Some Particularities of the Natural Organization of the Romanian Mountain Space and its Implications in the Mountain Rural Economy

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Introduction

The mountain is a creation of the fight between the endogenous forces' contraries, which are dominant in intensity and territorial magnitude of manifestation, and the degradation forces, which represent a basic component for the geo-restructuring of the national geographic space of Romania.

The natural geo-restructuring of the national space finds a coordinating vector in the mountain unity that gives a concentric, proportional, and almost unique order to the other major components of the space (figure 1).

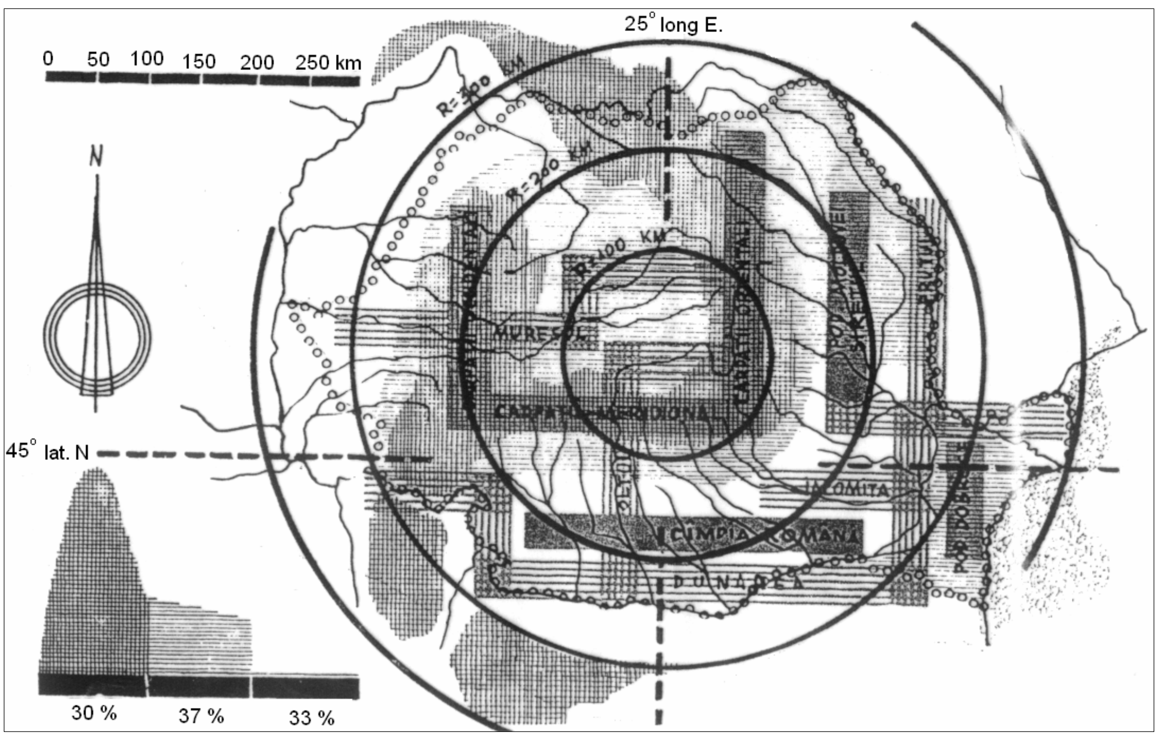

Figure 1. The ortogonale axes and the concentric circular areas of the Romanian nature frame (after G. Gusti, 1974).

The mountain area covers a surface of about 66.025 sq km (27,8%) of the Romanian surface, and it is concentrically positioned in the central part of the country. The vertical deviation of the mountain unit within the national geographic space is of 2.544 m in a geographical sense, and of about 10.000 m in an epimorphologic way (according to the vertical limits of the geographic stratum), respectively, a medium slope of 7,3 m/km (figure 2).

