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THE ANTHROPIC RELIEF IN THE SUPERIOR HOLLOW OF THE CRIŞUL REPEDE RIVER

Summary of Doctoral Dissertation

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SUMMARY

ANTHROPIC RELIEF IN THE SUPERIOR HOLLOW OF THE RIVER CRIŞUL REPEDE

Key words: anthropic relief, anthropic morpho-genetic factors, morpho-hydrographic fluvial system, morpho-genetic system, anthropic activity, types of resources, spatial repartition, morpho-anthropic rehabilitation, spatial convergences and disjunctions.

Short recourse to the theme and work

In the shadow of the approached topic, geomorphologic research ranks first the themes of genetic geomorphology. One has always given priority to current genesis; the anthropic geomorphologic genesis received only secondary, or even random, positions. However, now that the current geographic reality reveals the fact that the anthropic impact on the territorial systems leaves its influential mark in the field, and in some spaces even decisive, the affinity for anthropic relief grew widely. For our country it was a "renaissance" required by the modern conceptions about durable development.

In the choosing of the theme stated above we went by the directions from "the theory of the contemporary knowledge" inscribed within the intercession of geographic and, respectively geomorphologic, knowledge. From this context, we selected the idea that not only the quantity nor the quality, but also the relationship and the function, become critical for the territorial systems. Following researches, especially those on soil, we realized that the Crişul Repede hollow kept, "par excellence", its natural pattern. Due to the patterns inserted in the work (e.g. the territorial administrative pattern "Poieni"), the government of the wooded areas (pasture-lands, grass lands) over the plough-lands or the ones occupied by infrastructures, becomes obvious. Nevertheless, the relief created by man left its mark in the areas having strong concentration of resources exploitation (subsoil, water etc.). Thus, the anthropic relief becomes an ostensive factor in the

relationship between man and the environment, between natural availability and anthropic requirement.

In the elaboration of the study, limited to the superior hollow of the river Crişul Repede, we faced some difficulties, out of which stand out:

- the lack of broad geographic studies on the entire hollow;
- the lack of some professional studies (climatic, hydrologic, bio-geographic) extended for the entire territory;
- limited accessibility for some areas;
- attitude discrepancies between the local interests and the regional, and even national, ones (e.g. the circulation infrastructures).

Consequently, the elaboration of the study asked that, in the first part (chap. II, III), we analyze and present, in a physical-geographic synthesis, the Geospatial Unity of the river Crişul Repede and, at the same time, (II) The morphologic system of the river Crişul Repede. The elaboration of the second part (chap. IV, V) was possible only afterwards, effectively having in sight the "Anthropic activity and the resulted relief" as well as the "Rehabilitation aspects of anthropic relief".

The details are rendered in the summary of the work and within the pages of the text. We are aware of the fact that the requirements of such a study are infinite, but one militated in favor of a selective profile with the principle of the anthropic activities balance, of the relief created by man and of spatial concentration.

Summary of the thesis

I. The intercession of scientific knowledge

1. **Motivation for theme selection**

In geomorphologic discourses, man is considered an essential morphogenetic factor that generates a distinct relief which arrives in the territorial reality. This is well pointed in the geographic system of the Crişul Repede hollow, this being the main reason for the theme selection of the doctoral thesis.

2. **Methodological support of the scientific research**

Geomorphologic research has as its support a methodological system and principles on the basis of which the research was made. We exposed the basic methodological trends, the means of investigation, the principles used in research (6 principles) and the methods used in geographic knowledge (11).

3. **The knowledge support offered by the geographic literature towards the Crişul Repede hollow** made the difference between global research of the natural setting and differential research. The thoroughness of the geologic knowledge and the relativity of the geographic knowledge become obvious.

II. The Crişul Repede hollow, a geospatial unity, integrates the spatial geographic boundary of the Crişul Repede hollow (Fig. 1), the evolution of this unity under the geologic and morpho-hydrographic report, the geospatial unities, by mountainous sub-unities and depression sub-unities, to which the connecting territories added as well (defiles, cloughs and mountain passes – e.g. Oşteana). The conclusion is that the current hydrography of the Crişul Repede hollow took shape in an evolutional process, where one could notice a summing-up of underpinnings, lateral oscillations and vertical sinking, all synthesized in at list three stages:

a) the stage preceding the formation of the main current valleys;
b) the stage of rivers' outflow towards the bay of Simleu;
c) the stage of the orientation of the flowing towards the bay of Oradea.

The restructuring process did not come to a close in the superior area of the hollow.

1.2. The geospatial sub-unities of the Crişul Repede hollow are based on the geologic substratum and on the relief. As one can notice on the geologic map, the petro-graphic constitution (volcanic, crystalline and sedimentary, especially limestone) and tectonic constitution (general, local), were the basis of the relieving of the sub-unities.

1.3. From the main unities of the Crişul Repede hollow we distinguish: the superior unity, starting from the source of the river down to Vadul Crişului, being mostly concentrated on the depression of Huedin, and the inferior unity, being set on the West Hills and West Plain (Fig. 5, 6).

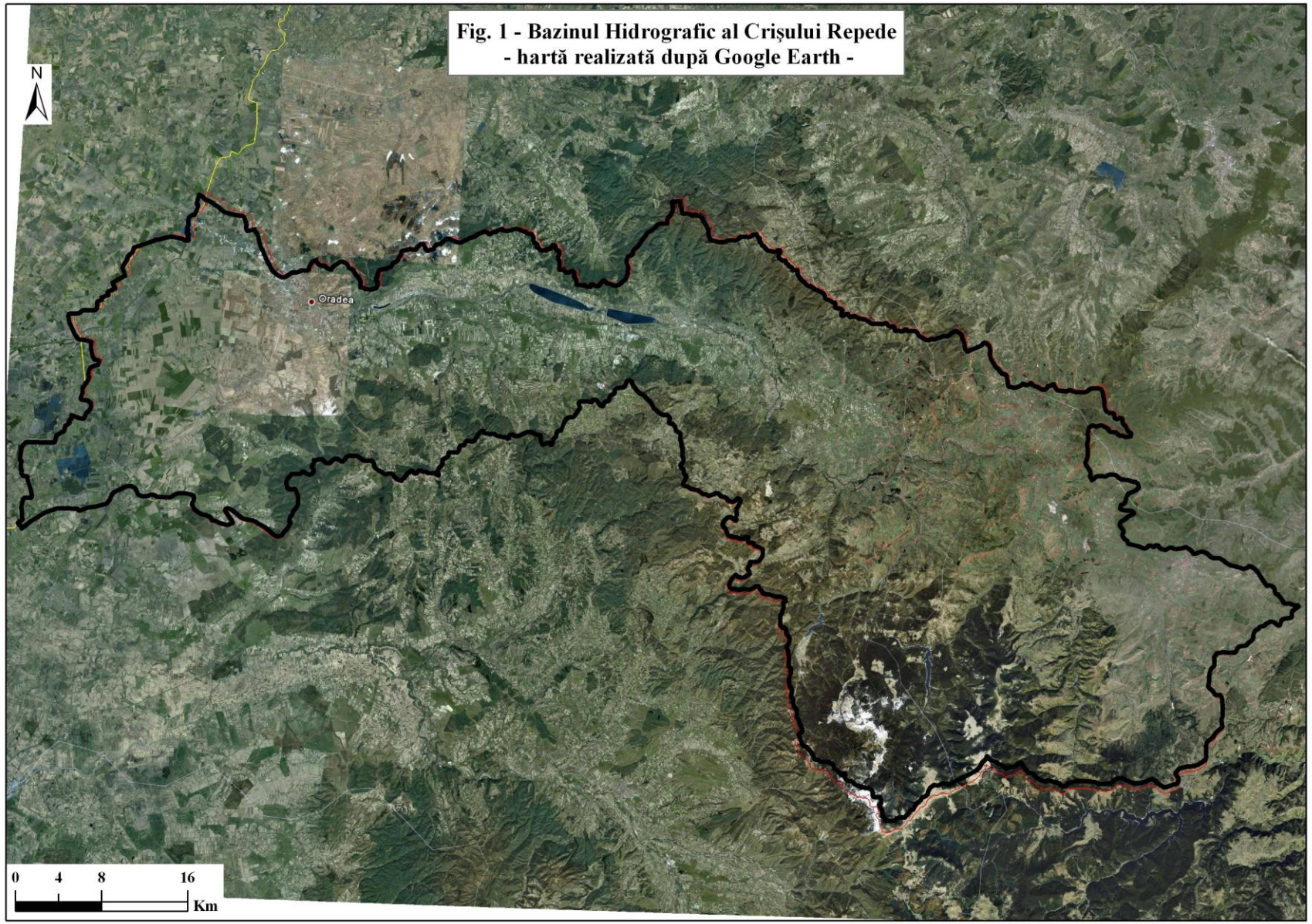

Fig. 1 - Bazinul Hidrografic al Crișului Repede
- hartă realizată după Google Earth -

