Cluj County. Choremetic Model for Ecological Rehabilitation

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Introduction

Ecological rehabilitation represents the preliminary stage for the promotion of the strategies for the sustainable development of a territory.

This is represented by a clear delineation of the areas that are to be included in the ecological systems regulated through various codes of law (natural reservations, protected areas, natural parks, dendrology parks etc.) as compared to the areas that are aimed to develop from a socio-economic point of view.

As ecological areas are disseminated and spread at random within the territory, an ecological network is to be formed out of these and it would connect all the elements in a unique territorial unit.

The configuration of an ecological network is urgent and absolutely necessary in Cluj County because of the accelerated rhythm of economic development**.**

A postponement or a refusal of establishing such a network will give way, in time, to an ecologic vacuum and to the impossibility of setting up, in the future, of a coherent ecological system.

Choremization – the final stage in the process of territorial design

A choreme represents a model of maximal generalization and abstraction referring to the status, the dynamics and the way a territory is organized. It prefigures the territorial patterns which are to be used for the implementation of the future anthropic structures, for the directions of evolution of the settlements, for the territories that are optimal for development and for those that are in a critical state and need specific measures for rehabilitation, for the areas that prove to have potential for development as well as for the under-development areas.

Setting up the choremetic model of development is supported by a series of theories (theory of the polarized space, theory of the networks, theory of the axes of force, theory of the expansion poles, behavior theory, cluster theory, and fractal theory) and on concepts of development (the concept of system, the concept of region, the concept of potential, the concept of norm, the concept of threshold, the concept of equilibrium, the concept of resource, the concept of sustainable development etc.) that have to fundament scientifically the actions of territorial modeling.

Making a synthesis of all these theories and concepts that fundament territorial development, an innovative concept came out, that of ***integrated network or polarized space***.

The concept of integrated network represents for territorial planning an essential instrument that has a guiding role in delineating and establishing the location of various geographical-territorial systems - natural or anthropic, existent or becoming.

As a fundament of this concept, we can consider a lot of theories and models that were meant to push further the ideation, the comprehension and the understanding of the territorial structure in time. We can enumerate some of the classical models by: J. Forrester, B. Rodoman, B. Mandelbrot etc.

Romanian scientific literature registers preoccupations in this field by G. Gusti (1974), A. Molnár, A. Maier, N. Ciangă (1975), and more recently by I. Ianoş (1987, 2000). They put in practice the concept at a national level. Yet, they all considered just the development of anthropic systems, without analyzing the rapports between the natural systems and the anthropic ones, nor the way they develop territorially.

Contemporary authors took over classical ideas on the modeling of territorial structures that highlight exclusively anthropic structures and adapted them, through modern theories (systems theory, fractal theory, polarized space theory, synergetic and choremic theory) in order to model geographic systems by considering their territorial complexity which is given by the overlapping of anthropic and natural systems.

The position natural systems have within the concept of integrated network

The natural pattern of a territory is made out of geo-systems that have various ranks, their undisturbed interaction giving way, finally, to a dynamic balance at a high level that is capable to resist, with certain limits, to the anthropic intervention. By going over the tolerated thresholds – which means destroying the existing horizontal (among systems that have the same rank) and vertical (within the hierarchy) connections triggers destructive processes that can be very ample and can be characterized by a continuing rising intensity. These are generally called *geographic risks*. If they are uncontrolled, they can endanger the possibility of a future development of the territory. The equilibrium is restored in such cases only through major anthropic efforts.

In ideal conditions, the territorial network of protected area is meant to protect, not only the conservation of biologic and landscape diversity (biotopes, vegetal associations, animal successions and populations, landscape structures), but also their functional characteristics (including the restoration of the natural regimes and the elimination of the perturbations) for a given region on a long period of time. Yet, once experience was accumulated, the "classical" anthropic network (with major conceptual flaws, as *isolation* is, or the orientation towards the "exceptional" areas that are to be protected, thus eliminating others) is evidently found unable to ensure all these imperatives. More than that, the network of protected area itself, is perceived in the national environmental policies as a *"residual principle"*, namely it has never been a top environmental priority.

A solution for this problem would be the setting up of an *ecological network (pattern)* (R. Noss, 1992, A. Tiškov, 1995, A. van Opstal, 1999 etc.) following the principles of an integrated, unitary, open system that is hierarchical and capable of supporting the spatial-temporal, dynamic processes of all the eco-systems from micro-scale to macro-scale.

The processes, at their turn, can be divided, on the type of their manifestation, in regular migration of the animals, continuous population exchange within the territorial mega-populations, continuous flux of anthropic impact, of information, of energy with the landscape (biochemical flux) etc.

In general, several fundamental elements of such a network have been highlighted, namely: ecological nodes, ecological corridors, multi-functional ecological modules, point-like objectives and areas for ecological reconstructions.

"*Ecological nodes*" (nuclei). They are natural areas of at least two kinds, the main condition being of the low anthropic character of these areas.

Firstly, there are protected areas that are declared as such and they are recognized by the international conventions Romania adhered to or by the national legislation and by the Local Councils decisions.

Secondly, there are areas that do not have a protected and recognized status, but they function on special regulations (sanitary protected areas, strategic public interest areas – drinking water supply sources, forestry areas etc.). These ecological nuclei ensure the functioning of the eco-systems on a spontaneous dynamic basis. They support the populations – those rare species, or those endangered, as well as the regular ones - that are important economically and that have also environmental functions for geo-systemic balance etc.