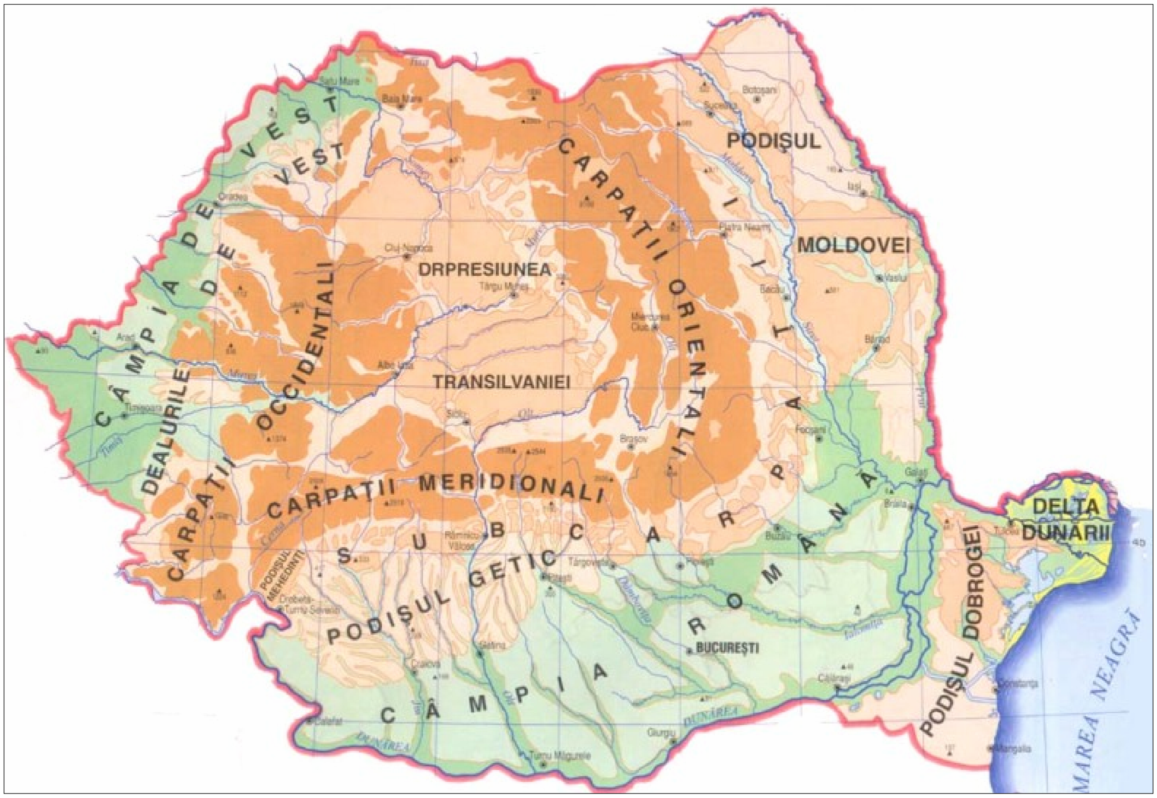

Figure 2. Romania. The major units of relief (after www.romaniatravel.com).

Thus, the mountain unit of the Romanian Carpathians directed and influenced the natural and anthropic geo-structuring of the geographic space through the following aspects:

- the concentric and proportional distribution of the other major forms of geomorphologic units (piedmont hills, sub mountain hills, hilly areas and plains);
- the organization of the hydrographic network, radiar divergent outside the Carpathian arc and convergent inside it;
- it functions like a natural geographical barrier, influencing the spatial dynamics of the geographical objects, it imposes peripheral tracks of circulation, it blocks some vectors of low intensity dynamics;
- it acts like a storage basin, transforming and multiplying the primary energies (the solar, the geotectonic ones) into biogenic, morphologic and hydrographical energies, functioning as a reserve of space;
- it is a genesis and re-genesis space of the natural components (hydrological, climatic, biogenic, and mineralogical);
- a fost un spațiu de referință, leagăn al genezei popoarelor euroasiatice şi inclusiv a poporului român (ipoteză recentă, aflată în curs de elaborare);
- it has been a reference space, cradle of the genesis of Eurasian and even Romanian people (a recent hypothesis, still in course of elaboration;
- nowadays, it is a place for living, exploitation, economic valorisation. It signifies a reserve space for Romania.