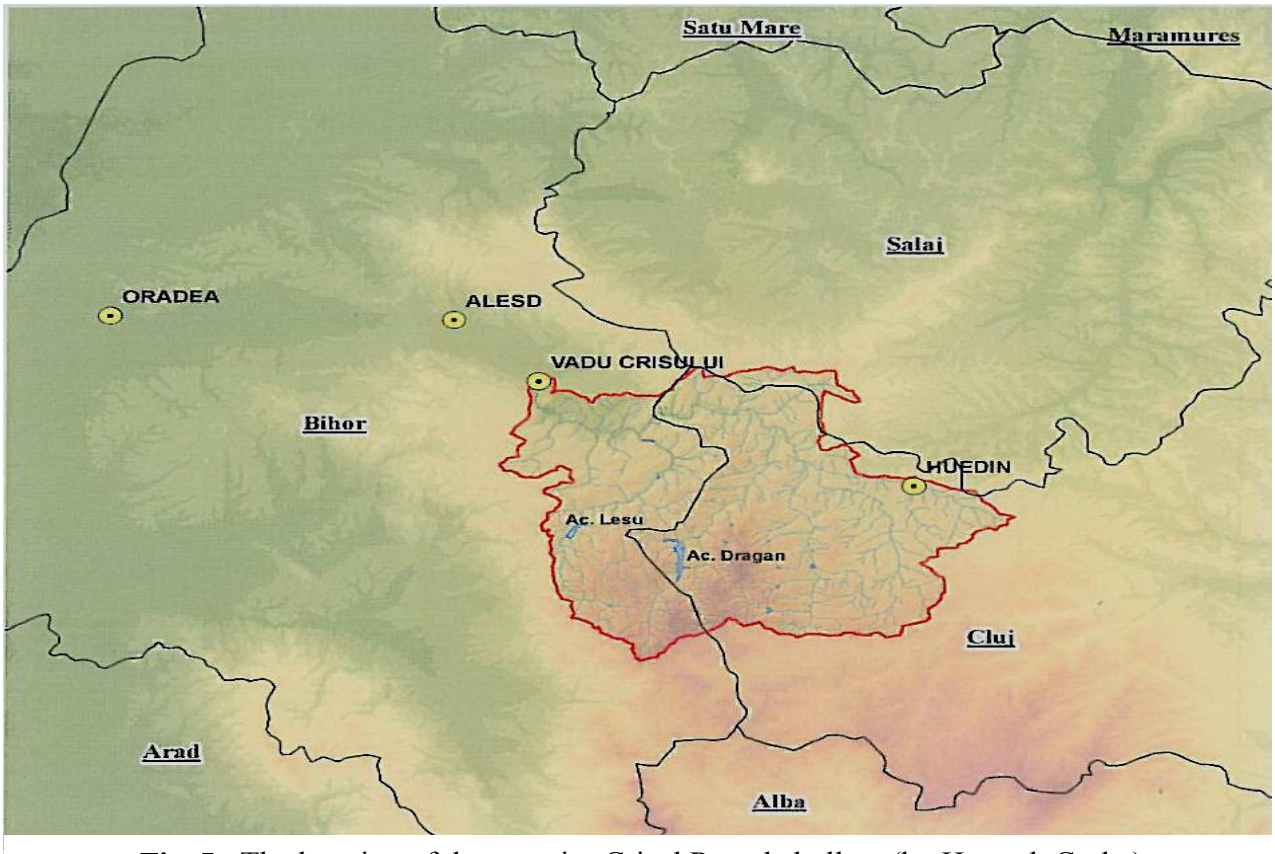

Fig. 5. The location of the superior Crişul Repede hollow (by Horvath Csaba)

III. The morpho-hydrographic system of the river Crişul Repede

The previous chapter (II), intended to outline, from a physical-geographic perspective, the Crişul Repede hollow and to identify and present its geospatial unities, fulfils the requirement of the description of the knowledge and operational space. The systemic analysis was considered necessary for the understanding of the testing of the processes prosecution, in terms of the action of the factors in a relation of co-determination and territorial answer. Thus, chapter III becomes a follow-up of the previous one, but with an explicit area of action on the morphologic and hydrographic (morpho-hydrographic) coordinates. The systemic analysis starts with the well known ratio: substratum ↔ relief ↔ hydro-atmospheric mass ↔ community (biotic and edaphic). Hence, the description of the components passed in review, and their effects on the overall system, becomes explicable.

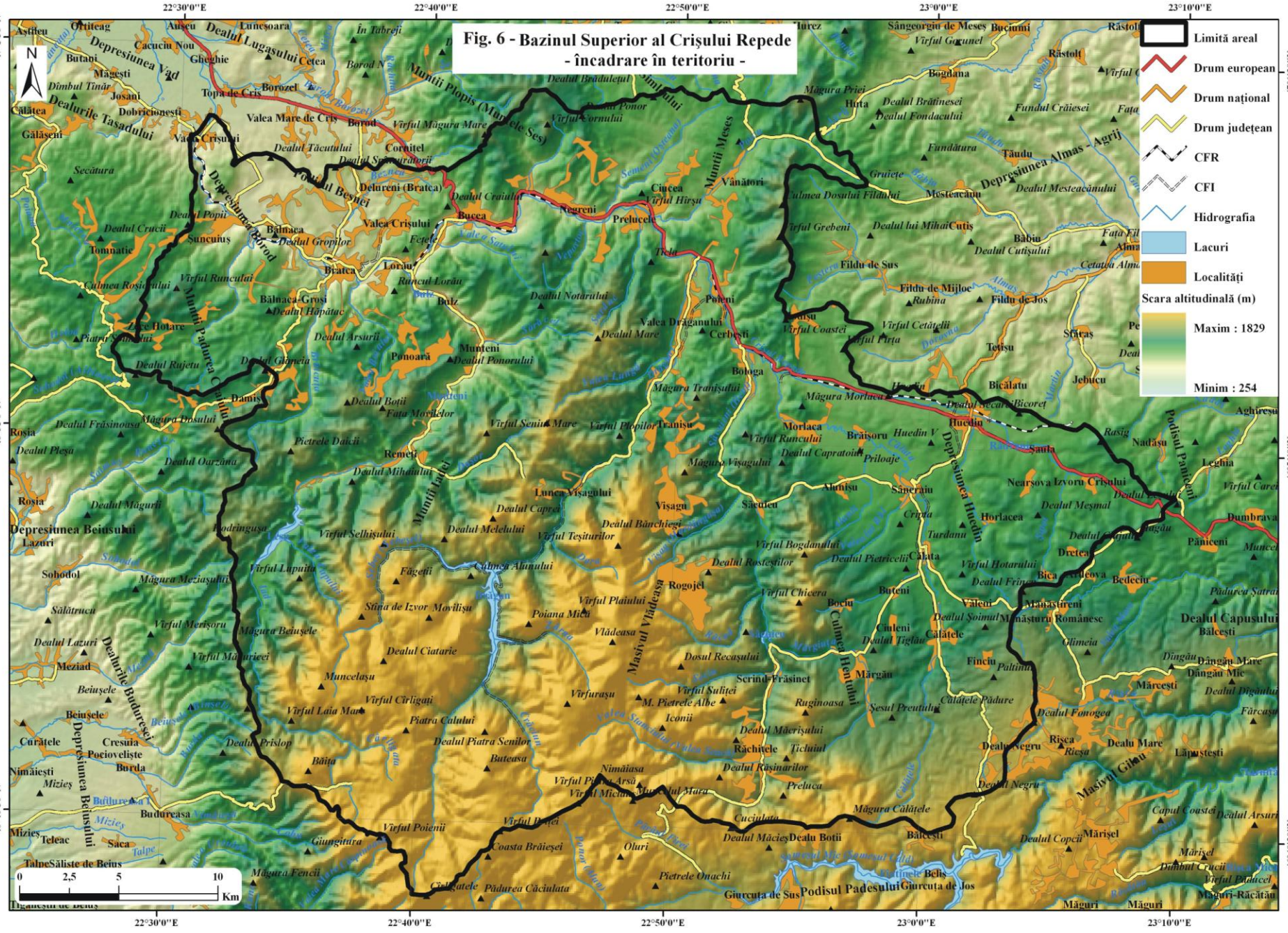
Fig. 6 - Bazinul Superior al Crișului Repede
- încadrare în teritoriu -
N
Limită areal
Drum european
Drum național
Drum județean
CFR
CFI
Hidrografia
Lacuri
Localități
Scara altitudinală (m)
Maxim : 1829
Minim : 254
0
2,5
5
10
Km
22°30'0"E
22°40'0"E
22°50'0"E
23°0'0"E
23°10'0"E
N.:46°31'47"
N.:46°30'49"