"Ecological corridors". They ensure optimal conditions for the population-repopulation process of the territory, the ways for migration to hibernation or reproduction, including the

spaces for rest and the reproduction. They also represent a link among the ecological nuclei, keeping the adequate level for a bio-chemical exchange within the landscape etc.

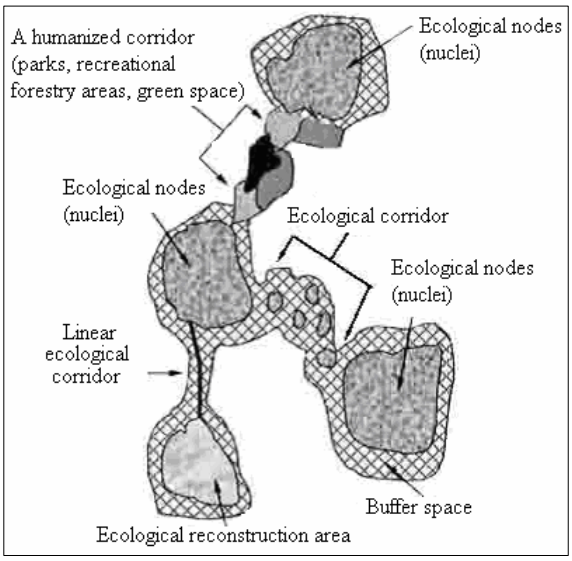


Figure 1. Conceptual model of an ecological network (after I. M. Bouwma, ed., ECNC, 2001).

The alluvial plains are classical examples of ecological corridors. Yet, lately, because of an accentuated anthropization process of the alluvial plains, this function of ecological corridors decreased. Their place can be taken, but not totally, by the interstream area or anthropic areas that have a protective function. As the configuration is concerned, ecological corridors can be linear (including only the marginal biotopes, known as ecotones) or in stripes (including whole biotopes). The main condition of the ecological corridors is the territorial and functional continuity within the "ecological space".

Multifunctional ecological models (multifunctional natural reservations). They differ from the first category by an internal zoning in the areas that have a severe regime of protection, the buffer-areas or the ecological chains, where the access and the disposal of resources is restricted, the areas for recreation etc.

Point-like, non-territorial objectives. This category includes the so-called "monuments of nature", that are not so large, but sectorial, and have various informational load, sometimes even of emotional nature. We also include here those small spots of natural flora that are part of the anthropic areas and play the role of an ecological island.

Areas for ecological reconstruction. These areas bear the anthropic mark and they undergo a process of systemic reconstruction (badlands, abandoned quarries, orchards and vineyards that are no longer in use, cleared areas at present affected by overgrazing, arable lands that are characterized by low productivity etc.)

Present situation of the protected natural areas within Cluj county

The biological bio-diversity includes species of plants, animals and micro-organisms, as well as the ecosystem and the ecological processes they are part of. The importance of the bio-diversity is essential for the stability (homeostasis) of the natural environment, as well as for the stability of the anthropic systems, thus the need for conservation.

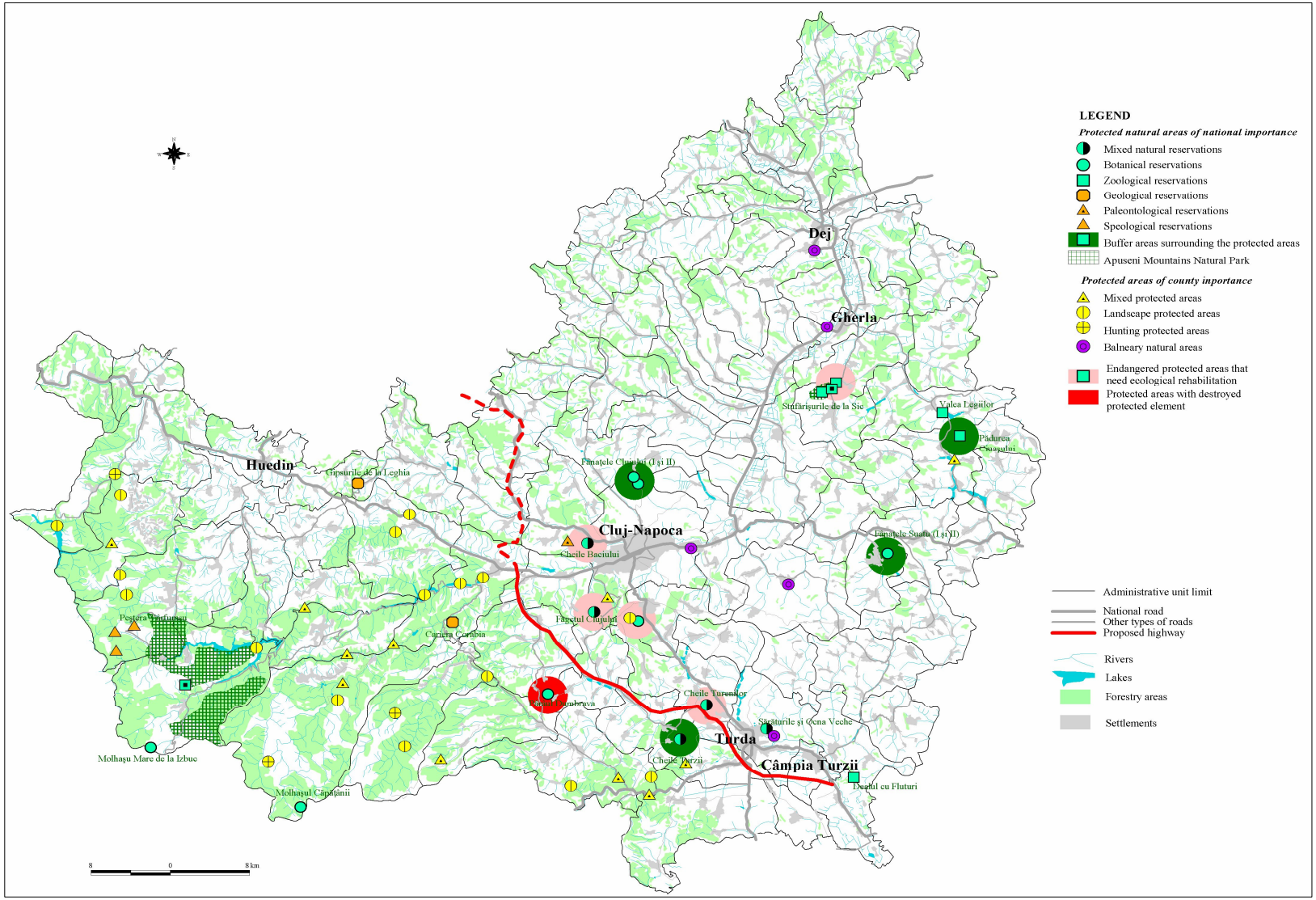
The conservation of the bio-diversity is a fundamental condition for a sustainable development.