The integration of the mountain space into the economic circuit and the development of the human habitat led to the transformation of the natural characteristics of the components and often to a real degradation of these up to total disappearance. The biotic component responded the most vehemently to these transformations, thus receding to the mountain areas, or disappearing completely. The biostases geosystems in their natural balance, which, about two centuries ago, occupied almost entirely the mountain areas, now were mostly disorganized by the socio-economic assaults, thus generating rhexistases geosystems (in a fragile equilibrium) and parastases geosystems (in a disequilibrium state) all over the mountain area.

The appearance of the last two types of geosystems is a result of the excessive intervention of the socio-economic systems, acting according to the principle of "Nature offers, man disposes of". This way, the ecological potential of the reference geographical unit of the national space, respectively the Carpathian Mountains, was disrupted. If this action doesn't stop, we are going to helplessly witness the multiplication and degradation of the ecological crisis states, both locally and regionally. On the other hand, it would be impossible for the national territory to entirely integrate the mountain space into the ecological circuit, because here we may still find the main Romanian soil and subsoil resources.

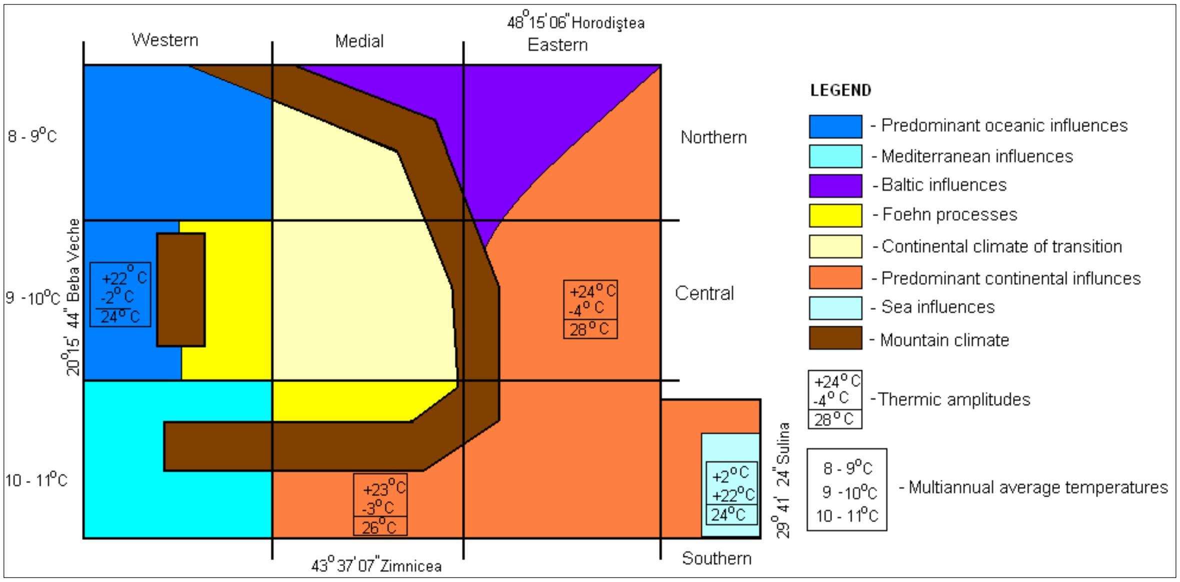

Figure 3. The model of organisation on latitude and longitude.

Some solutions for healing this kind of state exist, but these have to be properly applied at the most optimum moment. In this respect, all these measures and solutions must be adapted according to the concept of Sustainable Development of space.