1.1. The entire geologic architecture, from the **geologic support** (petrographic, structural and chronologic) to the geologic unities: Bihorul de Nord, Vlădeasa, the Mountains Pădurarea Craiului, the Mountains Plopiş, the Mountains Meseş, the depression Huedin and the depression Vad-Borod (Fig. 8), was built during the Hercynian and Alpine phases, but the weigher movements (fractures, flex) contributed as well, which led to the formation of uplifts and diggings; the moment of chrono-tectonics is the Tortonian age. The surrounding mountainous sub-unities got a wide description (the mountains Vlădeasa, Gilău, Pădurea Craiului, Plopiş and Meseş).

The sub-unities of the depressions (Huedin, Vad, Borod) have a sedimentary charge (Paleogene, Neogene), wherefrom limestone come to the fore.

1.2. The **structural-genetic relief** is a coordinating factor of the interaction between the elements of the landscape. In the hydrographic hollow of the river Crişul Repede we distinguish a great variety of relief: domineering mountains, middle mountains, low mountains, hills, and plains, in the western side. Additionally, there are depressions (wide, small), cloughs and quays. Tectostructural genesis, the creator of morpho-structures, interferes with the morpho-sculpture, which generated: leveling/pool surfaces, erosion surfaces (at least 6) described in the thesis, and 7 (8) ledge steps. The peculiarity of the region modeling brought forth the existence, besides the **erosion surfaces** and the **fluvial ledges,** of a **selective modeling relief**, a **carstic one** and the one of **contact soils** and **alluvial cones**. This is how the morpho-structural-genetic picture of the Crişul Repede hollow was completed.

We encounter the above-mentioned series of relief forms, in its synthetic form, in the subunit of the clough of the river Crişul Repede– which came into focus – and the results exposed in a few pages and on the "map of the morpho-genetic steps".

1.3. **The study involved an evaluation of the climatic component**. This component actively participates to the interaction of the other elements of the system. From temperatures to precipitations, the wind motor, and to the topo-climatic types, it was proved that the climatic factor is favorable for **diversified economical-social development** of the region.

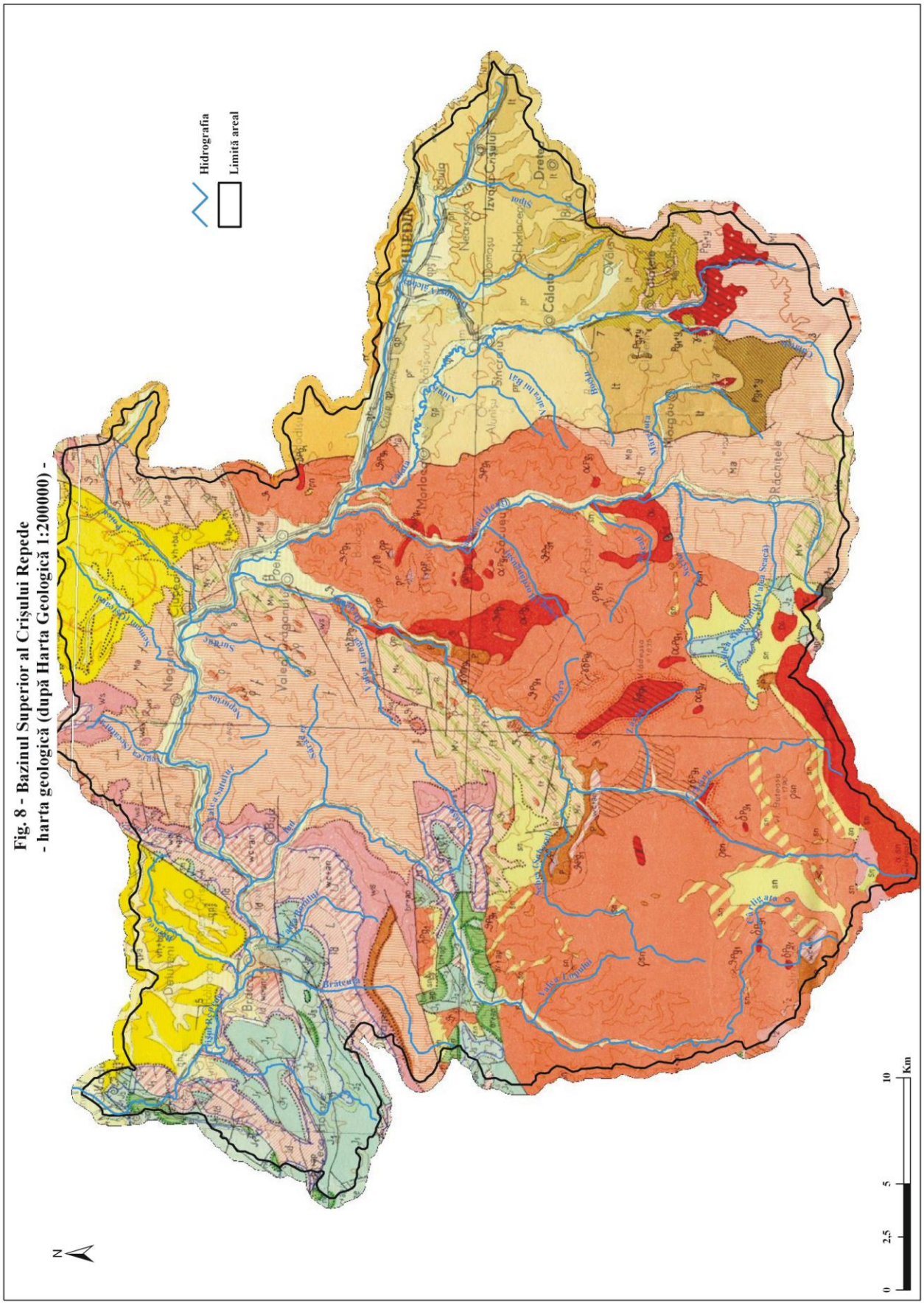

Fig. 8 - Bazinul Superior al Crișului Repede - harta geologică (după Harta Geologică 1:200000) -