The valorization of the habitats and of the species identified as a consequence of systematic research was certified within Cluj County by the establishing of an important number of natural reservations (map 1). Yet, the total surface of the protected areas occupies just 1% of the total county surface, which places Cluj under the national average (4,8 %).

Protected natural areas of national importance

Protected natural areas of national importance in conformity with the present system of classification (including those established by The World Conservation Union) are represented at county level by: national parks, monuments of nature, natural reservations and landscape reservations, with various structures: *geologic (g), paleontologic (p), speologic (s), botanical (b), zoologic (z), geographic-landscape (gl) or mixed (m).*

In conformity with the Law concerning the Plan for National Territorial Planning – Section III (Protected Areas), published in the Official Gazette on April, 12, 2000, 22 protected areas have been declared within Cluj County (table 1).



Map 1. Cluj County. Protectid natural areas.

Table 1. Protected areas of national interest in Cluj County.

No.	Code	Name	Location	Type	Category	Area (ha)	Year of establishment
1	2.324	Corabia quarry	Gilău commune	geological	monument of nature	2,0	1966
2	2.325	Vârfuraşu Cave	Mărgău commune	speological	monument of nature	1,0	1974
3	2.326	Fânaţele Suatu (I and II) (meadows)	Suatu commune	botanical	natural reservation	9,2	1932
4	2.327	Fânaţele Clujului - Copârşaie (meadows)	Cluj-Napoca city	botanical	natural reservation	1,5	1932
5	2.328	Fânaţele Clujului - Valea lui Craiu (meadows)	Cluj-Napoca city	botanical	natural reservation	1,0	1932
6	2.329	Valea Morilor (valley)	Feleacu commune	botanical	natural reservation	1,0	1974
7	2.330	Pârâul Dumbrava (river)	Ciurila commune	botanical	natural reservation	0,5	1974
8	2.331	Turda Gorges	Mihai Viteazu and Petreşti communes	mixed	natural reservation	104,0	1938
9	2.332	Lacul Ştiucilor (Pike Lake)	Fizeşu Gherlii commune	zoological	natural reservation	26,0	1966
10	2.333	Valea Legiilor (valley)	Geaca commune	zoological	natural reservation	13,5	1966
11	2.334	Stufărişurile de la Sic (bittern area)	Sic commune	zoological	natural reservation	2,0	1974
12	2.335	Făget forest	Cluj-Napoca city	mixed	natural reservation	10,0	
13	2.336	Peştera Mare (cave) from Valea Firei (valley)	Mărgău commune	speological	monument of nature	2,0	
14	2.337	Piatra Ponorului Cave	Mărgău commune	speological	monument of nature	2,0	
15	2.338	Gipsurile de la Leghia (gypsum area)	Aghireşu commune	botanical	monument of nature	1,0	
16	2.339	Coruşu (fossils)	Baciu commune	paleontological	monument of nature	2,0	
17	2.340	Molhaşu Mare – Izbuc (spring)	Beliş commune	botanical	natural reservation	8,0	
18	2.341	Baciu Gorges	Baciu commune	mixed	natural reservation	3,0	
19	2.342	Tureni Gorges	Tureni commune	mixed	natural reservation	25,0	1977
20	2.343	Sărăturile and Ocna Veche (salting and old salt mine)	Turda town	botanical	natural reservation	10,0	
21	2.344	Apuseni Mountains Natural Park	Beliş commune	mixed	natural park	6200,0	
22	2.16	Molhaşurile Căpăţânii[1] (turf moor)	Măguri-Răcătău commune	botanical	natural reservation	5,0	

