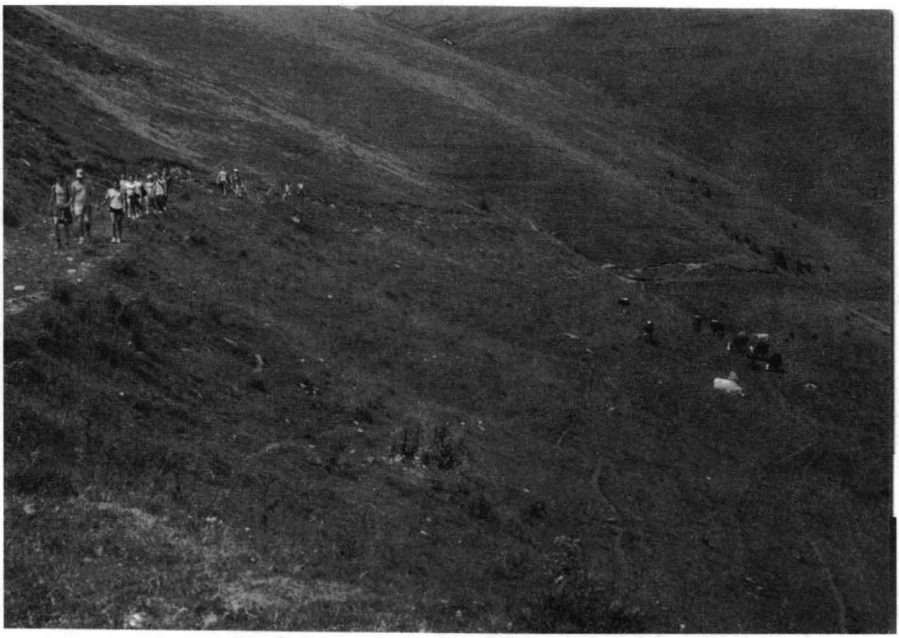

Fig. 3: Natural meadow in the alpine region

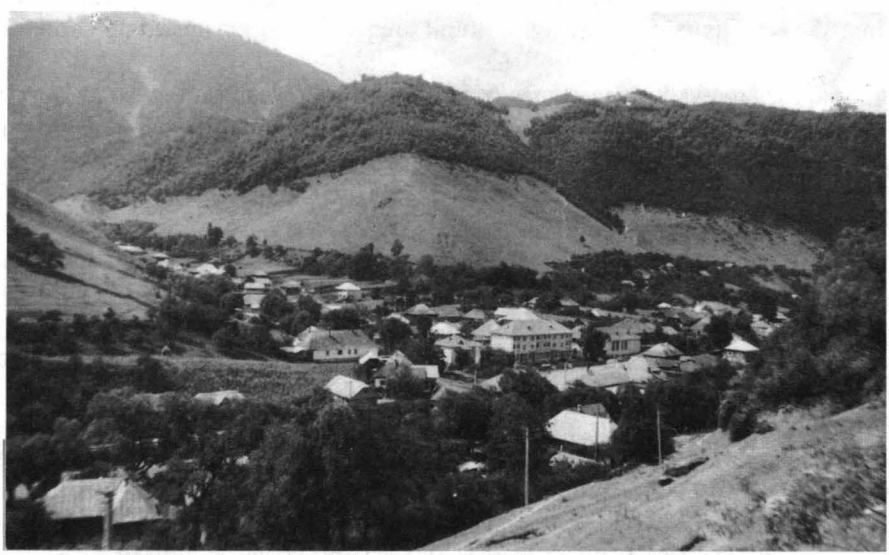

Fig. 4: Deforestation in the vicinity of Leşu village for grazing

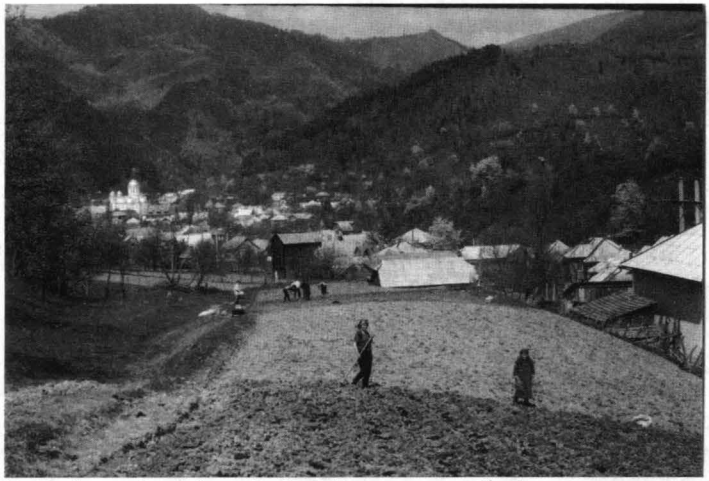

Fig. 5: Infield in Rodna, gained through ploughing up a grassland – a common practice in the area

Physiognomic and structural, the agro-pastoral landscape in the upper basin of the Someşul Mare River keeps its characteristics till the 1990's (only following elements extend their area: buildings, roads, mining shafts, dumps and catch pits for non-ferrous ore).

Beginning with the year 1990, the lack of viable economic alternatives to the recession of mining pushed the inhabitants of the basin to find their means for living in exploiting and primary processing of wood, causing a considerable decrease of the forest areas.

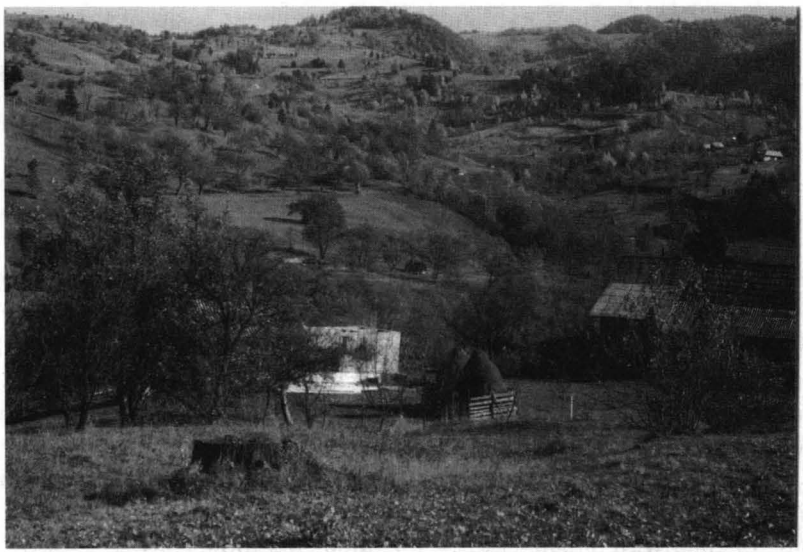

Fig. 6: Natural reforestation on a former meadow on the watershed between the Someşul Mare and Ilva rivers

For the year 2006 we can observe a dramatic fall of live stock, even under the level of the year 1850 (20000 cattle, 31000 sheep).

The agro-pastoral landscape reveals following characteristics:

- in 2006, the forest area drops under 50% of the basin's area
- the pastures and meadows occupies almost 40%, paradoxically, not by quantitative and qualitative improvements, but by fallow-lying once arable land, and including clearings and non-forested areas
- the infields drop to 2%, as a result of the "invasion" of the corn and vegetable markets with products from other EU countries
- the building area grows, large arable areas from the water meadows being occupied by housings; as a matter of fact, on the entire superior course of the Someşul Mare Valley and the valleys of its confluents, the villages tend to unify, prospectively making the occurrence of a authentic habitat belt along the rivers possible
- in place of the numerous abandoned sheepfolds and mountain meadows there appear natural, spontaneous reforestations
- The enlargement of the Rodnei Mountains Natural Park, with strict rules regarding economic exploitation of the pastures and forests, will create the premises of rebalancing the natural environment, which can regain, in approximately half a century, its condition from the 18th century.

Conclusions

- the introducing, in 1770, of the land registers in Transylvania, gave us the possibility to access data based on which we realized a set of analyses and quantitative interpretations of the agro-pastoral landscape in the upper basin of the Someşul Mare River;
- in the year 1850, at the denouement of the habsburgi military border institution, the agro-pastoral landscape is characterized by the human pressure on the geographic milieu;
- the year 1938, as a landmark of the interwar period Romanian economy, is the moment when the agro-pastoral landscapes reaches their maximal extension, linked to the increasing pastoral activities and plant cultivation in this area;
- the massive migration of the inhabitants in Spain and Italy, the recession of the mining activities and the over-filling of the market with cheaper products from the Central and Western European, EU member countries, generates a dramatic decline of the grazing and agricultural activities in the area; the year 2006 shows the lowest cattle and sheep stocks recorded in the last century and the lowest percent of forest areas; this is reflected by the rapidly transforming agro-pastoral landscapes;
- the enlargement of the Rodnei Mountains National Park in 2004 creates the premises for a rebalancing of the natural environment, which, in a optimistic scenario, will regain, together with the landscapes, its initial condition.

Tabel 1: The relationship between the morphological-geographical spatial elements and the types of landscape in the upper basin of the Someşul Mare River

Morphological-geographical component	**Landscape type**
River meadows and river terraces (400 – 600 m)	- agricultural landscapes (corn and potato growing, orchard) - dispersed and compact habitats landscape
Subalpine hills (600 – 800 m)	- landscapes characterized by meadows, potato growing, and clumps of beech - slope habitats with seasonal housings
Low mountains (800 – 1200 m)	- beech forest mixed with spruce and fir - pastures and meadows, isolated seasonal housings
Medium high mountains (1200 – 1800 m)	- conifer forest with clusters of beech - small areas of pastures and meadows, seasonal shelters
High mountains (1800 – 2279 m)	- alpine pastures with clumps of *Pinus mugo* - sheepfolds and tourist shelters

Fig. 7: The state of the main types of landscape in the upper basin of the Somesul Mare River

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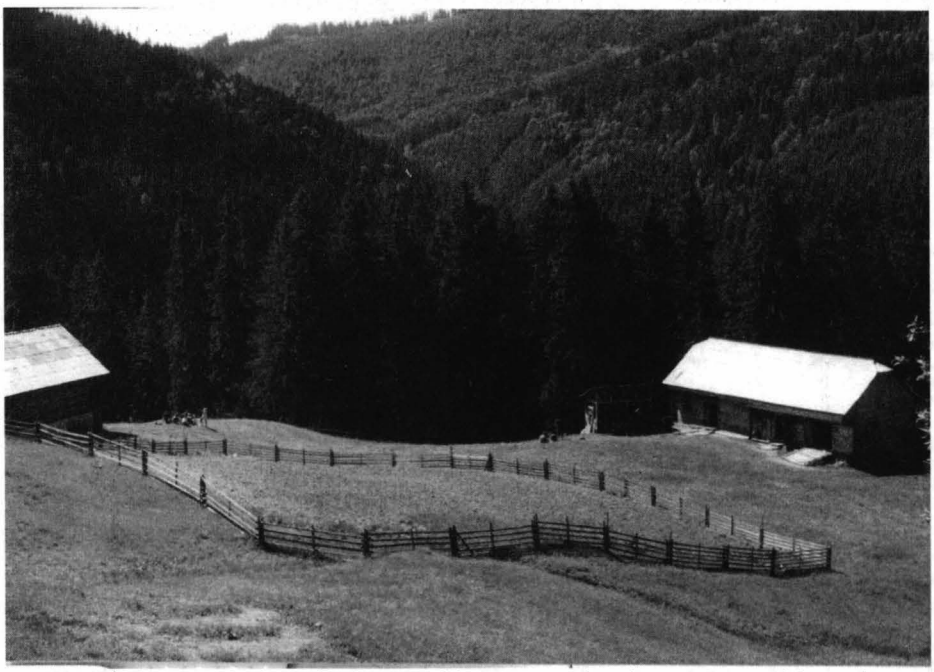