LEGENDA

CUATERNAR	HOLOCEN	SUPERIOR	1	qh_2	Pietrişuri, nisipuri
		INFERIOR	2	qh_1	Pietrişuri, nisipuri
	PLEISTOCEN	SUPERIOR	3	qp_3^3	Argilă roşcată, pietrişuri nisipuri
			4	qp_3^2	Pietrişuri, nisipuri
			5	qp_3^1	Pietrişuri, nisipuri
			6	qp_3	Argile, pietrişuri, nisipuri
		MEDIU	7	qp_2^1	Argile lateritice
		INFERIOR	8	qp_1	Pietrişuri qp Pietrişuri, nisipuri
NEOGEN	PLIOCEN	PANNONIAN	10	pn	Argile nisipoase, nisipuri
	MIOCEN	SARMAT (BESSARAB. INF. VOLHINIAN)	11	vh+bs$_1$	Conglomerate, gresii, marne nisipoase, calcare
		TORTONIAN	12	to	Conglomerate, gresii, marne, calcare
PALEOGEN	OLIGOCEN	RUPELIAN	13	rp	Argile cenuşii şi roşii, gresii (strate de Ticu)
		LATTORFIAN	14	lf	Gresii calcaroase (strate de Mera)
	EOCEN	PRIABONIAN	15	pr	Calcare, argile, marne (Calcarul grosier inferior, argilele vărgate superioare, strate de Cluj, strate cu N. fabianii, marnele cu briozoare)
		LUTETIAN	16	lt	Argile, marne, calcare, (strate cu N. perforatus)
	PALEOCEN	YPRESIAN	17	P_1	Argile roşii continentale (argilele vărgate inferioare)
CRETACIC	SUPERIOR	SENONIAN	18	sn	Conglomerate, gresii, calcare cu rudişti (facies de Gosau)
	INFERIOR	VRACONIAN ALBIAN APTIAN BARREMIAN	19	al+vr	Şisturi argiloase, calcarenite
			20	k_1	Calcare stratificate şi masive, marne (strate de Ecleja)
		NEOCOMIAN	21	ne	Bauxite, calcare lacustre Marnocalcare, calcarenite
JURASIC	SUPERIOR		22	J_3	Calcare masive calcare stratificate
	MEDIU		23	J_2	Calcare spatice, calcare oolitice
	INFERIOR		24	J_1	Conglomerate, gresii, argile, calcare
TRIASIC	SUPERIOR		25	rh	Calcare negre, şisturi argiloase roşii
			26	T_3	Calcare masive, calcare grezoase, marne
	MEDIU		29	T_2	Calcare albe masive, dolomite masive Dolomite, calcare
	INFERIOR		30	T_1	t-Calcare, dolomite, marne, şisturi argiloase ti-Conglomerate, gresii, şisturi argiloase, dolomite în plăci Conglomerate, gresii, şisturi argiloase
PERMIAN			32	P	Brecii, conglomerate, gresii, şisturi
CARBONIFER	INFERIOR		33	C_1	Şisturi verzi
PALEOZOIC ANTECARBONIFER PROTEROZOIC SUPERIOR ANTE-PROTEROZOIC SUPERIOR			34	Pts-Pz	Seria de Arada
			35		Seria de Somes

ROCI MAGMATICE

MAGMATITE PALEOGENE ŞI CRETACIC SUPERIOARE	36	a Diorite δ (P_{g_1}), b. Andezite α (sn/P_{g_1})
	37	a. Granite γ. Granodiorite γδ, Granodiorite porfirice γδπ (P_{g_1}) b. Riolite ρsn (P_{g_1}) Dacite ϕ (P_{g_1})
MAGMATITE PERMIENE	38	ρ Riolite
MAGMATITE PRECAMBRIENE	39	Granite
	40	Pegmatite
	41	Formaţiune vulcanogen-sedimentară: Tufite, brecii vulcanice, marne

TIPURI DE ROCI METAMORFICE

METAMORFISM REGIONAL

FACIESUL ŞISTURILOR VERZI clorit	42	Mv	Şisturi sericito-cloritoase
FACIESUL AMFIBOLITELOR granat, staurolit	43	Mg	Micaşisturi şi paragnaise
	44	a	Amfibolite
	45	ff	Roci verzi tufogene
	46	Mz	Migmatite metablastice
	47		Zone de diaftoreză

METAMORFISM MAGMATIC

	48	cg Corneene

TIPURI GENETICE ALE DEPOZITELOR CUATERNARE

49		Depozite fluviatile (de luncă şi terasă)
50		Depozite deluviale (argile cu Bohnerzi)
51		Depozite proluviale
52		Limită geologică
53		Limită geologică-morfologică
54		Baza de formaţiune transgresivă
55		Pînză de şariaj
56		Digitaţie
57		Falie inversă
58		Falie normală
59		Poziţia stratelor
60		Cuib fosilifer-nevertebrate
61		Cuib fosilifer vertebrate
62		Isvor mineral

1.4. Analyzed in a broad sense, the **hydric component** (ground surface drain, hydrographic organization, the flux of the waters differentiated through time and the geographic effects) – contributes to the "**supporting of the system**", in a heterogeneous form of course, which led and leads to a multi-spectral geographic imagery, hence set between the superior hollow and the inferior one, between the mountainous unities, the plane ones and the depression ones.

Along the study, tables with different values (e.g. flows) and graphics (e.g. Fig. 13) are inserted:

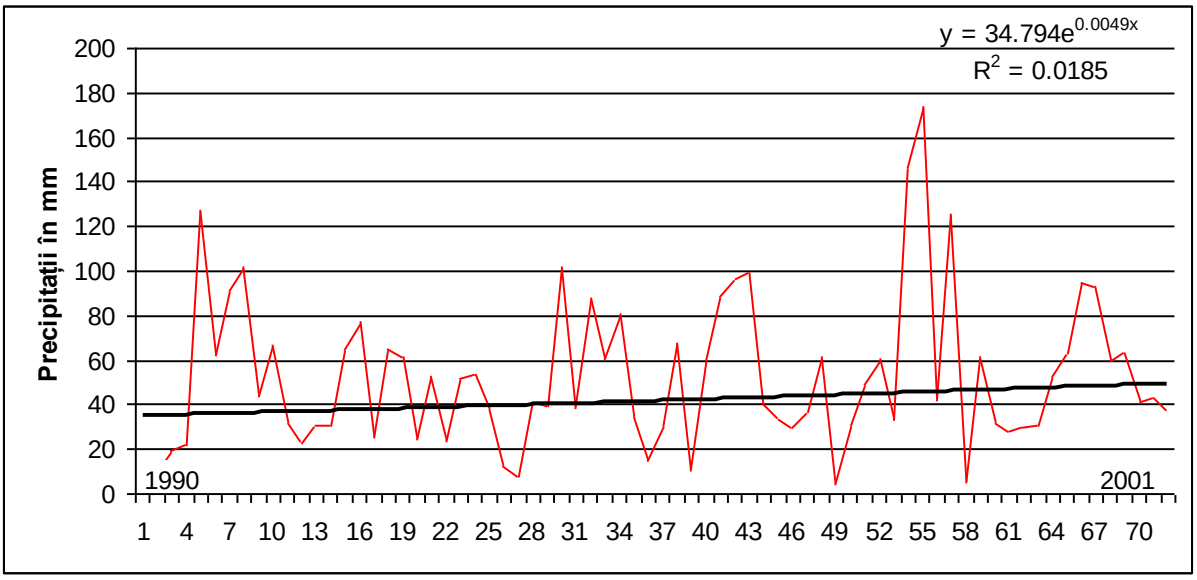

Fig. 13. Annual mean precipitations during 1990-2001 at the meteorological station Huedin

1.6. **Biotic Component**

References are directed towards the vegetation because vegetation is a concrete and precise synthesis of the eco-geographic conjunctions, rising, at the same time, the changes imposed by the anthropic factor. Because of the sylvan and grazing activities, the limitation of the natural vegetation has consequences on the overall landscape. The vegetation zones: subalpine, sylvan, depression areas, are frequently registered with species that are not specific to these zones, depending on the topo-climat.

There is a strong connection between the vegetation areas and the distribution of the fauna; as to the fauna species, there are only brief references (the brown bear, the wolf, the blackcock, the dace, the burdock etc).