Afterwards, two more protected areas have been declared through governmental decisions: ***Dealul cu Fluturi*** (20 ha), a zoological reservation, situated in Viişoara commune and ***"Pădurea Ciuaşului"*** - ***avi-faunistic special protected area*** (3 ha), situated in Ţaga commune. ***Sic Natural Complex Reservation was also established*** including three distinct

[1] In conformity with Law 5/2000, Molhaşurile Căpăţânii Reservation was mislisted as being part of Alba county.

areas represented by the bittern area in Sic Valley, having a South West-North East orientation, the marginal salting lands, as well as the grasslands and the meadows with a South – South West orientation from Valea Sărată and Bistrița Valley, together with the whole Păstăraia Valley and the damp meadow Coasta Valley (zone 1), the meadow area on the south slope of Dealul Sărat hill (zone II) and the area that is under ecological reconstruction (reforestation) situated in Transilvania Plain region, South of Sic and East of Coasta, in the terminal area of Țaga Valley (zone III) occupying 505 ha.

Governmental decisions also established the following areas as protected natural areas and they were included in appropriate management categories:

- ***Valea Legiilor Natural Reservation*** (125 ha) – includes the humid meadow from the southern part of Legii Valley (spring area), Valea Legiilor (valley), Valea Morilor (valley) (left tributary of Legii Valley) and the Western part of Geaca Lake;
- ***Turda Gorges Complex Natural Reservation*** (324 ha);
- ***Suatu Natural Reservation*** (11,3 ha) – represented by two areas (Fânațele Suatu I - meadows of 4,50 ha and Fânațele Suatu II - meadows of 6,80 ha);
- ***Fânațele Clujului-La Copârşaie Reservation*** (97 ha) – includes two distinct areas: La Copârşaie, which includes a steep slope, prone to landslides, the South orientation of Bogomaia Hill, which is partially forested, the grasslands that are between the massive landslides, the massive landslides themselves, and the damp areas in between, as well as the damp meadows on the opposite slope, plus the butterfly reservation in Apahida;
- ***Fânațele Clujului-La Craiu Reservation*** (2,2 ha);
- ***Lacul Ştiucii (Peak Lake) Natural Reservation*** (140 ha), that includes humid areas, areas with bittern and the Peak Lake.

The limits of the Apuseni Mountains Natural Park have been established through the Governmental Decision no. 230/March, 4, 2003, the area of the park being extended to 76.022,3 ha, Cluj county owing 30.545,5 ha of these.

Protected natural areas of county importance

A lot of the protected natural areas of county importance that have been declared along the time by county authorities have been included in Law 5/2000 as having national importance. In 1994, at the suggestion of non-governmental ecological organizations, a lot of natural areas from Cluj County have been established as protected natural areas, in conformity with Decision 147/1994 of the Cluj County Council.

As the legislation that established them was of territorial planning type, these newly-declared protected natural areas have been treated as the built-up, the balneary and the hunting ones. Because some of these enumerated above also include valuable natural elements, the initial list was maintained (table 2).

Table 2. Protected natural area of county importance.

No.	Name	Location	Type	Category (temporary)
1	Budureasa Reservoir	Valea Ierii commune	landscape	protected area
2	Drăgan Reservoir	Poieni commune	landscape	protected area
3	Fântânele Reservoir	Râşca, Beliş communes	landscape	protected area
4	Tarnița Reservoir	Gilău commune	landscape	protected area
5	Gilău and Someşul Cald Reservoirs	Gilău commune	landscape	protected area
6	Băile Băița (balneary spa)	Gherla municipality	balneary	protected area
7	Băile Cojocna (balneary spa)	Cojocna commune	balneary	protected area
8	Băile Ocna Dej (balneary spa)	Dej municipality	balneary	protected area
9	Băile Someşeni (balneary spa)	Cluj-Napoca municipality	balneary	protected area
10	Băile Turda (balneary spa)	Turda municipality	balneary	protected area
11	Borzeşti Gorges	Iara commune	landscape	protected area
12	Dumitresei Gorges	Măguri-Răcătău commune	landscape	protected area
13	Ocolişelului Gorges	Iara commune	landscape	protected area
14	Paniceni Gorges	Căpuşu Mare commune	landscape	protected area

15	Stanciu Gorges and Răchițele waterfall	Mărgău commune	landscape	protected area
16	Surduc Defile	Iara commune	mixed	protected area
17	Arieș Defile	Iara commune	mixed	protected area
18	Hăşdate Defile	Mihai Viteazu commune	mixed	protected area
19	Răcătău Defile	Măguri-Răcătău, Mărişel communes	mixed	protected area
21	Someşului Cald Defile	Râşca, Mărişel communes	mixed	protected area
22	Someşului Rece Defile	Măguri-Răcătău commune	mixed	protected area
23	Făget (Cluj) Forest	Cluj-Napoca municipality	mixed	protected area
24	Lunca Vişagului - Valea Drăganului (villages)	Poieni commune	hunting	protected area
25	Muntele Baişorii (mountainous resort)	Băişoara commune	mixed	protected area
26	Obârşia Someşului Rece (Someşul Rece water head) and Valea Răcătăului (valley)	Măguri-Răcătău commune	hunting	protected area
27	Piatra Bănişorului	Săcuieu commune	landscape	protected area
28	Pietrele Albe	Mărgău commune	landscape	protected area
29	Valea Şoimului (valley)	Valea Ierii commune	hunting	protected area
30	Valea Căprioarelor (valley)	Feleacu commune	landscape	protected area
31	Valea Căpuşului (valley)	Căpuşu Mare commune	landscape	protected area
32	Valea Ierii (valley)	Valea Ierii commune	landscape	protected area
33	Valea Someşul Rece (valley)	Gilău, Râşca, Mărişel communes	landscape	protected area
34	Vlădeasa Mountain	Săcuieu, Mărgău communes	mixed	protected area
35	Geaca - Țaga lakes	Geaca, Țaga communes	mixed	protected area

With a few exceptions – all referring to built-up and balneary areas, at present there are no exact limits for these protected areas, nor their category.