Fig. 8: Clearance in the Suhard Mts., with temporary housings and vegetable garden

THE MANY-SIDED STATUS OF THE NĂSĂUD BORDER DISTRICT

Mircea MUREŞIANU*

Abstract: Ein großer Teil des heutigen Kreises Bistriţa-Năsăud in Nordost-Rumänien war gegen Ende der Feudalepoche unter den Intellektuellen als „Năsăuder Grenzdistrikt" bekannt. Es war auch die Heimatregion des II. Rumänischen Grenzregiments. Für die Regierung in Wien war es durchaus von Vorteil, das die große Zahl von Bauern-Soldaten nur geringe materielle Unterstützung brauchte und stets einsatzbereit war, andererseits stellte es sich aber auch als ein „geopolitischer Boomerang" aus, da die einheimischen Rumänen vom Zeitpunkt der Emanzipation von dieser Situation profitierten. Der Năsăuder Grenzdistrikt war geodemographisch und ethnokulturell ein rumänisches Gebiet. Es gab zwar die Nachteile der strengen, z. T. rüden militärischen Ordnung, im Gegensatz wirkte es aber stimulierend für den wirtschaftlichen Fortschritt und den Wandel im kulturellen, konfessionellen und geographischen Kontext. Die Region spielte eine bedeutende Rolle bei der Bildung eines Nationalbewusstseins und Stolzes, was auch durch das Fahnenmotto: „Virtus Romana Rediviva" symbolisiert wird.
Key words: border district, cultural emancipation, "geopolitical boomerang", political entity, military entity, administrative entity, geobehavioural entity

Beginning and evolution. Confronted with various internal dangers (the range of claims of the Romanian peasants exploited for almost three centuries by the Bistriţean magistrate) and external ones (the Russio-ottoman expansionism, the emigration and immigration phenomena, the overborder smuggling, the epidemic danger etc.), the imperial authorities foremost of whom was the empress Maria Tereza, decided to militarize the Rodna Valley, starting with the year 1762.

Analised on the whole, the militarizing operation of the Năsăud region consisted of three major stages, each of them being characterized by several distinct moments.

During **the first stage**, 23 villages (21 on the Rodna valley and 2 on the Şieu valley) were militarized and transformed into politico-administrative and military-border entities.

The second stage materialized, in this geographical area, into the extension of the militarization (1762) over two communes on the Budacul valley, one on the Şieu, two on the Luţu valley and two on the Mureş valley, redeemed from their respective landlords. This stage practically ended in 1773 when, after the first visit of the emperor Josef II to the district, several villages were detached from some older border communes, thus becoming politico-military and administrative independent entities.

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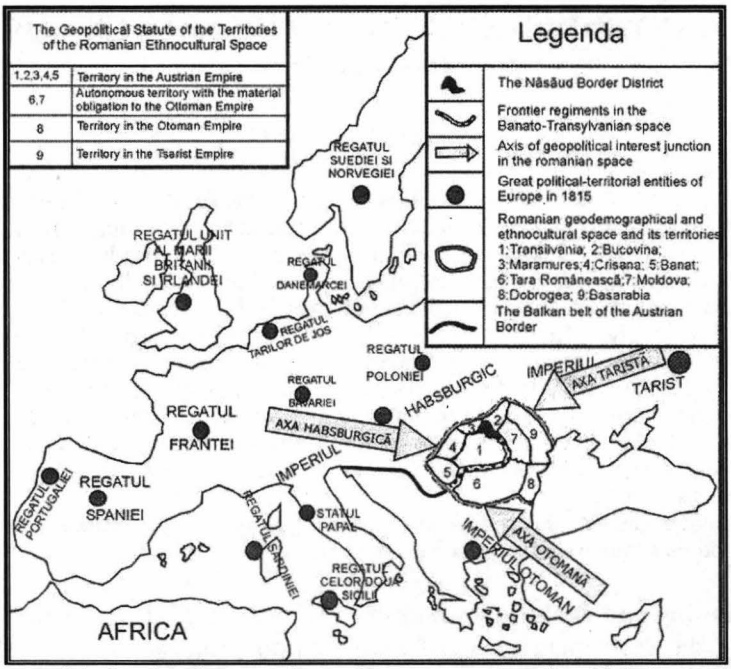

Fig. 1: The geopolitical regional, Romanian and European context in which the Border District of Năsăud functioned (the 1815's Europe, after the Vienna Congress)

The third and the last major stage was a consequence of the second visit of the emperor Josef II, in 1783. On this occasion, he ordered to include the eight Bârgău localities into the regiment territory, by redeeming them from the Bethlen family.

After the revolutionary events of 1848-1849, by the Disposition of January 22, 1851, they ordered to abolish the border regiments and on April 1, 1851, the communes of the Năsăud Border District were transposed under civil authority.

Political, administrative and military entity. Representing a part of the oriental policy of the Austrian empire and expressing the geopolitical and geostrategical interests of the House of Habsburg for this geographical and geodemographic region, the militarization of the Rodna Valley region conferred to the Năsăud Border District the status of a **political entity.**

The authorities atempt to achieve their politico-military and geostrategical goals obliged them, considering the large mass of civil population in the district, to promote and obey laws or rules specific to the civil administration, which conferred to the district the status of **administrative entity.**

The internal and external politics of the House of Habsburg required the military organization of the Năsăud territory and its inhabitants, transformed into a "people of soldiers", which attributed the district (first of all) the status of a **military unit**.

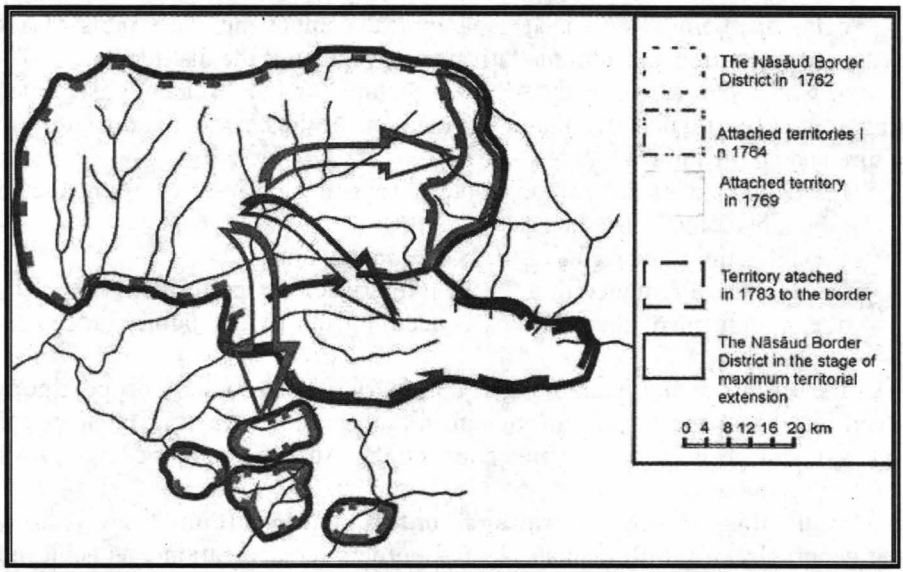

Fig. 2: Stages of the temporal-spatial evolution of the Năsăud Border District

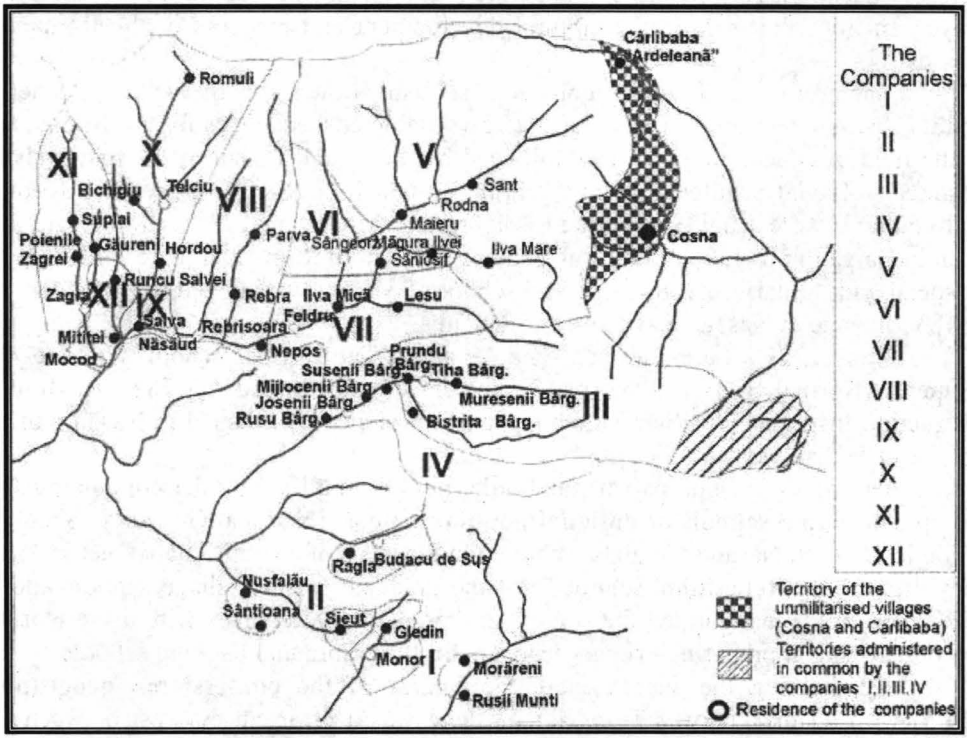

Fig. 3: The military-administrative distribution of the Năsăud Border District after the las reorganization (1816)

Social problems. The social geographical components were parts of a wide process of autodefinition and administrative improvement of the district.

On November 12, 1766 the "Border Statute" or the "Regulations" appeared; referring to it, G.Bariţiu declared that it "formed one of the best foundations for joining the culture and civilization".