The edaphic component as well follows the vertical distribution, and also the petro-graphic differentiations (e.g. the nigrosoils of the magmatic rocks). The human intervention contributed to the pronounced diversification of the soil layer (e.g. the erodo-soils from the Depression Huedin.

IV. The anthropic activity and the resulted relief

1. After the short introduction on the **Intercession of the economical-geographic knowledge** highlighting the conceptions, the trends and then, the relationships between components, we presented some ideas with regard to the economical regions (formal of functional).

2. **The resources in the superior hollow of the river Crişul Repede**

Par excellence, the anthropic activity is intended to the exploitation of resources. Consequently, despite the elusory repetition of some themes from the previous chapter and the current one, the evaluation of the resources offered by the superior hollow of the river Crişul Repede became mandatory.

2.1. The starting point was the **concept of resource**. To this was added the classification of resources setting out the meanings of resource and reserve.

2.2. Resource exploitation in time

During the process of inserting different natural resources into the economical circuit, several ages were distinguished, depending on the development level of the society: the Paleolithic age, the Third age, the Modern age and the Contemporaneous age, each of these materializing time, resource, the use and the purpose of the end product.

2.3. **Types of resources and actual exploitation**

The methods used for the quantitative and qualitative evaluation of different natural resources have a high degree of distinctiveness, depending on the domain of activity and on the resource category of application.

2.3.1. **Subsoil resources**

These resources are analyzed following a clear path: research, exploitation and reprocessing. In the superior hollow of the river Crişul Repede, the above mentioned methods, applied to the analyzed area, highlighted the:

- energetic resources (jet, radioactive metals, geo-thermic power);

- non-ferrous resources (bauxite);
- resources of the construction materials (eruptive rocks, sedimentary rocks).

2.3.2. **Soil resources**

Soil resources and vegetable resources belong to the biosphere.

Soils were the premise for the development of the different types of agro-systems, starting with the traditional agricultural landscapes (inherited) to the modern radical ones, or event artificially induced. The details on each type of soil (Fig. 19), presented along the study, illustrate, also, a fact of environmental attention, namely the pronounced degrading of the soil due to the irrational usage.

2.3.3. **Vegetable resources**. The sylvan resources come mostly into prominence, and the relevance of the content is displayed by levels: boreal l., bareo-nemoral l. (1200 – 1400 m), nemoral l. (beech, Holm). Additionally, there are shrubberies and herb vegetation.

2.3.4. **The Relief, a support for the development of settlements**

The relief, the basic geographic component in the relationship between territorial systems, has of course, multiple roles, but it was considered that its special role is for habitat sites. Thus, the relief fragmentation, the relief forms (valleys, versants, peaks, ledges, slopes etc.) and the terrain dips played crucial roles for the rural habitat (large, small villages, dispersed villages, aggregated villages, linear villages) and for the urban one (Huedin city, Alesd). The archeological fountains reveal a preferential occupancy of the relief forms (e.g. fortresses, strongholds, walled burgs) and the adaptation of the construction type (architecture) to the relief (e.g. Poieni, Bologa, Huedin).

2.3.5. **Climatic resources**

The solar radiations, air-mass circulation, are rated as fundamental climato-genetic factors.

The analysis of the climatic elements, through time and space (temperature, precipitations, wind), is considered capital, not only for the definition of the bio-climatic aspects, but also for the appreciation of the human activity chances. Starting with the precipitation regime, their spatial differentiation, to the Aeolian Regime, the thermic regime (table 7), or to the special climatic phenomena, including the underground climate

– they have all been (succinctly) analyzed for the human being and his household activity.

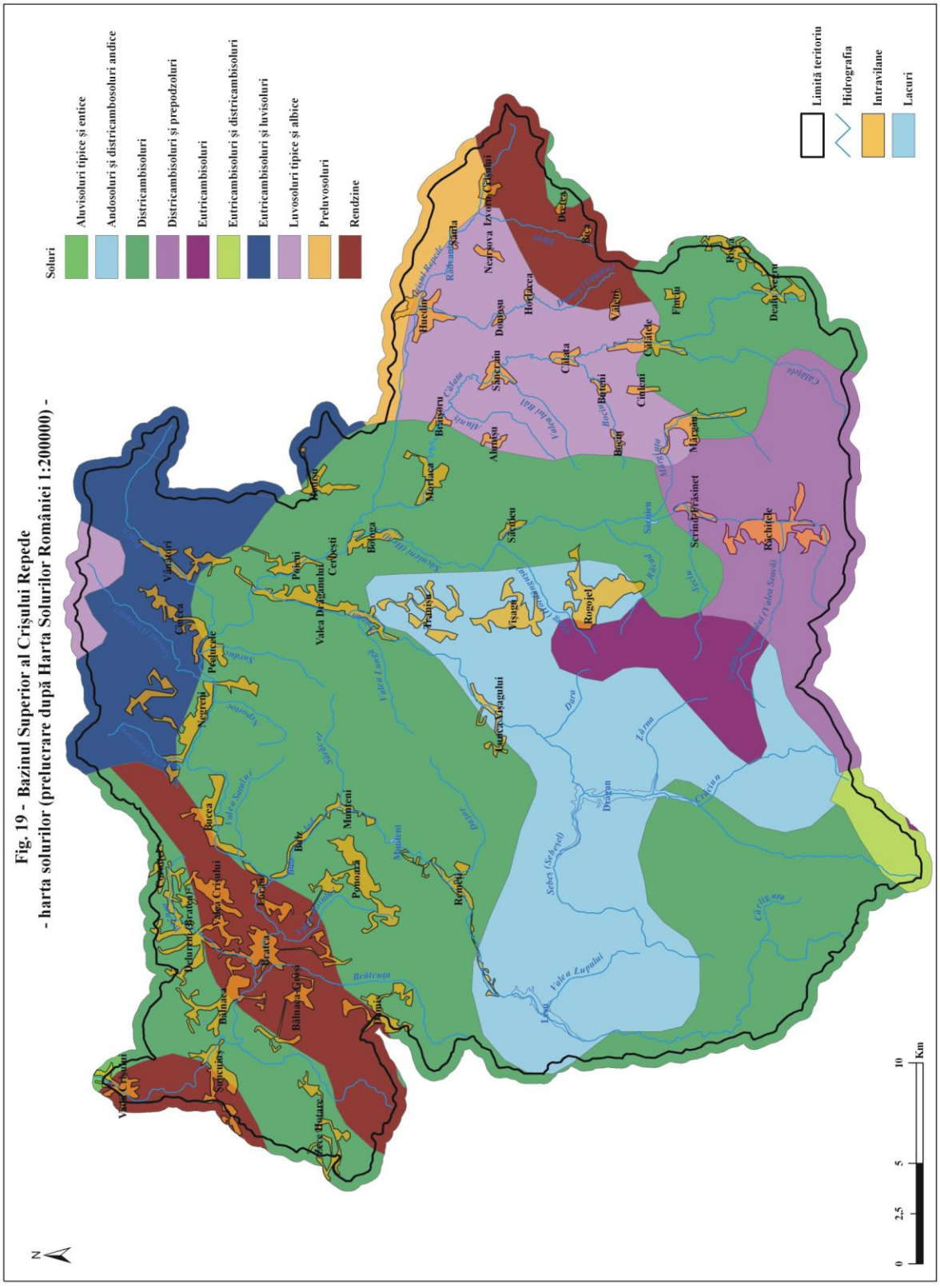

Table 7. Monthly and annual variations of the mean temperature on the versants with different aspects, deducted with the help of actual thermic gradients, estimated in relation to the meteorological station Vlădeasa