Categories of protected natural areas

In conformity with IUCN classification, protected areas, especially those that have national importance, can be in one of the following categories:

***A. IUCN III – Monuments of nature*:**

1. Vârfuraşu Cave (Vlădeasa Mountyins);
2. Peştera Mare (cave) from Valea Firei (valley) (Dealul Humpleului);
3. Piatra Ponorului (cave);
4. Cariera Corabia (quarry);
5. Gipsurile de la Leghia (gypsum resources);
6. Zona Fosiliferă Coruş (fossils).

***B. IUCN IV – Natural Reservation*:**

7. Fânațele Clujului – Copârşaie (meadows);
8. Fânațele Clujului – Valea lui Craiu (meadows);
9. Suatu I and II (meadow);
10. Valea Morilor (valley);
11. Pârâul Dumbrava (rivers);
12. Molhaşul Mare from Izbuc (turf moor) ;
13. Turbăria Căpățâna (turf moor);
14. Lacul Ştiucilor (Peak Lake);
15. Valea Legiilor (valley);
16. Sic Reservation;
17. Baciu Gorges;
18. Turda Gorges;
19. Tureni Gorges;
20. Sărăturile and Ocna Veche (Saltings and the old salt mine) (Turda);
21. Dealul cu Fluturi (hill).

***C. IUCN V – Protected landscapes*:**

22. Făget (forest);
23. Apuseni Mountains Natural Park;

Quality and stress sources for the protected areas

As a formal national classification of the natural habitats (semi-natural and anthropic) of the authorized bodies lacks, an assessment of their status cannot be currently realized. In our opinion and the assumptions made in the EC CORINE project – that was the basis for CEC CORINE (1991) system, that was the fundament for Direction 92/43/CEE – habitats, the identification of the types of habitats is still ongoing in Cluj County.

The types of habitats that have a commentary interest and those that are part of the protected areas have had priority. We can say about these habitats that the anthropic aggression is *very high*.

Thus, the habitat areas from the six types of eco-systems that are present within Cluj County (forests, shrubs and grasslands, typical rivers and lakes, damp areas, mountainous areas – especially cliffs) are aggressed, sometimes even extremely, by the socio-economical activities.

In conformity with the provisions of the article 18, line 2 from the Governmental Order no. 236/2000, the following three protected areas have been affiliated to the authorities for administration:

- ***Vârfuraşu Cave (Vlădeasa Mountains)*** – to the Speology Club that is part of the Technical University from Cluj;
- ***Suatu I and II Reservations*** – to the Local Council of Suatu commune;
- ***Turda Gorges*** – to Cluj County.

Even though the administration of Apuseni Natural Park has been established, it had not started its activities yet.

Concerning the protected areas that have national importance, we can notice that as they lack their own administration and protection (including invigilation), some of the protected areas have been seriously affected by grazing, aggressive tourism and in the area of the Apuseni Natural Park, the forest vegetation has been cleared from the so-called reforested areas.

The most endangered protected areas are: ***Pârâul Dumbrava***, ***Valea Legiilor***, ***Valea Morilor***, ***Peak Lake***, ***Făget*** and ***Tureni Gorges.***

In fact Pârâul Dumbravei reservation has lost the attributes that created it in the first place as a reservation, namely the conservation of *Cypripedium calceolus*, as this flower disappeared completely from the area.

Făget Reservation is in danger of extinction as a consequence of the clearings carried on during 2004-2005.

Turda Gorges, Fânațele Clujului – Copârşaie and Fânațele Clujului – Valea lui Craiu are characterized by unfavourable conditions, anthropic agrression being still an issue, even though buffer areas have been established or the reservations have been alloted to some authorities.

We should talk more about Apuseni Mountains Natural Park because of the importance of such complex form of protecting the ecologic sites and of larger eco-systems.

Even though the necessity of establishing a park in the Apuseni Mountains has been realized six decades ago, when in 1936, Professor Emil Racoviță revealed for the first time the exceptional scientific importance of the central area of this orographic unit - Bihor Mountains – and drawn up the first project handed down to the Committee of Monuments of Nature from Ardeal, as there were hard years – the World War II, his initiative was not put in practice. The same idea was put forward in 1959 by the speologists: Marcian Bleahu and Mihai Şerban that drown up a new project aiming to grant protection – as a national park – to the same region in which the area Padiş – Cetățile Ponorului (36 km^2) would be protected completely. Yet, the authorities in charge have not reacted this time either.

Finally, in 1981, Valeriu Puşcariu and Nicolae Boşcaiu drown up another project in which the area suggested to be included in a national park (an intersection among Alba, Bihor and Cluj counties) summed up 37 900 ha. This area proved to be insufficient, also considering the fact that Cluj County had a very small protected area included in the park. Yet, this structure proposed as a national park was approved and included in Law 5/2000.