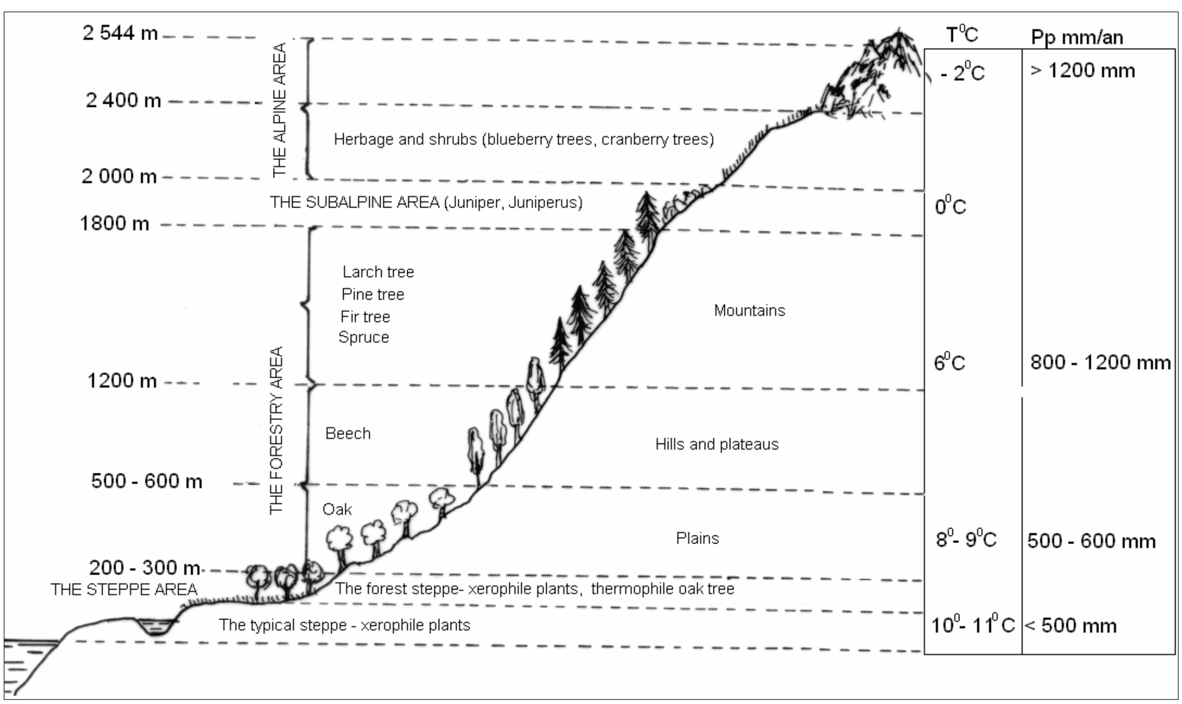

Figure 4. The model of natural vertical organization of the Romanian territory.

Thus, it is compulsory to highlight the ecological valences of the space when approaching the development and organization, due to the fact that the socio-economic systems have to have a discreet structuring.

The scientific basis for a theoretical development and practical implementation of this concept must serve firstly the geographical, systemic, and ecological laws and principles that govern the geographical stratum as a whole, as well as its components, to which the models of natural organization of the space are added.

In case of an organization of a mountain space, we need to elaborate the conceptual model of natural organization of this space, and the people who create these projects and have the power to decide should know it very thoroughly, as well.

The conceptual model of a natural organization of the mountain space

The natural organization of the mountain geosystem represents the most complex form of organization and systemic structuring ever seen in nature.

Comparing the mountain geosystem to the plain geosystem, which develops two-dimensionally, the first one, has altitude as its reference spatial dimension. In space, the mountain has more of a vertical, altitudinal repartition, than of a horizontal one, the mountain being expressed mathematically only in a three-dimensional system.

The verticality, as a quality and a geographical condition of the mountain, attracts and triggers the manifestation of a geographical law specific to the OZ dimension and consequently suspends manifestation of other geographical laws:

a) Law of Gravitation. It is a universal law that permanently acts on the mass. It refers to the force with which the gravitational attraction of a certain dimension and mass object acts upon other objects inflicting them a certain form and direction of movement. The force of gravitation of an object expresses itself through its mass and it actions vertically.

The manifestation of the law of gravitation on the geographical frame refers to the force with which the gravitational attraction of Earth acts upon a geographical object, inflicting on it a certain form and direction of movement:

$$F = k\frac{m_1 \times m_2}{d^2} = m_1 \times g$$

where:

k – the constant of universal attraction (6,67x10 $^{-8}$ erg.);

m_1- the mass of an ordinary object;

m_2 – mass of Earth;

d – the distance between the baycentres of the two objects, thus equal to Earth's radus;

g – the gravitational acceleration (g-galul = 1cm/s^2).