Altitude (m)	January				Iuly				Annual			
	N	E	S	V	N	E	S	V	N	E	S	V
1700	-6,9	-6,8	-6,8	-6,8	8,9	9,1	9,2	8,9	1,5	1,7	1,7	1,5
1600	-6,7	-6,6	-6,5	-6,6	9,7	10,1	10,2	9,8	2,1	2,4	2,4	2,1
1500	-6,0	-6,3	-6,1	-6,3	10,6	11,1	11,2	10,7	2,6	3,1	3,1	2,7
1400	-6,3	-6,0	-5,8	-6,0	11,4	12,0	12,0	11,5	3,2	3,7	3,8	3,3
1300	-6,0	-5,8	-5,5	-5,7	12,3	12,9	12,9	12,3	3,7	4,2	4,4	3,8
1200	-5,8	-5,7	-5,1	-5,4	13,0	13,7	13,7	13,1	4,2	4,8	5,0	4,4
1100	-5,6	-5,4	-4,8	-5,1	13,8	14,6	14,6	13,8	4,7	5,4	5,6	5,0
1000	-5,4	-5,2	-4,5	-4,8	14,5	15,3	15,2	14,6	5,2	5,8	6,1	5,6
900	-5,2	-4,9	-4,2	-4,4	15,2	16,0	15,9	15,3	5,7	6,2	6,6	6,2
800	-5,0	-4,9	-3,9	-4,1	15,8	16,7	16,7	16,0	6,1	6,7	7,1	6,8
700	-4,8	-4,6	-3,5	-3,7	16,5	17,3	17,2	16,8	6,6	7,2	7,6	7,4
600	-4,6	-4,4	-3,2	-3,4	17,1	18,0	17,9	17,5	7,1	7,6	8,1	8,0
500	-4,4	-4,2	-2,9	-3,0	17,8	18,7	18,6	18,3	7,5	8,1	8,6	8,6

2.3.6. **Hydric Resources**

Through its multiple activities, the anthropic factor brings crucial changes to the process of water flowing: hydro-ameliorative works, agro-hydro-technical works etc. It is notable that, under hydric rapport, there are many contrasts in the superior hollow of the river Crişul Repede, either rich water flows, or deficiencies marked by requirements. Large water retentions (Iad-Drăgan) or smaller ones, for local household purposes, their chemism and the solid flows are aspects that define special situations in comparison with other rivers in the North-Vest region of Romania.

2.3.7. **Touristic resources** are both natural and anthropic. They belong to the **geologic components** (rock, structure), to the **relief** (mountain, hills, ledges, quays, cloughs, caves), to the waters (courses, carstic fountains, mineral fountains, lakes) and to the climatic and topo-climatic peculiarities (the thickness of the snow layer). The bioclimatic and landscape resources are notable as well. The anthropic touristic resources have a diversified palette (Mahara and co. 1999).

3. **The purpose of anthropic activities and forms of manifestation** (direct and indirect) are diverse: material, dynamic (circulation infrastructures), strategic, cultural-educational, sporting and touristic. All of these activities lead to the creation of the anthropic relief.

4. The Anthropic Relief

4.1. General Assessments

Man has become, from a geomorphologic point of view, a key factor and self sufficient in order to generate, not only **isolated forms**, but even ensembles with an inherent physiognomy and dynamics. The anthropic system is thus defined by several parameters of content and manifestation. The activity of society has manifested in three directions:

- activity over morpho-genetic processes;
- involuntary creation of diverse relief forms, intentional creation of artificial relief

The result of man's intervention on the geomorphologic processes (endogenous and exogenous) and forms are expressed in the **condition of the geomorphologic system** (balance, imbalance, stationary, metastable, etc.) and in the scale of the anthropic relief forms.

4.2. **The classification of anthropic relief forms**. This systematic ordering contains the anthropic relief in the researched environment.

1. The relief forms resulted subsequent to the exploitation and valorization of the resources in the substratum (construction rocks – Poieni, Bologa, Morlaca; limestone – Aleșd; lignite – Vadul Crișului). Here we talk about quarries of different geometries and residue materials, and stockpiling:

- mines – underground works undergone by man in order to extract ore and other useful substances; they contribute to the degrading of the earth shell down to unbelievable depths. The collapse of the ceiling, for instance, changes

completely the configuration of the relief by creating a depression, which depression, when filled with precipitation water, can turn into a lake;

- quarries – are surface exploitations and they transform the relief; in many cases they lead to slope erosion and, should the erosion continue, they can even lead to the disappearance of previous relief forms;
- ditches, shafts, prospecting and extraction galleries;
- dirt-heaps and knobs; dirt-heaps are smaller or bigger residual accumulations (useless rocks cinder, ashes) which accompany exploitation (quarries, mines); industrial combine or towns in the case of dirt-heaps. The wastes appear under the shape of heaps or larger hills and are more often than not a rather unstable equilibrium, predisposed to drifting and collapse;
- artificial terraces – quarries with more than one level a day.

2. *Relief forms resulted from industrial processes:*

- dumps of fells and residues (created through the throwing of residues);
- artificial hollows and pools (for the flowing of artificial waters);
- dams and barrages – are set by people in order to stop river overflows or to build barrier lakes behind them. The construction of such barrages leads to the shattering of huge quantities of rock and, through their storage, to the creation of a new relief. Dams protect against flooding and its calamitous repercussions, being therefore, a positive intervention of people. Dams allowed the regeneration of some wide areas that were previously flooded.
- anthropic lakes (artificial barrages: Flororiu, Lesu, Alesd, the anthropic deltas).

3. Relief forms resulted from agricultural and sylvan activities

- the plant off-set (different shape and size terraces);
- land parceling (balks, slopes);
- terrain exploitation (grooves resulted from the elimination of the gravel on wide areas);
- runnels;

- cloughs, water flows formed on the roads along versants, which helped to log dragging.

Photo 1. Plant off-set

4. Forms resulted from the setup of the inhabited areas:

- land hills;
- forms resulted during the building of establishments (smooth surfaces, lifts, slopes);
- concreted, paved surfaces;
- dumps for the residues (cesspools, hollows).

5. Relief forms resulted from the construction of communication means:

- excavations;
- filling material;
- canals – they represent one of the most radical changes of the relief, made by man.

Canals help to the shortening of the distances for the maritime and fluvial transport; they bring the drinking water for the supply of the localities or for irrigations;

- support walls, tunnels.

6. *The relief resulted from touristic activities* – ski slopes, such as the one from Vanatori.

Through his interventions, man could speed up or slow down the geo-morphological processes, having negative or positive consequences on the relief.

7. Relief forms with the profile of fortifications or military actions

- defense grooves – the region of the fortress from Bologa.

5. The **specific types of economical activities,** for the superior hollow of the river Crișul Repede, having geo-morphological effects, are the following: the extraction of the usable mineral substances, the sylvan activities, the agricultural activities, the hydro-energetic activities, touristic activities, the transport activities and economical infrastructures with impact on the geo-morphologic landscape of the region (infrastructures for the exploitation of the construction materials, production infrastructures, energetic infrastructures (Fig. 22), tourism infrastructures, circulation infrastructures, the relief created through municipal facilities.