The park is more extended in conformity with the Government Decision no. 230/2003. With all the extension, there are still areas that are left aside, even though they deserved to be part of it, namely: Someşul Cald Defile, Vlădeasa Peak etc.

The postponements related to the establishing of the park lead to massive forest clearings in the area, starting with the '90s, thus many years will pass until the ecological reconstruction will wipe away the marks of de-forestation, not to speak about the permanent anthropic aggression that continues even after the borders of the park have been formally established.

In the protected areas that have a county importance, the anthropic pressure is constantly increasing as holiday villas have been built in the protected area or in the buffer-area without ensuring a sustainable development when organizing all the endowments necessary for a house.

Urban sightseeing and uncontrolled tourism lead to major ecological unbalances.

The status of wild flora and fauna

With the exception of some very small and scattered islands that have the natural capacity to regenerate and that present the index of bio-diversity at high levels, the status of the wild flora and fauna of the county as a whole gets worse as a consequence of the pressure of the anthropic factors that have a general action, followed by activities of uncontrolled collection of species of flora and fauna.

The number of wild flora and fauna species in danger of extinction is decreasing and they are now characterized by a low number of species – except those of hunting interest that enjoyed a special management regime. Some urgent modalities of preservation would be of help; otherwise some of them will disappear – as species or as populations.

Among the species that have become extinct lately, we can enumerate: *Ligularia sibirica, Carex digitata ssp. piroskana, Vipera ursinii şi Parnassius apollo* and the list could go on.

In conclusion, the status of the natural habitats from Cluj County is under a powerful anthropic pressure. If urgent and efficient measures are not to be taken, the present status will worsen, going from un-satisfactory to un-recovered.

Protected natural areas: suggestions and priorities

In order to stop the degradation of the present ecologic areas and to ensure their inclusion in a unitary network in accordance with the concept of integrated netwok, the following measures and actions are to be put in practice:

- continuing the actions started in 2005 by the specialits from the Regional Inspectorate for Environmental Protection: identifying the forest habitats from the mountainous area of Cluj county by studying the forestry organization, as well as the habitats that are eligible to be included in Natura 2000 network. All these activities resulted in the identification of 10 sites that are a priority in conformity with the Textbook of identification of the Areas that Present Special Interest for Conservation and of Special Areas for Protection in order to include them in Natura 2000 network;
- continuing to monitor the types of habitats that present a communitary interest and of those that are part of the protected areas;
- put in practice international conventions that have been integrated in Romanian legislation as: the Directive "Birds" - 79/409/EEC – concerning the conservation of the wild birds; the Directive "Habitats" - 92/43/EEC - concerning the conservation of natural habitats and of wild flora and fauna; the Convention from Berne, 1979 – a convention concerning the conservation of the wild life and of the natural habitats in Europe; the Directive concerning the confinement of wild animals in Zoological Gardens;
- including the following avi-faunistic sites in Natura 2000 network: 1. Vlădeasa Mountain; 2. Fizeş Valley;
- declaring, at the suggestion of some ecologist organizations, the protected areas of county importance as areas of national importance, and the examples would be: Borzeşti Gorges, Ocolişel Gorges – Iara commune; Dumitreasa Gorges - Măguri-

Răcătău commune; Stanciu Gorges; Răchițele Waterfall and Pietrele Albe from Mărgău commune; Hăşdate Corridor from Mihai Viteazu commune;

- a functioning zoning of Apuseni Mountains Natural Park and establishing the regulations for each of the zone established;
- extending the Apuseni Mountains Natural Park by including Vlădeasa area, Someşul Cald Corridor, and even Răcătău area;
- initiating the necessary activities in order to establish the following natural parks: ***Feleacu Massif*** (including the following protected areas: Făget Forest, Valea Căprioarei, as well as Valea Micuşuilui, Sălicea Gorges, Sălicea carstic plateau, Tăuți Forest); ***Trascău***;
- setting up new botanical reservations in order to preserve the steppa vegetation within the Transilvanian Plain and the surroundings, as well as for the conservation of some relics as *Centaurea ucranica, C. trinervia, Astragalus escapus, Iris pontica* etc;
- establishing Piatra Secuiului area, Moldoveneşti commune as a complex reservation;
- continuing to separate protected areas from direct anthropic aggression through the creation of buffer areas;
- starting a process of ecological rehabilitation of the protected areas that are seriously affected by direct anthropic aggression (Tureni Gorges, Valea Morilor);
- ecological rehabilitation of the damp areas along the main water courses, as a principal factor for stability and regenaration of the water sources;
- drawing up the whole integral ecological network within Cluj county.

A complex ecological network – Cluj County

The configuration of an ecologic network is urgent and absolutely necessary in Cluj County because of the accelerated rhythm of economic development**.** A postponement or a refusal of establishing such an ecologic network will give way, in time, to an ecological vacuum and the impossibility of setting up in the future of a coherent ecological system.

The choremic model of the future ecological network which we suggest to be adopted and implemented within Cluj County and in the future to be extended in other counties is centered on the concept of ***integrated network or polarized space***.

On the other hand, following a relevant analysis on the present state of the ecological areas, the conclusion states that these have just an insular character and are not included in a unique ecologic network that would enable a real protection.