Considering that the terrestrial gravitation maintains some time and space variations, of various size scales, it influences, triggers, and sustains the dynamics of the geographical objects in an inclined plan, determining the architecture of the geosystemic structures at a planetary, regional and local level. Within the plan surfaces, the gravitational force determines only the mass of the geographical objects that conserve a certain quantity of kinetic energy. Because the gravitational acceleration of the Earth grows from the equator (about 978 cm/s^2) towards the poles (about 983 cm/s^2), both the mass of the geographical objects and also that of the disposable kinetic energy increase, fact that, on its turn, causes new vectors of dynamics.

On the versant, the weight of an object that is moving under the action of gravitational attraction is divides into two components:

- the force down the versant, which tends to move the object towards smooth slopes, parallel to the topographic surface;
- the force perpendicular on the topographic surface, which tends to decelerate the moving of the object on the versant.

In a vertical plan, the gravitation decreases and tends to 0. In such a plan the gravitation vertically decrease is different; thus, at altitudes ranging between 500 and 1000 m this diminishes with about 0, 3 mgal/m (1 gal = 10^3 mgal) (after I. Mac, 2000), and, according to the vertical gradient of gravitation (dg/dh), the higher the altitude is smaller than the values. From this point of view, *the Law of Gravitation* determines that the higher the attitude is, the higher the potential gravitation energy of the mountain is.

This represents a potential energetic source still not enough capitalized, but, if neglected and interposed between some actions of altitudinal valorization of space, it causes high energetic consumption for its annihilation.

In conclusion, the terrestrial gravitation carries out a double function in the geographical stratum, that of stabilization of geographical objects and structures, and also that of induction of these into a unidirectional movement, on the slope's gradient or in a free fall towards the centre of the Earth.

This is the natural going of the gravitational processes that exists in absence of outside interventions. Not even the movements in reverse are excluded, but this supposes the existence of an equal force (that determines the stabilization of the geographical objects or structures) or of an even higher one than the gravitational force, involving adequate energy consumption (it is not a natural way, but a technogenous one supported by significant quantities of energy, bigger than the kinetic energy the respective objects have, which in fact means losses caused by the non-compliance of this law).

The force of gravitation has existed in the geographical space since the apparition of the Earth as a planet; hereby contributing to a certain extent to the organizing and modeling of the geosystems, to the coming off of their evolution process.

By the mass conferred to the components, the gravitation has the biggest impact on the geosystems. This formula of the mass induces the gravitational spatial stabilization of the components. In order that these components have a plan-spatially dynamics, they have to defeat the force of gravitation through the consumption of other types of energy, of larger quantities than the force itself (thermic energy and its various forms of secondary transformation representing the main energetic source used by the geosystems for defeating the gravitational force).

Again, the gravitation is the one that limits the dimensional development of the components of the geosystem, the tendency being towards an optimum dimensioning accorded to the existent energetic spare for fighting this force.

The organic systems are the most sensitive and the more adapted to the gravitational force; they include the humans, as well, as biological entities, through the configuration and the structure of the body, but also as social entities through the tehnogene systems that they create, all of them having to allow for the action of this force.

b) The law of the progressive growth of the energetic consumption, along with the altitude. This is owed to the quantity of energy that needs to be consumed in order to defeat the force of gravitation. The higher the altitude and the difference of level *($\Delta h = h_2 - h_1$)* are, the higher the progressive growth of the reverse movement of an object to the gravitational attraction is, according to the angle of the slope.

Therefore, if the consumption of fuel necessary for a vehicle to move on a horizontal land is of 100%, for moving on a 6^o slope (10,5%), the consumption of fuel would be of 106% (after Gh. Timariu, 1993), meaning 6% bigger than in the case of its moving on a horizontal surface. This law acts in strong relation with the *Law of Gravitational Attraction*, constituting a serious impediment in the going on of some processes of geographic dynamics up the slope, in the exploitation and economic valorization of the mountain space.