This document settled, among others, several elements regarding the social domain of the inhabitants' life, such as:

- the obligations and rights of the border inhabitants;
- the novelty of remuneration for the military activity performed;
- the settlement of the relations concerning the border family, adoption and home-community;
- the setting up and functioning of a military medico-sanitary office, rigorously organized aiming at the territorial epidemical supervision, granting medical care in time of war and peace and the application of the Austrian sanitary laws in all the affiliated communes.

Implications in the cultural and confessional evolution. There is no doubt that the geography of the Romanian Năsăud borders' emancipation was achieved not only through material means, but also – maybe first of all – through changes in the field of education, culture and church, which, as fundamental institutions of the state, played an important role in the cultural development and progress of the Romanian masses .

The promotion of the enlightened despotism at the Court of Vienna in general, and its Josifinic variant, in particular, had favourable consequences for the Romanians in the field of education too; it was followed by the establishment of the first **"trivial schools"** – Trivial Schulen – (from **trivium** – in which three subjects: writing, reading and counting were taught) in Năsăud, Maieru and Monor, in 1770 and in Zagra and Prundu Bârgăului in 1786; all the subjects were taught in Romanian. Later, in 1816 out of social and military reasons the trivial school of Maieru was moved to Sângeorz and in 1837 the one in Năsăud was moved to Telciu.

From 1771 a Latin-German school, called "The Normal School" and later the "Superior Normal School" ("Normal-Hauptschule") functioned in 1784, a "Military Instruction Institute" ("Militär-Erziehunghaus") was also established in Năsăud, being unique in Transylvania.

During the second part of the border period, in all the border communes they set up **communal schools** or **national popular schools** (National Gemainde Schulen) while in 1826, in Năsăud – a **girls' school.** On the basis of an authoritative act in 1827, they organized **"Repetition Schools"** for the graduates of the village schools and in 1837 there were inaugurated the 6 months' "preparatory" courses within the Normal School, aiming at preparing primary teachers for the communal national schools.

Considering the fundamental coordinates of the **confessional geography,** (fig.3) we find that, if over Transylvania there was a clear-cut contrast between the ideas and aspirations of the united intellectual elite and the predominant opinion climate of the village peasantry (proved by the orthodox resistence) within the territory

of the Năsăud border, it was initially diminished trough the authorities' policy related to the organization of the Geek-Catholic church and the consolidation of the union, and then, during the second part of the border, - through the activity of well – instructed clergymen, as well as of brilliant personalities such as the vicars Ion Marian and Grigor Moisil, all of them outstanding charismatic and confessional – cultural representatives, endowed with a considerable sense of history.

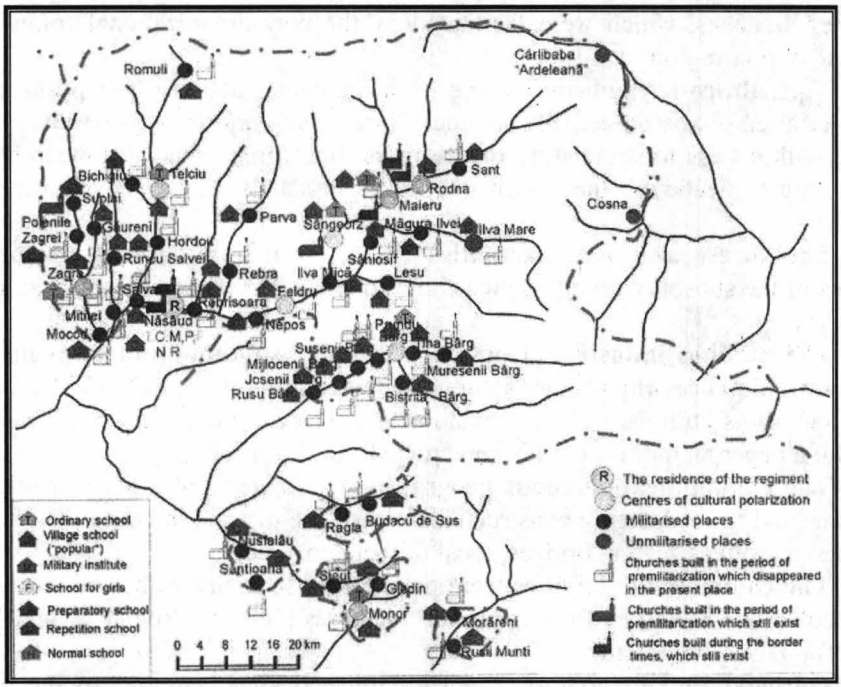

Fig. 4: The main cultural and confessional reference points of the border (1762 – 1851)

The borer managed to strengthen the Greek-Catholic church and to line it up to the aspirations of the Romanian natives, also marking a crystalization of the church hierarchies and a certain disciplining and ordering of the ecclesiastic staff and clerical administration, according to the model of the rigorous catholic institutions. Worth mentioning was a greater involvement of the church into the ordering of the village life; despite the material difficulties, a lot of churches were built during the border period, while the old ones were renovated.

The Năsăud border also managed to solve the components related to the territorial organization of the rectorship and, later, of the vicarship; on the social level, it promoted in maintaining a reasonable status for the clergymen, according to their mission in society.

Economical development. Important **mutations** determined the militarization, in the **domain of economical geography** too, for this process developed in an eminently silvopastoral mountainous territory.

The militarization quickened the appearance of elements specific to the transition from the feudal to the capitalist economy, materialized in the district's manufactures, or extraction and trade; thus the relation goods – money extended and the internal market developed, under the circumstances of a consistent contour that the enlightenment was obtaining.

Besides the redimensioning of the traditional economical branches, there also take place, at the same time, an increase of the productive activities, the appearance of new other branches, which were facilitated by the new organizational frame of life within the border region.

Agriculture strengthens its role of fundamental activity, **the plant culture** (with special emphasis on cereals, potatoes, linen, hemp and fruit-trees) diversify and improve with a view to stimulating **the animals' breeding**, especially sheep breeding on the alpine meadows, the mountains and grasslands are given to the border communes.

The forest and mine activities are intensified by utilizing some other resources of the subsoil within this area (limestone, andesites, dacites, marble, mineral waters etc.)

The millings industry, alongside with **home spinning and weaving** on the **primary wood processing** acquire an unprecedented proportion. In Năsăud, a beer and alcohol factory is built, as well as a manufacture for skin processing, while at Prundu Bârgăului a paper factory ("mill") is constructed.

The communication roads geography also underwent important mutations, important linking roads being constructed between the district and other neighbouring territories; as well as several bridges, most of them covered.

The commercial activities were performed especially within periodical fairs, which took place in some of the important localities (Năsăud, Rodna, Zagra, Monor, Prundu Bârgăului, Morăreni).

Outlooks and behaviour. Being established after centuries of the people's isolation, for fear of the invaders and nature's hostility, after dominations of different kinds, which generated a state of obedience, of material and spiritual misery, associated to our secular traditionalism and a complex and inert empirism, the military conditions of the Năsăud border were to determine profound changes in the **geography of outlooks and behaviour.**

The fundamental coordinates of the geography of outlooks and behaviour could be found in the attitude of the border people towards certain elements of progress and civilization, which the new authorities endeavoured to promote in the district.

At first, the reaction to the **militarization act** was hostile and hasty, both for fear of the military service, and because of the "short-term" way of thinking of the Romanian, accustomed to expecting his major problems to be solved from day to day. The series of rebellions and exodus at the beginning of the border period justifies this opinion, while the diminishing of the above – mentioned phenomena, with the passing of time, is a proof of the outlook of fate-reconciliation, typical for the Transylvania Romanian peasant.

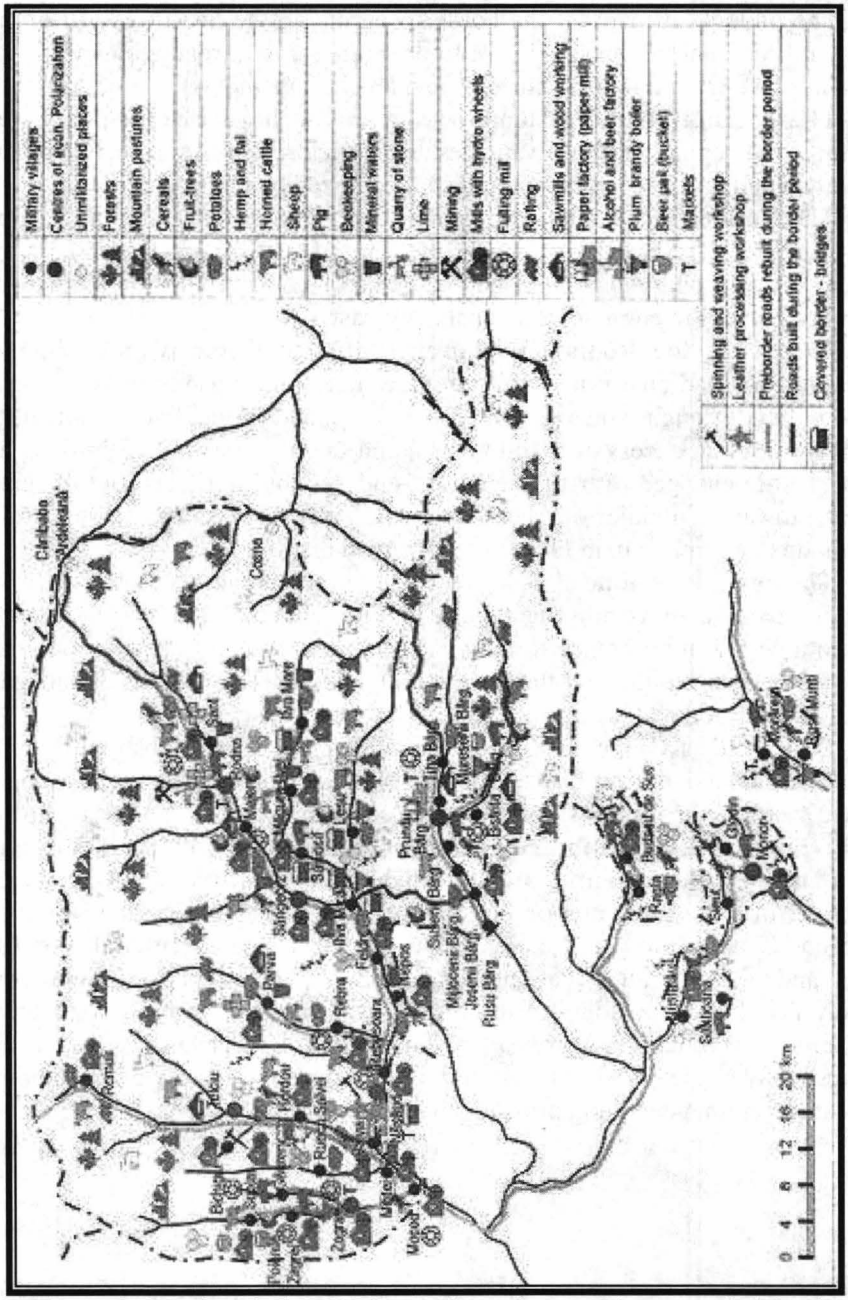

Fig. 5: The Năsăud Border District – fundamental coordinates of the economical development (1762 – 1851)

The outlook of many of the border peasants on the **health condition** and the necessity for the qualified medical staff to obey the sanitary regulations was rooted in the past, in superstitions, in local customs and level of instruction.