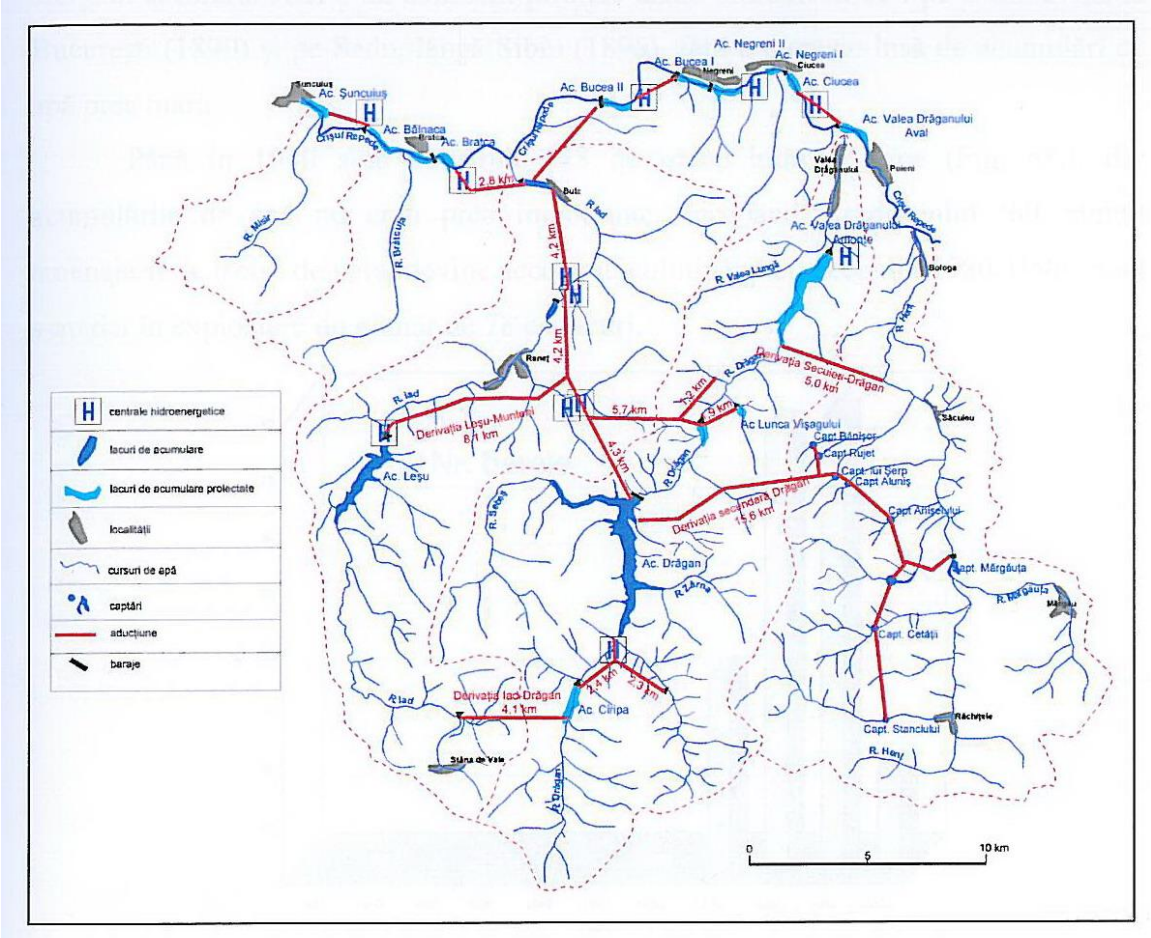

Fig. 22. The map of the hydro-technical setup Drăgan-Iad

We notice that neither of the intervention forms in the territorial geo-morphologic system remains isolated. Thus, a relation of cumulation and support was created between the micro-relief, the meso-relief and macro-relief.

7. **The resulted anthropic relief and its spatial distribution**

The overall image of the anthropic relief from the superior hollow of the river Crișul Repede joins two major parts: the content one, which is directly related to resources, and the one of spatial localization, dependent on the substratum, relief, climate, waters and human settlement.

Regarding the spatial repartition of the anthropic relief forms, we used the numeric index, complemented by the cartographic illustration, under the form of a superscription (Fig. 24).

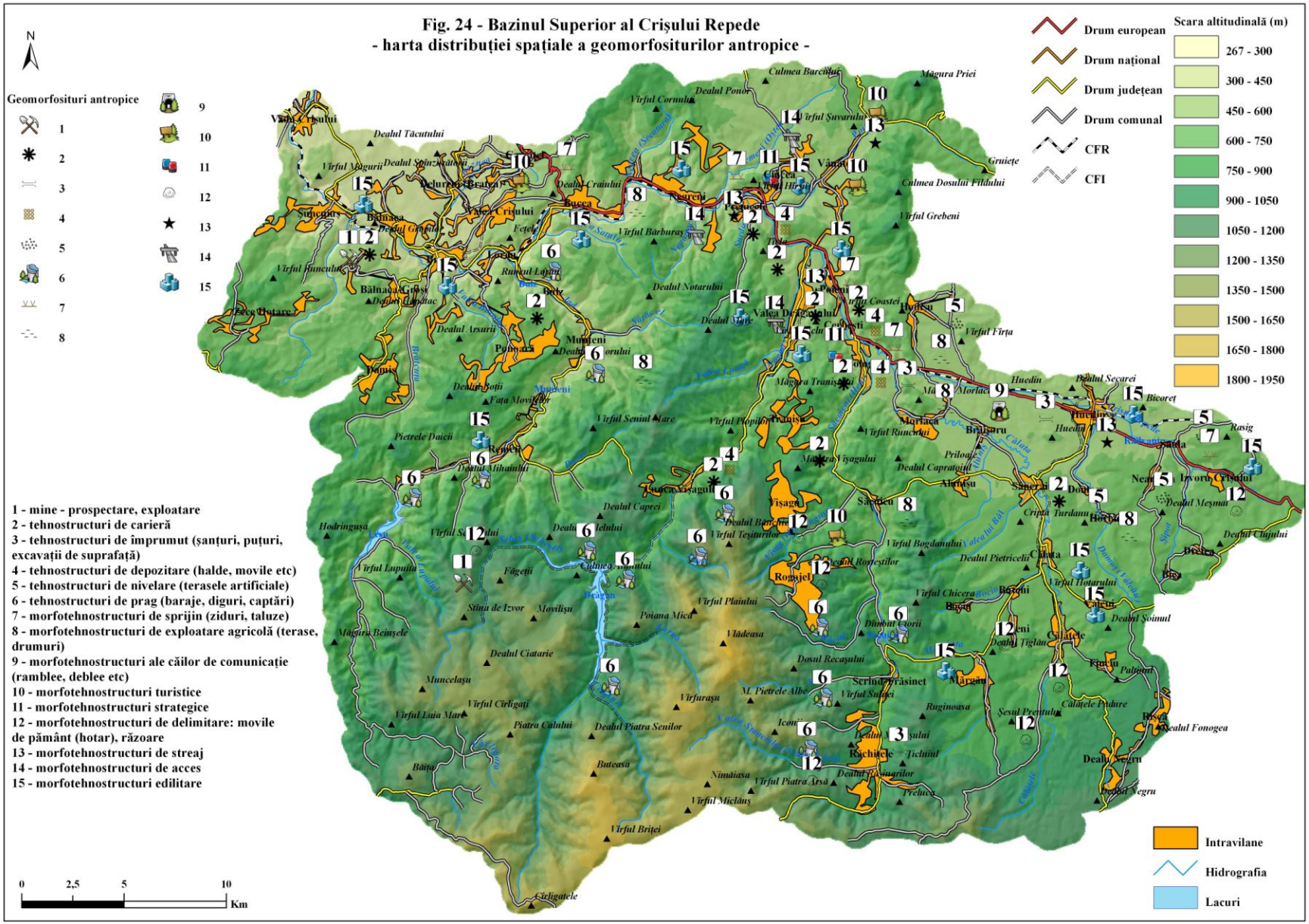
Fig. 24 - Bazinul Superior al Crișului Repede
- harta distribuției spațiale a geomorfositurilor antropice -
N
Geomorfosituri antropice
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
1 - mine - prospectare, exploatare
2 - tehnostructuri de carieră
3 - tehnostructuri de împrumut (șanțuri, puțuri, excavații de suprafață)
4 - tehnostructuri de depozitare (halde, movile etc)
5 - tehnostructuri de nivelare (terasele artificiale)
6 - tehnostructuri de prag (baraje, diguri, captări)
7 - morfotehnostructuri de sprijin (ziduri, taluze)
8 - morfotehnostructuri de exploatare agricolă (terase, drumuri)
9 - morfotehnostructuri ale căilor de comunicație (ramblee, deblee etc)
10 - morfotehnostructuri turistice
11 - morfotehnostructuri strategice
12 - morfotehnostructuri de delimitare: movile de pământ (hotar), răzoare
13 - morfotehnostructuri de streaj
14 - morfotehnostructuri de acces
15 - morfotehnostructuri edilitare
0 2,5 5 10 Km
Drum european
Drum național
Drum județean
Drum comunal
CFR
CFI
Scara altitudinală (m)
267 - 300
300 - 450
450 - 600
600 - 750
750 - 900
900 - 1050
1050 - 1200
1200 - 1350
1350 - 1500
1500 - 1650
1650 - 1800
1800 - 1950
Intravilane
Hidrografia
Lacuri

Regarding the spatial repartition of these forms from the Crisul Repede hallow, we could make the following remarks:

1. The river valleys, together with their surroundings, centralize the most diversified and manifold scale of forms. In the local landscape, the morpho-techno-structures are dominant.