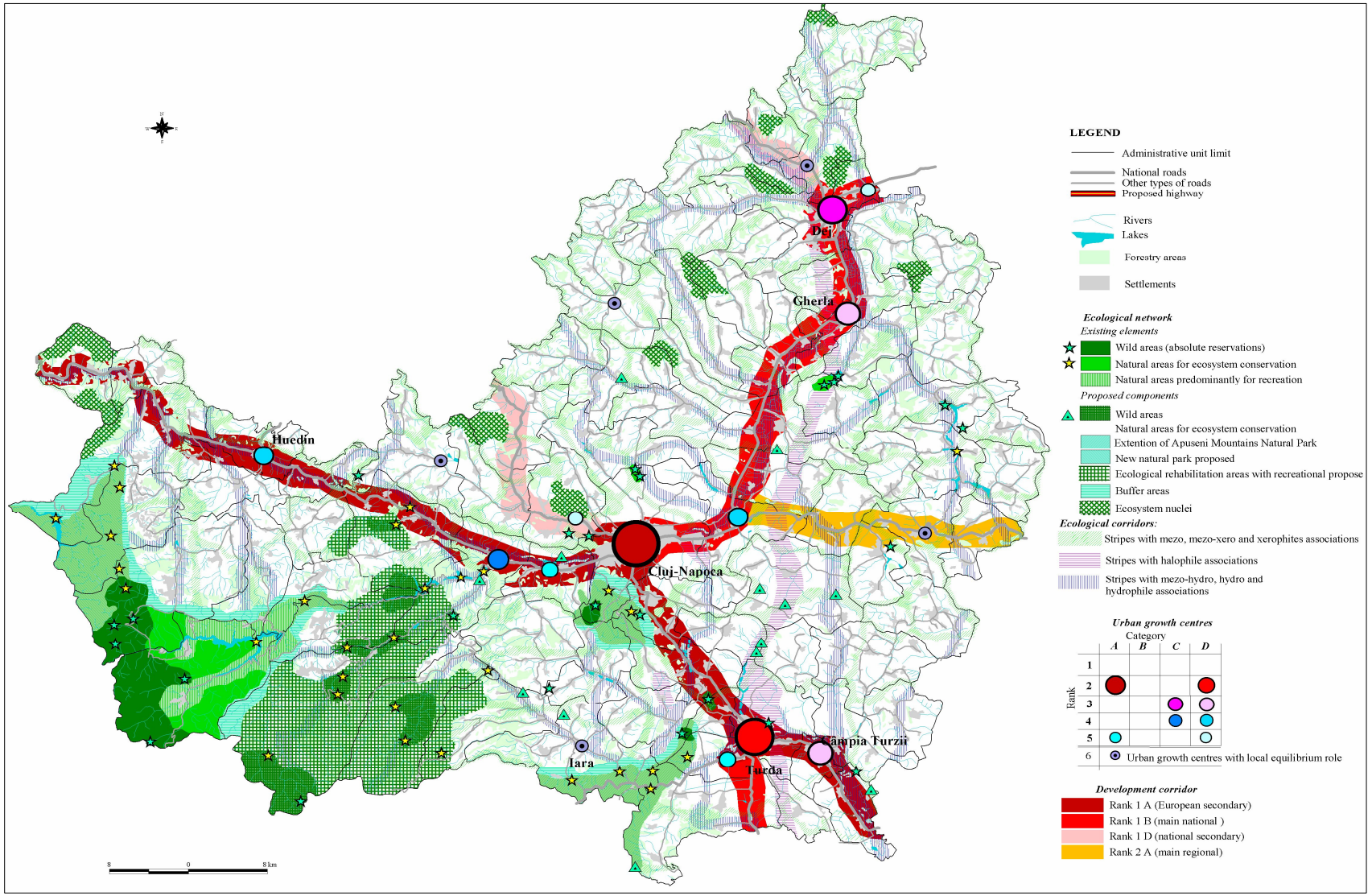
The present ecological areas occupy small surfaces[2] and we have to emphasize the fact that there is no clear delineation of their borders. This induces a high anthropic pressure which determines a low efficiency of the protection of the valuable species or of those that are in danger of extinction. The lack of an ecologic network that is clearly delineated at county level, that to include all the reservations and the protected areas hinders the setting up of a real protection as the ecological exchanges are not taking place[3].

The establishing of a unitary ecological network, in conformity with the concept of integral network or polarized space, represents the only viable solution for the setting up of a

[2] The surface of the present ecological areas occupies only the protected ecotop without including the ecotonal areas. In conformity with Darlington Rule, that states that "the reduction of an area ten times determines the decreasing of the species two times" and the lack of these ecotonal areas generates an increase of the anthropic pressure on the protected areas. This usually determines the reduction of the surface and thus the reduction of the number of species that are protected.