The outlook on the systematization of the border settlements was also reserveful at the beginning; the advantages and superiority of life in such habitual units – well united and grouped – were to be then recognized by their people.

The outlook on school also underwent an interesting evolution, from the phase of an initial reserved attitude on the part of many border inhabitants to the acceptance of their children being schooled on short term and further to the awareness of the role of school in coming off an enslaving past.

As regards **the Romanian church united to Rome** (Greek-Catholic), the Năsăud peasants had firstly a hostile attitude, not from reasons of rejection of the imperial policy, through which catholicism was planted in the Transylvanian ground, but, purely out of an excess of traditionalism and fidelity to a way of thinking and life which had little changed over the centuries, and, last but not least, out of ignorance. However, towards middle of the border period, catholicism, in its Romanian cvasiorthodox variant, won, in favour of Romanian masses.

The outlook on time also developed, from the preborder period, in which the rural traditional and above all sedentary, with pastoral and agricultural preoccupations, expressed a certain indifference to time – to the military border society, in which the military-soldiers discipline and the border obligations determined a rationalization of time and another outlook and attitude to it.

Conceived as a defending instrument of this part of the Habsburg Empire, both against internal and external dangers, the Năsăud Border District developed and asserted itself as a **many-sided status**, concomitently **a political entity, an administrative entity, a military entity, a social entity, an economic entity, a cultural and confessional entity and a geobehavioural entity**.

The many-sided status of the Năsăud border and the great victories of the autochthonous population in the field of economical, social, cultural, confessional, political and – above all – national emancipation, determined an impressive and extremely favourable spreading of the response of this institution through ages, front its end up to now; thus it has proved that The Năsăud Border District was, is and will remain not only a referential moment in the geography and history of these places, but also a state of mind, generating pride and hope.

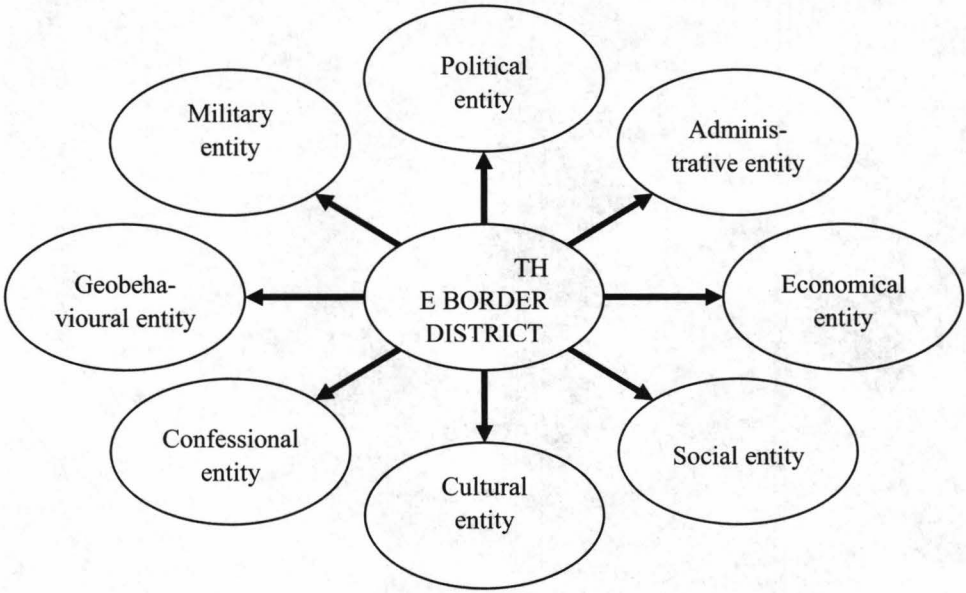

Fig. 6: The many-sided status of the Năsăud Border District

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THE GEOGRAPHIC STUDY BETWEEN CONCEPT AND COGNITIVE ANALISYS

Călin C. POP[1]

Abstract. The geographic study between concept and cognitive analisys. The selection of the facts and dates regarded as an operation caught in the conceptual matrix develops itself in the field of a general classification principle and shall be determined by the researcher's intention. He has a great freedom in choosing the theme, the concept, ideas, study, but once that these were established it will be easier to distinguish the *essential* facts of that *unessential* ones. Ofcourse the selection of facts in the investigations sphere depends not only by theory in the light of which the investigation is undertaken, but also by the whole knowledge, but it also depends on valorous judgements, mentalities, ideologies. The selection is strung by generalization. Phenomena ill - assorted are taken under some subsumed conceptions, but the heterogeneous variety of information is organized in homogenous units. The abstractions with which the geographers work allow comparisons, establishments and generalizations. The space is embodied and revealed in matter and both concepts are understood and applied in the terms of time. It is clear that matter can be understood and considered only in relationship with that part of the space which it occupies and with that period of time during which it acts. The *matter* concept, in the largest way, is synonym with energy and so that matter and energy become and are inconvertible. The energy includes light, warmth, sound, electricity, radiation and all the other manifestation of the energetic phenomena, capable of producing movement (dynamics) and realizing mechanical work of course, also comprising what we consider generally as matter, with its atomic and molecular structure and with its characteristics of density and inertia. The dynamics becomes in these contents the most essential attribute of the existence understood as like a permanent action, as a permanent interaction and permanent passing in general a continuous transformation. The space is a fundamental attribute of the existence, attribute that defines the spreading of the objects, but also the mutual relationship between the component elements of one material system, the extent showing the continuity characteristics of the space, and the mutual relationships of the discontinuity characteristics. The lasting notes of the process and succession of the events, the lasting notes showing the continuity aspects and those of the succession of the discontinuity aspects, are generally defining time. From time's characteristics we can't miss the coexistence that connects the time to the spatial coordinator understood in the sense of the concomitant passing of time and eventually reciprocally influencing the existence processes, an aspect that offers time the volume dimension. In what the time concept is concerned, the science generally and geography in particular bring for studying the almost indissoluble connection between spatial and temporal characteristics of certain studied systems. The integration is in fact interaction, inter-conditioning, interdependence and cooperation, meaning a system of influences and connections that manifest themselves in different ways, from the relations from and within the system's point of view, and regarding the integration problem in the facts and essence, we observe the dependence of the sub-systemic element towards the superior system, towards the element that commands. V. Mihăilescu, 1968, presents the geographic integration as being the most specific principle of the geography, because it shows the way for touching geography's goal - describing and explaining the territorial whole. The geographic integration has as a goal realizing an equilibrated dynamic for the superior geographic system, being an important mechanism because it assures the structural unity of the geographic reality and the dynamic equilibrium for the superior geographic cover. The geographic integration becomes a process, equilibrium, relation, unity, production, reproduction, adaptation, creation, hierarchy, reality, metamorphosis, finality etc. The geographic axis may be defined as being a force space-time line, *a line which allow space-temporally the diagnosis and prognosis of a geographic territory, a territory which may embody different*

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geographic shaping and dimensions in accordance with the components capacity of polarisation (Pop, 2003). The geographic Jibou-Zalău-Şimleu Silvaniei-Marghita axis is a functional territorial axis, defined by the following component elements: an urban nucleus, the territory periurban, a rural functional nucleus, a rural functional nuclei and the natural space. The axis as a whole, but especially the axis with its main components may be read from the point of view of integration (but also of analysis), under the following cognitive hipostasis: *union, globalising, inclusion, fusion, superposition* and *belonging (non-belonging).*
Key words: matter, dinamic, space time, axis, geographical axis, conceptual, cognitive hipostatis.

1. Introduction

In front of a great mass of data and facts, the researcher is solicited to different them by their importance in comparison with the investigated theme, to select them, to trace their relevance. The conceptualization comes to offer the study some criterions of selection for the facts and data. The selection of the facts and dates regarded as an operation caught in the conceptual matrix develops itself in the field of a general classification principle and shall be determined by the researcher's intention. He has a great freedom in choosing the theme, the concept, ideas, study, but once that these were established it will be easier to distinguish the *essential* facts of that *unessential* ones.

Even in the study of events happened in the past, the selection of the facts will be imposed in the outline of the background. On the other hand not only the theories, but also the interpretation of the theories affects the selection. The reduction of the conceptions about geography in a current or other affects in a negative way the selection of the facts so much that predisposes to neglecting the own autonomy of the information and facts domains encouraging simplified connection schemes between geographical load and the other loads.

Of course the selection of the facts in the investigations sphere depends not only by theory in the light of which the investigation is undertaken, but also by the whole knowledge, but it also depends on valorous judgements, mentalities, ideologies. The selection is strung by generalization. Phenomena ill - assorted are taken under some subsumed conceptions, but the heterogeneous variety of information is organized in homogenous units. The abstractions with which the geographers work allow comparisons, establishments and generalizations.

Science would be in vane if the phenomenon would be the same with the essence. Marx's finding is shared by any scientist. The theory imposes not only to distinguish what is important of what is unessential, but also to clear up the mechanism through which the phenomena gets to manifest its essence and to mark them systematically. The problem of the concrete essence of a geographical fact is being put particularly in case of the great events, those junction points in the life of a geographic system, long standing processes with slow pregnancy.

We are interested on the essence of the events particularly where these events appear as essential. The phenomenon can appear as essential, as important and great without always knowing exactly in what resides their essentiality, they affect from the start the life of some geographic systems for example of a human community and as long as they fill her up more, they exist and appear more essential. But what is their

effect, in what series of facts they include themselves, how do their effects manifests and what is manifested through themselves is not that obvious. Just that lacks of coincidence between the phenomenon and the essence claim the researcher a subtraction approach of the plenitude of facts, to discover the hidden source that generated them. For example, in what concerns the process of ozonosphere making, we have a great collection of data regarding the circumstance that created them.

The event played an important role, not only trough the colossal energies which were spent in their preparation and building, but also particularly trough consequences. The futurology presents alternative models for the future systems of the possible processes, with the results of influencing of decision and action. The starting point is made not by the past, but by the present and present tendencies, and redefining as a way of prediction consists in the intellectual ability to elaborate, to work in an original way the known things.

2. Matter, dynamic and space time

The space is embodied and revealed in matter and both concepts are understood and applied in the terms of time. It is clear that matter can be understood and considered only in relationship with that part of the space which it occupies and with that period of time during which it acts. Ofcourse, the *matter* concept, in the largest way, is synonym with energy and so that matter and energy become and are inconvertible.

The energy includes light, warmth, sound, electricity, radiation and all the other manifestation of the energetic phenomena, capable of producing movement (dynamics) and realizing mechanical work ofcourse, also comprising what we consider generally as matter, with its atomic and molecular structure and with its characteristics of density and inertia. Any manifestation of energy or matter in the Universe produces itself in space and time.