2. The lean gores of the mountains (Vlădeasa, Gilău, Meseş, Plopiş, Pădurea Craiului) form a localization "band" of the morpho-technical structures of hydrodynamic "crest".

3. The versants having relatively pronounced dips offered favorable terrain for the setup of ski slopes (Vlădeasa, Vlasin).

4. The depression areas, the wide valley sources and the contiguous smoothing surfaces are projected with a more detailed relief, derived from agricultural works (off-sets, coast drain) of the circulation infrastructure and the habitat setup.

5. The anthropic forms, such as the support walls, pack-walls, mounds, passage ways etc., are disseminated along the circulation artery and in the municipal household spaces.

V. Rehabilitation aspects of the anthropic relief

1. General considerations

The directions of man's actions on the geo-ecological support are selective and have lead to the creation of an anthropogenic relief shaped according to location, conditions and needs.

For the superior hollow of the Crişul Repede River the special map (Fig. 25) highlights a wide spectrum of utility of terrains with the preponderance of surfaces falling directly under the incidence of anthropic activities. As a consequence, the greater part of the relief that results needs to be rehabilitated in order to become useful.

2. The rehabilitation of excavation techno-structures

The wide spectrum of quarries needs specific and multiple interventions (battering, leveling, terracing, vegetation seeding, etc.). Abandoning a quarry leaves behind a ruiniform relief (Poieni, Bologa, Valea Lungii, etc.) (Photo 9).

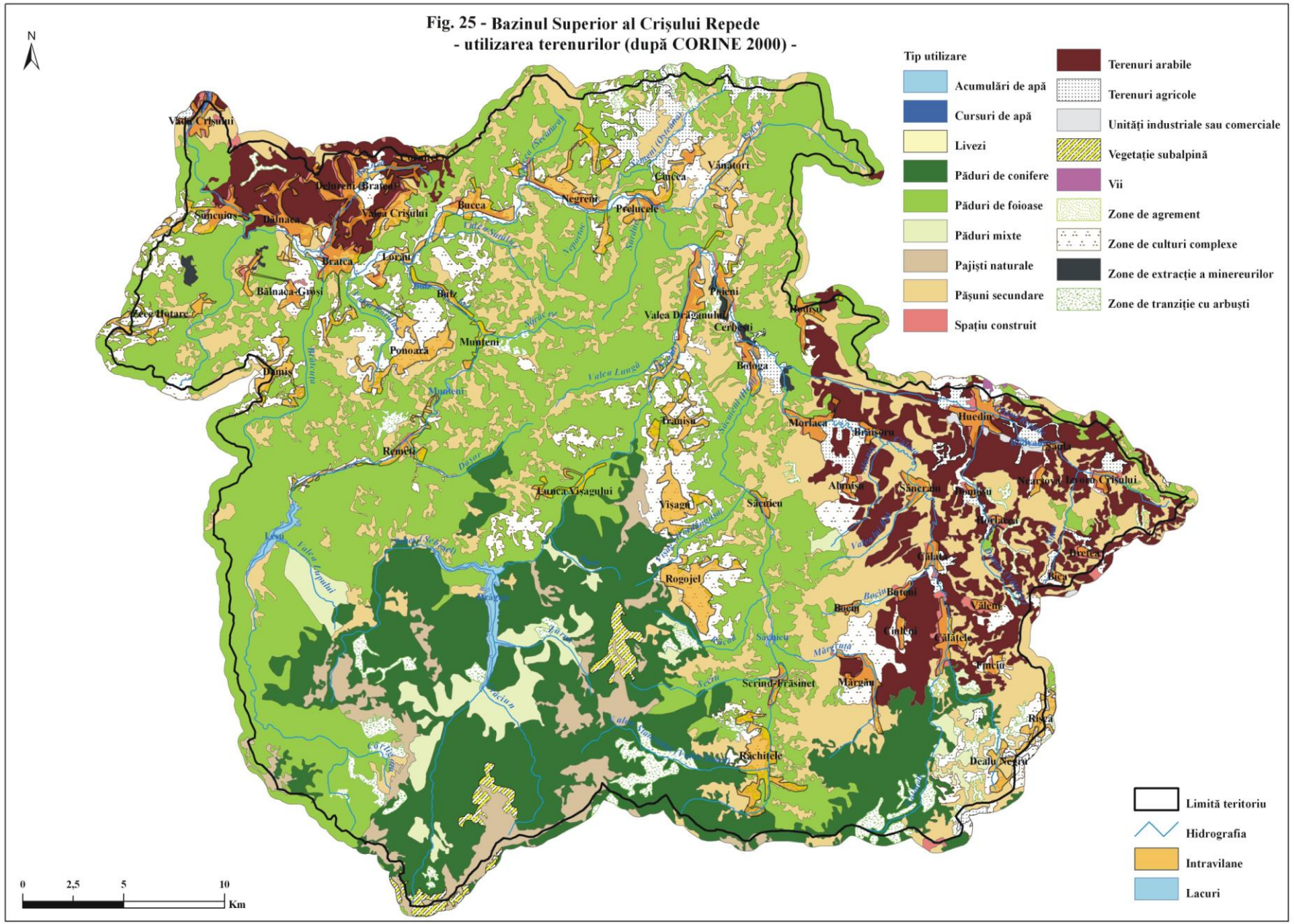
Fig. 25 - Bazinul Superior al Crișului Repede
- utilizarea terenurilor (după CORINE 2000) -
N
Tip utilizare
Acumulări de apă
Cursuri de apă
Livezi
Păduri de conifere
Păduri de foioase
Păduri mixte
Pajiști naturale
Pășuni secundare
Spațiu construit
Terenuri arabile
Terenuri agricole
Unități industriale sau comerciale
Vegetație subalpină
Vii
Zone de agrement
Zone de culturi complexe
Zone de extracție a minereurilor
Zone de tranziție cu arbuști
Limită teritoriu
Hidrografia
Intravilane
Lacuri
0
2,5
5
10
Km

Photo 9 . Ruiniform and residual relief, 1 km upstream Lunca Vişagului

3. **The rehabilitation of agricultural terrains**

In the patterns for the situation of terrains from several communal systems, which we have described in this thesis (e.g. Poieni, Ciucea, Negreni), the reduced participation of agricultural terrains compared to forests, pastures and meadows is highlighted. It is this aggressive exploitation of these terrains that explains the unleashing of accelerated erosion. Terrains such as these are to be rehabilitated: terraced, shrub seeded, protected against leaks, etc. Details are to be materialized upon presenting each model.

5. **The rehabilitation of terrains within the means of communications**

It constitutes a permanent activity as it belongs to the **maintenance system**. The actions vary and the techniques are complex. The pictures in thesis show specific cases.

Conclusions

The apparent simplicity of man's action and artificial anthropic relief actually hides here a complex geographical load derived from the diverse nature of these places and from the extended and widely complex human impact.

There are very few works aimed at knowing the Crişul Repede River hollow from a geographic point of view, which forced us to undergo a thorough field investigation and a selective orientation in the subject at hand. The elaborated study thus contains five chapters:

I. The intercession of scientific knowledge

II. The Crişul Repede hollow, the geospatial unit

III. The Crişul Repede morpho-hydrographic system

IV. The anthropic activity and the resulted relief

V. Rehabilitation aspects of the anthropic relief

The entire work revolves around the anthropic activity and the resulted relief (chap. IV). In order to succeed in what we had set forth we had to fulfill the need to describe the entire Crişul Repede morpho-hydrographic system and to evaluate the availability of its natural resources. For the analysis of the anthropic relief we have frequently used the terms of techno structures, geo-anthropo structures and morpho-techno structures.

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