[3] In conformity with the *Law of the dissipation of isolated natural sub-systems* (after G. Hilmi, 1966), individual sub-systems that function in the environment, having an inferior organizational level as compared to the macro-system, lose in time their structure and dissolve in the micro-system. Their dissapearance is due to the incapacity of the system, which is not cooperating with the major system, to face competition imposed by the young dissipative structures and thus gives the associated internal energy as free energy. This law determines for the natural and anthropic systems, the following ways of spatial organization:

- protected areas that include biotic elements that are in danger of extiction have to have extended functional area. Protected areas that have a limited surface and that interact directly with the technologic systems have to face a higher pressure and thus their inner organization is destroyed, they are de-populated. From this point of view, this law imposes buffer-areas within the protected natural systems that are to make a gradual passage between natural systems and socio-economic ones;
- agricultural areas cultivated with perennial, multi-annual or anual crops have to occupy a certain area so as to include sufficient ecosystemic elements and thus a new structure will result – the agricultural geo-eco-systemic structure;
- the settlement – as major sub-system of settlements has to ensure enough communication means with the whole system (transportation and other types of communication means) as otherwise, it will be dissolved in the environment and the hearth will be degraded.



Map 2. Cluj County. The chorema of the ecological network.

favourable ecological framework that to facilitate the promotion of the strategies of sustainable development of a territory because of the following reasons:

- it facilitates a clear delineation of the areas that fulfill the conditions to be integrated in an ecological network (forestry areas, alluvial plains, damp areas, natural grasslands and meadows, former areas occupied by vineyards and orchards, badlands, dumps etc.);
- creates a functional framework for the reduction of the protection of the rare species, but also of regular flora and fauna;
- creates favorable conditions for the rehabilitation of those natural elements affected by anthropic pressure;
- natural or anthropic overlapping usage of the land is avoided;
- intersection between two categories of ecological networks is done through ecological passages;
- an optimal percentage of extension of the ecological areas in conformity with the Law of the 10%[4] is achieved;

The choremic model suggested for the ecological rehabilitation of Cluj county comes to fulfill all these ecologic needs (map 2) and can represent a part of the medium and long term Strategy for Development of Cluj county.

The main characteristics of the choremic model we suggest are:

- presents and delineates all natural areas, reservations and natural parks that exist and that are proposed to be set up within Cluj county. They will form "**ecological nodes**";
- delineates the different types of ecological strips and configured them spatially in "**ecological corridors**";
- delineates the ecological areas that are to be also recreational places or they will have other aim. These will form "**pluri-functional ecological modules**";
- delineates those areas that are proposed for ecologic rehabilitation. They will be taken out of the economic circle and they will be included in the ecologic network;
- configured the main corridors for development, in conformity with the territorial reality, that are part of the anthropic network and that concentrate the most anthropic activity;
- highlights the main centers for development that are part of Cluj county and their rank. They induce the configuration and the dimension of the anthropic network;
- highlights the intersection points between the anthropic network and the natural one. They will mark the setting up of the ecological passages;
- highlights the space left as reserve for a future extension of the anthropic network and of the natural one until the optimal territorial development is reached in conformity with the *Law of optimal development*[5].

As a consequence of the implementation of this ecological network, at the end, we can say that a territorial order[6] was induced observing systemic principles and in conformity with the *concept of sustainable development*.

A territorial order can offer a functional, optimal framework for development in conformity with the reality in the territory.

If an ecological network is not to be implemented, spatial development will be uncontrolled and will give way, eventually to "conflicts" between anthropic structures and natural ones, resulting in serious ecological and economic disfunctions.

Thus, the ecological decline and the economic one will deepen – this characterizes contemporary societies and the solutions found that not consider this implementation of an ecological network will be temporary and limited. If rapid measures will not be taken, society will

[4] *Law of the 10 %* (after N. Rejmers, 1992), specifies that in order to preserve the territorial ecological balance, just 1% of the total global area is to be used at a 100% intensity, or to use 10% at a 10% intensity, or the whole area but at a 1% intensity.

[5] *Law of optimal development* (after N. Rejmers, 1992). A system develops and functions with an increased efficiency within certain spatial and temporal limits. No system can shrink or extend infinitely. The *General Theory of Systems* states that the dimension a system has is to correspond with its function, thus the energetic support is ensured. In conformity with this law, a system that is over-developed, yet it has a low diversity of the components tends to disintegrate in functional partas – in sub-systems that have optimal functional dimensions. Translating this for our case, we have to highlight that optimal dimensions are to be found for the ecological, socio-economic and agricultural networks. Making environment uniform through the implementation of giant systems – uniform and extended, determines the setting up of functional structures which destroy the stability of the systems involved.

[6] Territorial order is itself generating development potential and can be also considered a spatial resource.

end up being a victim, in conformity with the *Law of the counter-action of man-eco-sphere relation*[7].

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[7] *Law of the counter-action of man-eco-speare relation* (after Gh. Mohan, P. Neacşu, 1992). Any change induced by economic activity in nature will counteract and will have consequenses on economic, social and health life. This law, reminds us, that within the geographic space, the matter is organized in holarchic systems having a dissipating character and being characterized by sub-ordonation and recriprocity relations of two types: positive or negative feed-back. The development of the geo-systems at a geographical space level is characterized by two major coordinates: a limited space for development and a limited available energy flux. The configuration of the geo-systems, their dimension and the type of relationships (determination and subordination) is structured in conformity with this two major characteristcs. Man and society – as a higher form of development induced by human relationships - set up socio-technical systems on a spatial and energetic fundament offered by the geographic space. Thus, they competed with the ecosystems and they went over all the tolerated thresholds (see *Law of tolerance*, p. 120). Consequently, the eco-systems perceive the socio-economic structures as intruders, thus the relations between them are contradictory, not cooperative in the present form of organization of the social systems, which manifests through positive feed-back answers from the part of the ecosystems.