For any finite phenomenon, it's specifically duration has a specific duration and localization, a beginning and an end, both special and temporal. It is also meaningful that any energy manifestation involves in a necessary way a form of movement (light, warmth, sound, all has speed). To understand means to express as a concept.

The dynamic has at the basis of the definition the fact that the existence is material and, in the same time, the existence in generally has among the complex aspects of the material realities and aspects of a spiritual realities and that this spiritual reality isn't independent of the material reality. The dynamics becomes in these contents the most essential attribute of the existence understood as like a permanent action, as a permanent interaction and permanent passing in general a continuous transformation.

The reality needs space, and the space has three dimensions. Moreover, every dimension of the space occupies the whole space. In what the space is concerned, we accepted that the Universe as an integrating space is a spatial three-dimensional Universe. From the natural view of the human being, that scouts the created Universe,

it could be said that the three major dimensions are North-South, West-East and up down, which we can name length, width and height. Each one of these is infinitely spread and occupies the whole space. In conceptual-mental, if there would be only one dimension (e.g. the length), even if it would be infinite it would be impossible to surround or to visualize the way it looks like.

If we try to mark a line no matter how thin it would be, it must have and has a certain width in order to be seen, and then it isn't a line any more, but a plan. In this way the existence of a dimension (geographical), can be demonstrated only a stencil formed from two dimensions, and it is imperious for the second dimension to be present in order to evidence the first one. The reality and the presence of the length can be demonstrated only through the simultaneous presence and presentation of the width.

The space is a fundamental attribute of the existence, attribute that defines the spreading of the objects, but also the mutual relationship between the component elements of one material system, the extent showing the continuity characteristics of the space, and the mutual relationships of the discontinuity characteristics. The lasting notes of the process and succession of the events, the lasting notes showing the continuity aspects and those of the succession of the discontinuity aspects, are generally defining time. From time's characteristics we can't miss the coexistence that connects the time to the spatial coordinator understood in the sense of the concomitant passing of time and eventually reciprocally influencing the existence processes, an aspect that offers time the volume dimension. In what the time concept is concerned, the science generally and geography in particular bring for studying the almost indissoluble connection between spatial and temporal characteristics of certain studied systems.

3. The Integration (nondissociation)-geographic concept

Why should we regard integrated? Why should we analyze integrated? They look as tough questions, but they can receive logic answers, and this not only in the geographic domain. For example, the economists have basis economic patterns, the architects of referent architectural stiles, the painters have the representative colors, the historians work with the time periods, the anthropologists work with the basis species and the geographers have *integration levels*, and all these, but especially those that follow are combination, thinking and relating products.

As a first problem we must specify the ethimologic sense of the integration word, that comes from Latin and translates itself through establishment, completion and also the fact that through integration results the integral, produced whether through substitution method or the method of variable change or that of integrating on parts. In a system (a geographic system), the integration is necessary and possible through co-working and coherence state of the elements or even the processes that determinate this state. In a system *the self-destruction varies proportionally reverse to the degree of integration of the elements*.

For a community, as an example, the integration presumes a commune conscience, meaning sharing the same beliefs and the same goals between the members

of the certain community. The integration is in fact interaction, inter-conditioning, interdependence and cooperation, meaning a system of influences and connections that manifest themselves in different ways, from the relations from and within the system's point of view, and regarding the integration problem in the facts and essence, we observe the dependence of the sub-systemic element towards the superior system, towards the element that commands.

Mihăilescu, 1968, presents the geographic integration as being the most specific principle of the geography, because it shows the way for touching geography's goal – describing and explaining the territorial whole. Applying the integration principle allows us to get inside the secret structure of the territorial complex, to appreciate in a quantity and quality way the relations between the elements, as well the way they react to the movement forces (gravity and heat), meaning to ascertain and explain to ourselves the relative equilibrium that stabilizes itself between the elements of the geographic complex from the atmosphere to the society.

The integration presumes a contact between elements, bonding, interaction under the gravity's empire (terrestrial and universal) and heats (solar and terrestrial), on short, connection. Integrating into a complex means being bond to it through invisible and visible wires and living through that complex. The importance of the integration principle to geography, especially the importance of it's appliance in geography, has from the author, a very suggestive description, that we here by give: by applying very careful this principle, geography becomes an original and useful science not only by satisfying the curiosity of those who want to know the countries, the nations and their resources (geography in the informational phase), but also through the essential contribution to orienting terrestrial space utilization works (integral geography, meaning geography as a science).

If this principle is accepted, and it has to be, the geography also remains an independent science, with it's own object and method. It isn't accepted or it is believed that scientifically it can not be applied, geography dissociates or disappears as a science, loosing itself in different sciences (nature's, society's). The integration forms mean functional subordination, which means architecture in territorial reality, steps in the geographic plan. The integration of the geographic matter is the mechanism through which the geographic systems regulate and realize the state through which they can pass or tend from a stationary equilibrium on the inferior level to a dynamic equilibrium on a superior level.

In a new-order of ideas we can state that the geographic integration is the adequacy and reciprocal binding of the natural with the social, aspect that gives to the integration different degrees, being more intense when the natural corresponds to the relations of the social, the accent, in this case, being put on the relations. The geographic integration has as a goal realizing an equilibrated dynamic for the superior geographic system, being an important mechanism because it assures the structural unity of the geographic reality and the dynamic equilibrium for the superior geographic cover.

The geographic integration becomes a process, equilibrium, relation, unity, production, reproduction, adaptation, creation, hierarchy, reality, metamorphosis, finality etc. Seen as a process the geographic integration the non-conflictual dynamic on hierarchical steps differe between continuous or discontinuous hierarchical steps, through realizing the corresponding connections between the levels that contact. The geographic integration means the level to which the sub-systemic behaviors and major system behaviors are according with the awaiting of the superior geographic system. In the geographic reality, the integration is the interaction of the parts relating towards realizing their unity.

4. The geographic Jibou-Zalău-Şimleu Silvaniei-Marghita axis between concept and cognitive analisys.

The geographic axis may be defined as being a force space-time line, *a line which allow space-temporally the diagnosis and prognosis of a geographic territory, a territory which may embody different geographic shaping and dimensions in accordance with the components capacity of polarisation* (Pop, 2003).

The geographic Jibou-Zalău-Şimleu Silvaniei-Marghita axis is a functional territorial axis, defined by the following component elements: an urban nucleus, structured onto four unequal segments which consists of the dominant urban localities, the defining ones (Jibou, Zalău, Şimleu Silvaniei, Marghita); the territory corresponding to the urban territory (periurban), which is pinked with the urban from economic, social and natural point of view; a rural functional nucleus, structured in accordance with the capacity of the rural geographic space of the axis, with the communal centres respectively; rural functional nuclei, the villages corresponding to the axis; the natural space, given by the vertical and plan-spaced extremities of the axis.

Actually, the geographic Jibou-Zalău-Şimleu Silvaniei-Marghita axis is an environment which historically belongs to the Sylvania County, administratively to the district of Sălaj and Bihor; regionally-administratively to the north-west region; regional geographically, to the banato-Crişene Hills in the Silvano-Someşene this Unity; topo-climatelly (acording to Vintilă Mihăilescu), to the Sălaj type (the area of Jibou, Zalău, Şimleu Silvaniei), and Satu-Mare type (the Marghita zone); peri-glacial (Ichim, 1980), to the transitory domain between the discontinuous permafrost and the mountain permafrost (the area of Jibou, Zalău, Şimleu Silvaniei), and to the discontinuous permafrost (the Marghita zone); from the point of view of the zone (from the point of view of the forms of relief), to the Someş-Guruslău, the Sălaj Hills Depression, the Zalău Depression, the Şimleu Depression, the Camăr Hills and the Barcău Pasage; hydrological, to the Tissue Basin; economically, on the national level, the theca poor spaces; from the point of view of the forests (of the frequency of the forests), in between the values of 20-30 %, according to the location of the agricultural production, to the zone of breeding animals for the milk and for patato plantations (the Jibou perimeter), to the zone of vines and breeding animals for the milk (the Zalău perimeter), to the zone of fruit growing and of the vines (the Şimleul Silvaniei

perimeter) and to the zone of breeding animals for meat and for cereals craps (the Marghita perimeter); urbanely, to the towns and middle-sized cities; from the point of view of human landscapes (Giurcăneanu, 1973), to the cereals landscapes from the low forest zone (the Someş Plateau); touristically with a medium-large potential, but low level of actualising this, which consequently requires further study, analysis and charting; according to the functional zones of the north-west region (Cocean, 2002), to the critical zones (Zalău and Şimleu Silvaniei) and to the disadvantaged zones (Jibou and Marghita).

In conclusion, geographical systems of the axis type are the beneficiares of some memories where depending on the above characteristics, a series of essential parameters of different states, in their most efficient form accumulate so that they enrich the statuses having in view the lasting of the systems (the perfection of these statuses). The axis as a whole, but especially the axis with its main components may be read from the point of view of integration (but also of analysis), under the following cognitive hipostasis:

- *union*, of more than one sub-systems in order to the from the axis for common interests and purposes, from an economic, social and natural point of view. We return the fact even the formation of the major systems and sub-systems takes place through the union process too;

- *globalising*, meaning the major components are globalise, they are compressing parts of the axis, the some way the sub-components are integrated within the statuses superiority organised up to the level of ultrastructures;

- *inclusion*, considering that any element of the axis belongs to the four main components, in the some way the elements which give the major components their structure belong to the subsystems too;

- *fusion*, understood in the case of the axis by the unification of the forms (subsystems), in the background, so that the axis be comes a unique system which functions according to the new status;

- *superposition*, which implies the explanation of the dichotomy, a moment in which the axis as a whole coincides with the subcomponents and reversibly, the subcomponents coincide with the axis , meaning we may speak about the axis and see if through the components or speak about components at the level of the axis;

- *belonging (non-belonging)*, meaning the components are constitutive subsystems of the axis system, be them considered punctually or arreally, yet we retain that some of the sub-components of the four major components may not belong to the axis area, the some way they way belong totally or just to be opined to the axis.

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SOME ASPECTS CONCERNING THE MONTHLY DISTRIBUTION OF SNOW LAYER OVER THE CRIŞANO-SOMEŞANĂ PLAIN

Eugenia ŞERBAN[1], Carmen DRAGOTĂ[2]

Abstract: In the present work, data have been used concerning the monthly and annual number of days with soil covered with snow, on the period 1961-2002, data coming from the National Meteorology Administration Archive. On the average, between 30-50 days with soil covered with snow are recorded annually in the Crişano-Someşană Plain. In the last three decades, the duration of the snow layer has reduced a lot compared to the first decade. During the last two decades (1981-1990 and 1991-2002), the snow layer has decreased in length compared to the first decade by about 10-13 days to the South, 17 days to the centre and 20 days to the North of the plain. Throughout the year snow covers the soil during the interval November-April. The maximum duration of the snow layer occurs in January, the coldest month of the year. The snow layer occurs very rarely in October, only to the North of the plain, at Satu Mare station where low soil and air temperatures favour its occurrence. In extreme months of its occurrence – April and October – the frequency of this phenomenon has grown starting with the second part of the analysed period (1982-2002), hence rising the risk generated by the presence of the snow layer off-season. The phenomenon is linked to the growth of the number of late snowfalls in spring and early snowfalls in autumn in the last years, at the West of the country.
Key words: soil covered with snow, snow layer, frequency, duration, climatic risk

Introduction

The snow layer forms during the cold season, when the air and soil temperature is below freezing point and precipitation is falling as snow-form. Three conditions are essential for the snow layer to form: negative temperatures in air and on soil, sufficient solid precipitation amounts and atmospheric calmness.

The snow layer can become a climatic risk phenomenon both by its simple presence or its absence. In these circumstances it can has negative effects and produces damages to the society. By its presence, the snow layer can be considered a climatic risk when it occurs off-season, generating chilblains to cultivated plants, vines or freezes the fruit trees buds, when it is very thick, affecting transportation systems, when it melts abruptly or when the soil water reserve is sufficient or in surplus, bringing flash floods. By its absence the snow layer is an indirect climatic risk, because its absence drives to an increased frost risk, most affected being the autumn crops (Bogdan, Niculescu, 1999).

Data and methods

For the present work, data have been used concerning the monthly and annual number of days with soil covered with snow, data coming from the National

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Meteorology Administration Archive. The analysis has been performed for a number of 9 weather stations throughout the Crişano-Someşana Plain. They are as follows: Satu Mare, Săcueni, Oradea, Salonta, Holod, Chişineu-Criş, Ineu, Siria and Arad. The evolution of the number of days with a snow layer between 1961-2002 has been viewed and the monthly frequency of its occurrence has been calculated.

Results and discussions

On the average, between ***30-50 days*** with soil covered with snow, are recorded annually in the Crişano-Someşana Plain. The annual number of days with a snow layer has fluctuated a lot over the years at the weather stations (fig. 1). Thus, compared to the mean number, the maximum number has risen to values between 55-97 days and the minimum number to 0-2 days. The highest values were recorded at the beginning of the analysed period, in 1964 and the lowest values in 1972.

The highest values of the number of days with soil covered with snow were recorded at the weather stations, during the first decade of the analysed period (1961-1970) (fig. 2). *In the last three decades, the duration of the snow layer has reduced a lot compared to the first decade.* The poorest decade in days with snow layer was the second one (1971-1980), when the annual duration of the snow layer was 17 days shorter to the South, 20 days to the centre and 31 days to the North of the Plain, compared to the first decade. *During the last two decades* (1981-1990 and 1991-2002), *the snow layer has decreased in length compared to the first decade by about 10-13 days to the South, 17 days to the centre and 20 days to the North of the plain.* The cause of this diminution is the air temperature growth recorded in the last years, which did not keep the snow layer on the soil.

The linear tendency of the annual number of days with soil covered with snow (fig. 1) shows as well that *in the period 1961-2002, the duration of the snow layer was in decrease at the West of the country.*

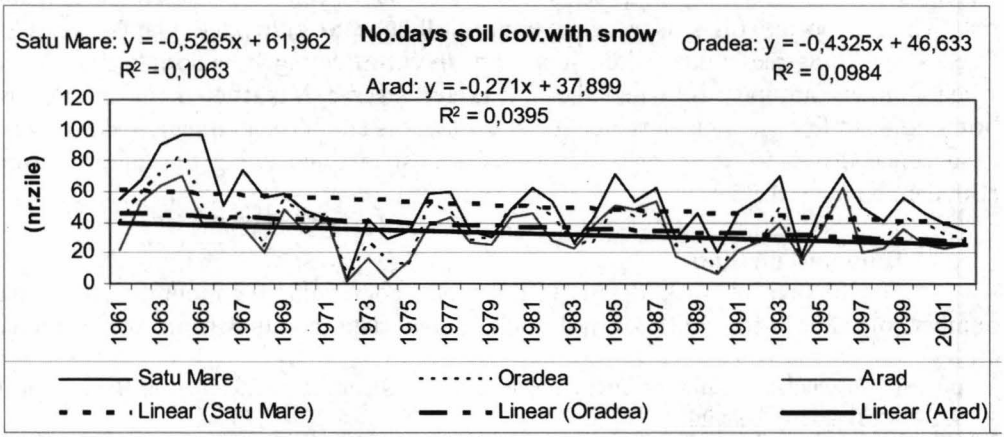

Fig. 1. The annual number of days with soil covered with snow and its linear tendency, in Crişano-Someşana Plain (1961-2002).

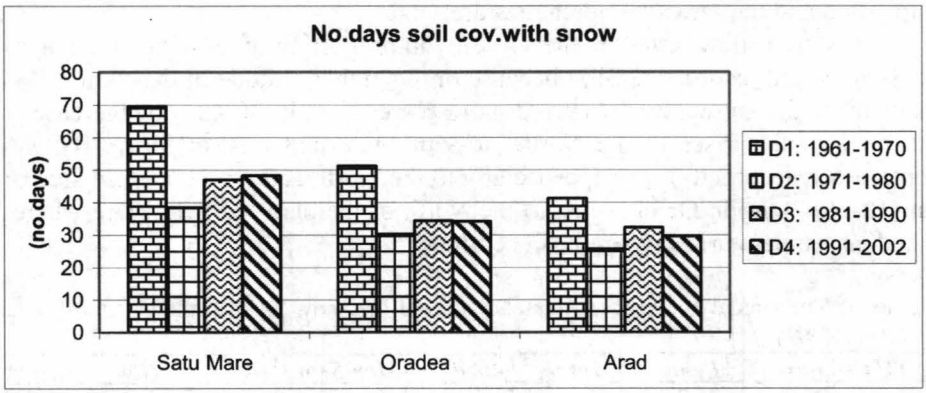

Fig. 2. The annual mean number of days with soil covered with snow, on the four decades of the period 1961-2002, in Crişano-Someşana Plain.

Throughout the year snow covers the soil during the interval ***November-April*** all over Crişano-Someşana Plain territory. To the North only, at Satu Mare where the mean air temperature is lower and the climate oceanic influences are felt, the snow layer lasts longer, from October till April and at Salonta less, in the interval November-March. Here its shorter duration is linked to the shorter observation period (1983-1998) in which days with a snow layer in April weren't recorded, respectively due to the lower altitude of the weather station (95 m, Salonta being the station at the lowest altitude in the plain), that determines the lowest amounts of precipitation in the Crişano-Someşana Plain.

We can observe that throughout the plain, even though most of the stations have snowfalls in October as well, the air and soil temperature does not allow the occurrence and maintenance of the snow layer in this **month.**

The duration of the snow layer rises from November until *January,* when it has a peak and then it decreases until April. The maximum of January occurs due to thermic minimum recorded in this month. In the months of the interval May-October there are not favourable conditions to formation of the snow layer on the soil (except for October at Satu Mare).

Table 1 shows the annual occurrence frequency of the snow layer during 1961-2002, in different months of the year. We can notice that during the winter months the snow layer was present almost each year. Thus, out of the 42 analysed years, it occurred in percentage of 84.4-100% of years in January, 78.1-95.2% in February and 84.2-92.9% in December. In these months the snow layer was absent of the entire surface of the plain on an average of 2-3 years and longer only to the South of the plain, at some of the stations, where it was absent up to 5-8 years (in February it was absent at Chişineu-Criş for 7 years out of the total analysed years and for 8 years at Arad). The snow layer makes a good presence in these months especially in the

Someşana Plain and in the eastern sector of the Crişurilor Plain that is where the richest precipitation and the lowest temperatures are.

In March snow lasted on the soil only in proportion of 50-65% of the analysed years (most often recorded at Siria because of the higher altitude of the station: 447m). In November the snow layer occurred more scarce, just in 30-40% of the cases (and about 50% of the cases to the North, at Satu Mare and East at Siria). By way of exception was recorded in April, especially to the North and on the eastern side of the plain (10-26%) and in October just to the North of the plain, at Satu Mare where low soil and air temperatures favoured its occurrence.

Table no. 1: The annual occurrence frequency (%) of the snow layer in the Crişano-Someşana Plain (1961-2002).

STATION	*Jan.*	*Febr.*	*March*	*April*	*May-Sept.*	*Oct.*	*Nov.*	*Dec.*
Satu Mare	95.2	95.2	64.3	9.5	–	4.8	52.4	92.9
Săcueni	90.6	90.6	62.5	6.3	–	–	34.4	87.5
Oradea	95.2	88.1	52.4	11.9	–	–	38.1	90.5
Salonta	87.5	87.5	50.0	–	–	–	31.3	87.5
Holod	91.4	85.7	54.3	20.0	–	–	37.1	91.4
Chis-Cr.	84.4	78.1	53.1	6.3	–	–	28.1	84.4
Ineu	94.7	89.5	52.6	5.3	–	–	31.6	84.2
Siria	100.0	94.7	78.9	26.3	–	–	52.6	89.5
Arad	88,1	81,0	50,0	4,8	–	–	38,1	92,9

The monthly mean number of days with soil covered with snow. In ***January,*** the month of the longest duration of the snow layer, the mean number of days with snow covered soil rises up to 11.7-18.5 days (fig.3). The lowest value is recorded to the South, at Chişineu-Criş and the maximum to the North, at Satu Mare. Except the stations Chişineu-Criş (11.7 days) and Salonta (12,2 days) where the number is the most scarce - because the lowest altitudes of the stations that determines low precipitation amounts - at the other stations it rises from the South (12.4 days at Arad, 13.7 days at Siria) towards the centre (about 14 days at most of the stations) and North (18.5 days at Satu Mare).

The second month with a long duration of the snow layer is February, when the records show on the average between 8.4 days with soil covered with snow to the South, at Arad and 13.8 days to the North at Satu Mare. At the stations Siria, Salonta and Holod, the snow layer lasts about 11 days, longer than at the stations around them, because for the first two stations February is the month with the highest number of days with snowfall and at Holod there generally falls richer precipitation because of the location of the station at the boundary between the plain and the hills. Here, the forced ascendant movement of the air masses determines richer precipitation. At the rest of the stations over the plain, snow lasts on the soil about 10 days (and 8.5 at Chişineu-Criş) in February.

The third month with a high number of days with soil covered with snow is December, when records show on the average, between 6.4 days at Ineu and 12.0 days at Satu Mare. During this month there are 6-7 days in the Crişurilor Plain and 10-12

days in the Someşului Plain and to the eastern part of the Crişurilor Plain, at Holod. At Siria, similar to the situation of the number of days with snowfall, the second month with a longer duration of the snow layer is December (11.8 days), followed by February (11.0 days).

Compared to the number of days with snowfall, which shows December as the second month with rich snowfalls, followed by February, the case of the number of days with a snow layer, the second month is February and not December, because of the lower temperatures recorded at soil level in this month, which bring to a longer lasting snow layer.

In March, the snow layer lasts longer than in November because there is more snowfall. Also the soil is colder in March as it keeps being cold after winter passes. But, in November, its temperature isn't that low, because of the warmth it stores during summer and autumn, and gives off now.

The mean number of days with soil covered with snow rises in March up to 1.8-4.1 days (and 4.6 at Siria), lower at Chişineu-Criş and Ineu, whereas in November it is between 1.1-2.1 days (and 3.6 at Siria). At Siria the snow layer lasts longer than at the other stations because of the higher altitude of the station. It is actually located in the mountain sector.

In March, the duration of the snow layer is smaller than the number of days with snowfall, except for the northern stations (Satu Mare) and eastern stations (Holod and Siria), which are colder. In November also, the snow layer lasts less than the number of days with snowfall because of the soil temperature, which is unfavourable for maintaining it.

The shortest interval of the snow layer is in *April,* with a mean number of 0.05-0.2 days (and 0.6 at Siria). The snow layer is absent in this month only at Salonta. In *October* the snow layer occurs only to the North of the plain, at Satu Mare (0.1 days) and very rarely (in 2 out of the 42 analysed years, respectively the years 1991 and 1997).

As for the monthly *frequency* of the number of days with soil covered with snow (fig.4), we can notice that winter months have the highest values, toting up between 88-91% of the total of the months of a year (and only 80% at Siria where snow occurs in higher proportion in the extreme months, too, due to the soil and air lower temperatures). This percentage is a little higher than the one of number of days with snowfall. Thus, January has a 35-43% frequency of occurrence of snow layer (and only 30% la Siria) and has the highest percentage. February has about 24-32% and December 19-26% of the total of the months of a year.

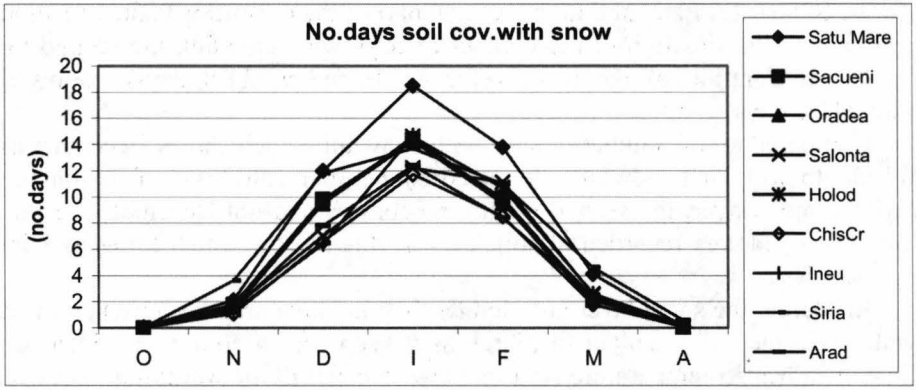

Fig. 3. The monthly mean number of days with soil covered with snow in Crişano-Someşana Plain (1961-2002).

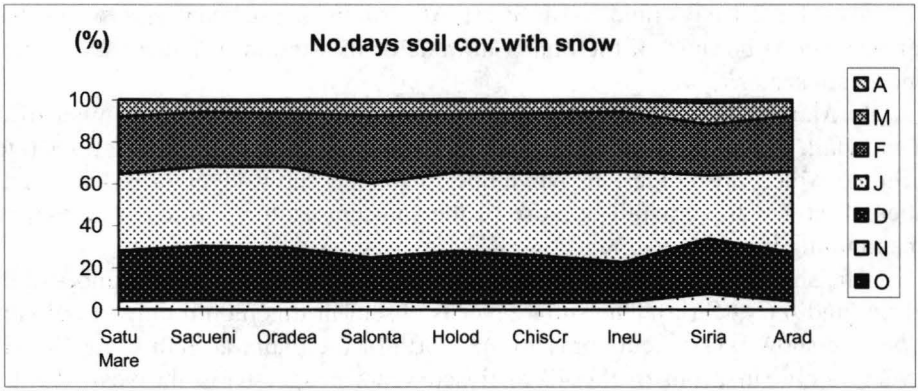

Fig. 4. The frequency of monthly mean number of days with soil covered with snow in Crişano-Someşană Plain (1961-2002).

In the other months, the frequency of days with soil covered with snow lessens very much. So in March the frequency is 5-10%, in November 4-8% and in April lowers even more, to 0.2-1.3%. In October the snow layer is absent over the entire surface of the plain, except the northern sector where, at the station Satu Mare it has a frequency of 0.2%.

In April the snow layer was present especially in the second half of the analysed period, 1982-2002. It was present especially in 1982,1986, in the interval 1995-1997 and in 2002. In October, the snow layer recorded at Satu Mare occurred in the last decade of the analysed period (the years 1991 and 1997). It was absent before 1991. We can say that *in the last years, the risk generated by the presence of snow layer off-season, has increased.*

When it occurs at the beginning or at the end of the plants vegetation period, the snow layer represents a major risk, endangering crops, fruit trees or vine and in autumn it forces plants to shorten their annual cycle of active life.

Conclusions

In the last three decades of the analysed period 1961-2002, in the Crişano-Someşană Plain the duration of the snow layer reduced considerably compared to the first decade. The cause lies in the growth of the air temperature in the last years, which didn't favour the maintenance of the snow layer on the soil.

Throughout the year snow covers the soil in the interval November-April. The maximum duration of the snow layer occurs in January, the coldest month of the year. In the western plain areas of the country, the snow layer represents a climatic risk when it produces at the beginning or at the end of the plans vegetation period, endangering crops. In its extreme months – April and October – the frequency of this phenomenon has grown starting with the second part of the analysed period (1982-2002), hence rising the risk generated by the presence of the snow layer off-season. The phenomenon is linked to the growth of the number of late snowfalls in spring and early snowfalls in autumn in the last years, in the western side of Romania.

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Rezumat: În lucrarea de faţă s-au utilizat datele privind numărul lunar şi anual de zile cu sol acoperit cu zăpadă pe perioada 1961-2002, provenite din Arhiva Administraţiei Naţionale de Meteorologie. Analiza s-a realizat pentru un număr de 9 staţii meteorologice. În Câmpia Crişano-Someşană se înregistrează în medie pe an, între 30-50 zile cu sol acoperit cu zăpada. În ultimele trei decenii, durata stratului de

zăpadă s-a redus foarte mult comparativ cu cea a primului deceniu. În ultimele două decenii (1981-1990 şi 1991-2002), stratul de zăpadă s-a redus ca durată faţă de primul deceniu cu circa 10-13 zile în sudul câmpiei, 17 zile în centru şi 20 zile în nordul câmpiei. În cursul anului, zăpada acoperă solul în intervalul noiembrie-aprilie. Durata maximă a stratului de zăpadă se semnalează în ianuarie, ea fiind cea mai rece luna a anului. În octombrie, stratul de zăpada poate fi întâlnit numai în nordul câmpiei, la Satu Mare şi în situaţii foarte rare. În lunile extreme de producere a lui – aprilie şi octombrie – a crescut frecvenţa acestui fenomen începând cu a doua parte a perioadei analizate (1982-2002), deci a crescut riscul general de prezenţa stratului de zăpadă în extrasezon. Fenomenul este legat de creşterea numărului ninsorilor târzii de primăvară şi timpurii de toamnă din ultimii ani, în vestul ţării.

BOOK REVIEW

Pop Cornel Călin, *Geografie Conceptuală (Conceptual Geography)*, Casa Cărţii de Ştiinţă, Cluj-Napoca, 2006, 165 p., 17 figures

We are sincerely glad each time a colleague of the noble "guild" of the geographers brings to light, after long quests and sleepless nights, a new book. It is a time of joy for both the author and the readers.

Conceptual Geography by our colleague Călin Cornel Pop, from the Faculty of Geography (Babeş-Bolyai University Cluj-Napoca), tries (and fully succeeds) to consolidate the "structural system" of this spectacular edifice, namely Geography, through a consistent and inspired theoretical argumentation.

In the four main chapters (I. Conceptual Argumentation and Rationale; II. Concept. Science. Geography; III. Examples and Conceptual Usage; IV. Conceptual Geographical Correlations) that compile a interesting, 165 pages long book, the author succeeds to convince us that geography and its conceptual bases can be constantly improved by works of this type, conceived and elaborated by restless minds, characterized by a profound interpretive and analytic spirit, as well as a constant restlessness.

The book's thematic plan is based on a clear, logical, rigorous, and coherent thinking, assuring the successful promotion of the structural-systemic formula in the work's theme.

As the author alleges, "the conceptual geography, based on conceptual elements, starting from the mental ones, from perception, is basing on the creation, through multiple junctions, of those kind of things or on the acceptance of those study models or prototypes that can indicate how far the geographical thinking reached or can reach, in order to offer a viable and distinct solution to a newly emerged problem". This is the author's belief and the golden thread of the entire work, linking its parts in a whole that serves as a model for all those who place theory in the centre of knowledge and who believe in the necessity of bringing geography in the front and in the fact that conceptual-projective geography can represent the future of society development.

Conceptual Geography deserves to be looked for and studied, providing a new approach regarding the availability of geography to arrange the existing facts, along with the explanation of the existence's subtleties from the analysed space.

It is a meritorious work, contributing to the triumph of scientific modernism over the derogatory traditionalism of the excessive descriptivism.

Conf. univ. Dr. Mircea MUREŞIANU

Studii şi cercetări, Geology-Geography 13, Bistriţa, p. 163-170

ATELIER REGIONAL DE CONSERVATION DU PATRIMOINE CULTUREL ARC-NUCLEART

Les techniques actuelles de conservation d'objets en bois georgés d'eau d'un intérêt historique et esthétique majeur

Ioan CHINTĂUAN[1]

L'Atelier Régional de Conservation ARC-Nucléart:

• ARC-Nucléart, implanté dans l'enceinte du CEA/Grenoble est un GIPC entre le ministère chargé de la culture, le CEA, la Région Rhône-Alpes, la Ville de Grenoble et l'association Pronucléart.

Missions:

• Réaliser les travaux ayant pour objectifs la conservation préventive, le prélèvement, la consolidation, la restauration, la désinfection, la présentation muséographique des matériaux organiques: bois gorgés d'eau, bois secs, cuirs, vanneries, cordages.

• Mener des recherches afin de développer les méthodes les mieux adaptées au traitement des objets.

• Informer les milieux de la conservation et de la culture des problèmes, des techniques et des possibilités relatifs à la conservation du patrimoine culturel étudié et traité par le laboratoire.

• Entreprendre toute action de formation par la recherche dans le cadre de ses domaines d'intervention.

Moyens:

• Doté d'une équipe pluridisciplinaire associant physiciens, chimistes, techniciens, restaurateurs et conservateur du patrimoine, le laboratoire ARC-Nucléart étend son domaine d'intervention au patrimoine archéologique, ethnologique et industriel. ARC-Nucléart est certifié ISO 9001 version 2000.

Installations & équipements:

• 3 000 m^2 de locaux sécurisés comprenant: Unités d'imprégnation de résines, lyophilisateur de grandes dimensions, réserves climatisées, chambres froides de stockage, irradiateur gamma (sources de Co^{60}), ateliers de restauration, laboratoires d'étude, gestion informatisée des collections.

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Traiter et Consolider:

La désinsectisation s'effectue par simple exposition au rayonnement gamma des objets contaminés par des insectes xylophages. Le traitement est pratiqué à température et pression ambiantes, sans adjonction de produits chimiques. L'intervention dure de une à quelques heures. Ce traitement est uniquement curatif. La désinfection peut concerner des momies, des reliques, des collections d'histoire naturelle (lutte contre les attaques fongiques par exemple). Elle est également réalisée par exposition au rayonnement gomma.

La consolidation:

L'objectif est de consolider et sécher les objets en sauvegardant leur intégrité. Trois méthodes sont disponibles et choisies en fonction de l'état de l'objet à traiter:

a) L'imprégnation à saturation par polyéthylèneglycol (PEG) suivie d'un séchage contrôlé.

b) L'imprégnation par des PEG cryo protecteurs et consolidants, suivie de la congélation, puis de la sublimation de l'eau (lyophilisation). La méthode est appliquée aux bois comme aux cuirs.

c) L'imprégnation par résine radiodurcissable, suivie de l'exposition au rayonnement gamma (sources de Co^{60}): procédé «Nucléart», également utilisé pour consolider les bois secs.

Le choix de l'une de ces méthodes est déterminé en concertation avec l'archéologue responsable de la fouille et le conservateur du musée ayant reçu la dévolution des objets. Le choix est fait à partir de différents critères:

- Les dimensions maximales de la pièce à traiter:

12x3 mètres pour le procédé a)
5 x 0.9 mètres pour le procédé b)
3 x 1 mètres pour le procédé c)

- Le matériau (ou les matériaux s'il s'agit d'un objet composite)
- L'état de dégradation et de fragmentation de l'objet et son degré d'humidité.

Restaurer:

Le nettoyage de surface élimine les traces de produit consolidant ou de sédiment, mécaniquement avec de petits outils, brosses, pinceaux... ou par air chaud puisé.

Pour les collages et assemblages des parties fragmentées, colles et résines sont choisies dans le souci d'assurer la stabilité chimique et de ménager une éventuelle réintervention.

L'aspect extérieur est amélioré par des reprises de teintes; un film de vernis synthétique ou de cire est appliqué en finition pour protéger la pièce des influences extérieures et en particulier des ambiances humides et aussi pour réveiller la teinte des bois. Certains objets fragiles nécessitent des consolidations ponctuelles: refixage de soulèvements ou de fragments, réductions ou comblements de fentes, imprégnation locale de résines.

Des supports (métal, bois, plastique...) complètent la restauration en soutenant les pièces et en préparant la présentation muséographique ou le stockage.

La réalisation de boîtes ou de caisses adaptées à chaque cas, facilite les manipulations, le transport des objets, et assure aussi bien leur sécurité que leur conservation.

ARC-Nucléart

Pôle de conservation-restauration d'objets du patrimoine culturel.

Domaines d'intervention

• **Arrêt des causes de dégradation:** Conservation préventive, assistance de terrain, notamment sur le lieu de fouille archéologique pour les matériaux humides; diagnostic sur place; mise à l'abri des objets en les plaçant en chambre froide ou en réserve,

• Elimination des parasites: désinfection et désinsectisation de biens culturels,

• Prélèvement et conservation du patrimoine subaquatique et des vestiges de l'archéologie navale,

• **Consolidation** des objets secs ou humides par imprégnation de résines,

• **Consolidation** de parquets historiques,

• **Restauration** des biens culturels en bois, cuir et peau,

• Conservation-restauration du patrimoine industriel et artisanal,

• **Présentation en musée:** Conception et réalisation d'emballages spécifiques et de supports muséogrophiques.

Historique

A la fin des années 60, des chercheurs du CEA ont l'idée d'appliquer un procédé de consolidation du bois par impregnation gamma à la conservation des biens culturels en bois. Quelques années plus tard, des archéologues découvrent les vestiges d'un village medieval dans la lac de Paladru, qui livre de nombreux objets en bois et en cuir nécessitant un traitement de conservation. Cette rencontre donnera naissance à l'atelier ARC-Nucléart.

Fig. 1: La barque carolingienne monoxyle de Noyen-sur-Seine en cours de prélèvement.

Fig. 2: Sur le chantier de Paris-Bercy: prélèvement de la Pirogue n° 8. À l'aide de deux tireforts, les archéologues font glisser une plaque métallique sous la pirogue.

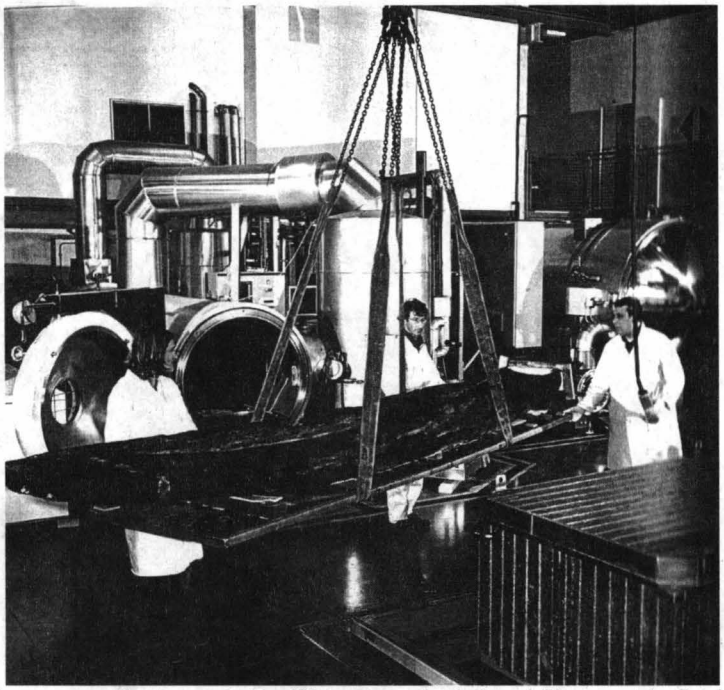

Fig. 3: La pirogue carolingienne de Drefféac est sortie du lyophilisateur à la fin du traitement.

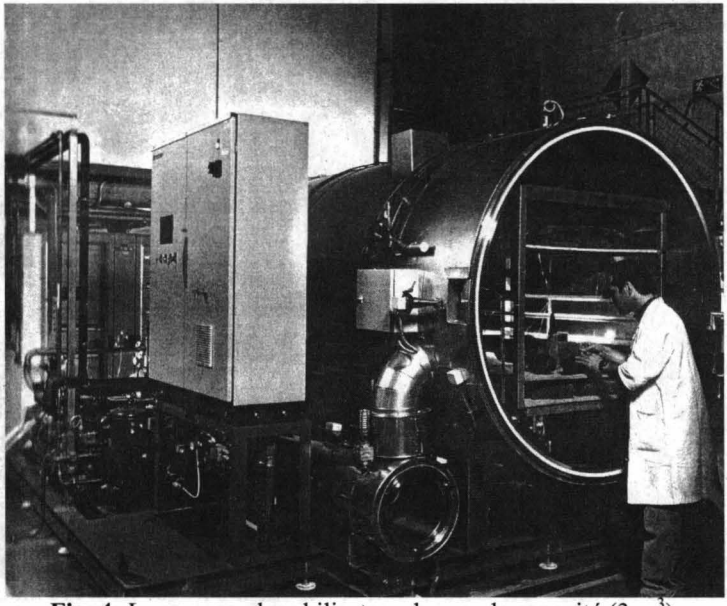

Fig. 4: Le nouveau lyophilisateur de grande capacité (3 m^3).

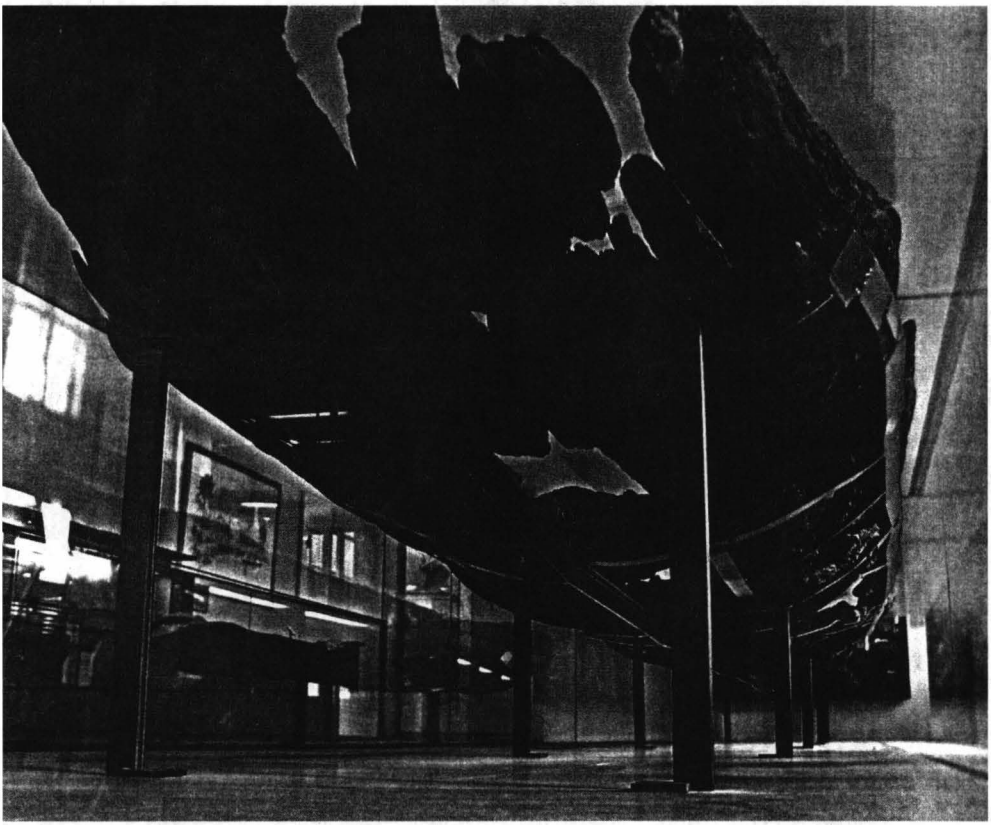

Fig. 5: Le support métallique de la pirogue P 3 de Bercy exposée au muse Carnavalet à Paris.

Fig. 6: L'étrave de la petite embarkation gallo-romaine découverte lors des fouilles de la place Jules-Verne à Marseille.

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