The law has a permanent character of manifestation and action, fact that needs to be considered in order to make all economic activities in the mountain space more efficient.

c) The law of the geographical altitudinal zonal dividing. It is a general geographical law that stipulates those specific geographical conditions and zones with characteristic altitudes are accentuated when the geographical objects and processes are vertically (in altitude) acting. The geographical superposing is a reflex of the vertical differentiation of the caloric, pluviometric potential, and of the action of the Gravitation (force) Law. The particular characteristics of the above mentioned objects are determined, in their turn, by the action of some geographical laws specific to OZ dimension:

c_1) The law of the decrease of atmospheric pressure and oxygen along with the altitude

The atmospheric pressure and implicitly the oxygen pressure, besides the periodical variations they register, determined by the advective movements of the air masses with various physico-chemical particularities (with different values of pressure), have also an altitudinal variation (decrease), according to a vertical medium baric gradient of 10,7 mb=8,0mm Hg/100m in altitude. Thus, each altitudinal level has a correspondent characteristic value of the atmospheric pressure and oxygen (table 1).

Table 1. The values of the total and partial pressure of the atmosphere, calculated at a vertical medium gradient of10.7mb=8.0mm/100m in altitude, for the Romanian mountain space, set on the basis of the values of atmospheric pressure, registered in Sulina şi Vârful Omul stations, in between 1896-1955.

Altitude (m)	Total pressure		The partial pressure of oxygen		Total pressure in some localities		
	(mm Hg)	(mb)	(mm Hg)	(mb)	Localities	Altitude (m)	Pressure (mb)
0	760	1013,0	159,9	212,7	Sulina	3	1016
50	720	960,0	151,6	201,6	-	-	-
1000	680	906,7	142,8	190,4	Predeal	1093	891
1500	640	853,4	134,4	119,2	Păltiniş	1450	852
2000	600	800,0	126,0	168,0	-	-	-
2500	560	746,7	117,6	156,8	Vf. Omul	2509	746

This decrease in the atmospheric pressure and oxygen at altitude, firstly determines the decrease of the oxygen in a volume of air, which has direct consequences on the natural conditions of the environment, through the decrease of the favorability degree for living in the mountain space. Therefore, it is considered that, 15% of the value of the pressure at the "0m" level represents the limit for the human organism toleration, that means a value of 144 mm Hg, respectively 152 mb, value that is being reached under normal conditions (21% oxygen in the air), at an altitude of about 2700 m. As for the environment conditions of the Romanian mountain space, no restrictions for living are mentioned. Likewise, the decrease of the atmospheric pressure and oxygen directly influences the capacity of the organism to adapt and tolerate the environmental conditions, the rhythm and intensity of the biochemical processes in the biotopes, the intensity of the physico-chemical processes in the geographical systems.

The value of the pressure of the air and oxygen represents a parameter that needs to be taken into consideration when projecting the type, the duration of the activities that take place in the mountain space, the technical parameters of installations and mechanisms, etc.

c_2) The law of the decrease of the natural caloric potential with the altitude

According to this law, the higher the altitude gets, the lower the natural caloric potential is, according to a vertical thermic gradient (γ) that varies in value in relation to the geographical latitude, altitude, angle of slope, the exposure of the versant. The thermic gradient (γ) that represents the ratio between the size of the variation of the temperature in air (ΔT) and the vertical distance unit (Δn), expressed by -Δt ^{o}C/100m,

$$\gamma = -\frac{\Delta T}{\Delta n}$$

has an average value of 0,6^o C/100m for the inferior troposphere.

This average value of the gradient differentiates during the year and in altitude, according to the existent geographical conditions. Consequently, the annual average of the thermic gradient is of 0,4-0,6^o C/100 m between 600-1600 m and 1900-2500 m, respectively of 0,7-0,8^o C/100 m between 1600-1900 m altitude.

During the cold season of the year, the monthly average of the thermic gradient has lower values, being of 0,1-0,2^o C/100 m between 600-1400 m, of 0,4-0,6^o C/100 m between 1500-2000 m, of 0,3-0,4^o C/100 m over 2000 m altitude. During the warm period of the year, the vertical thermic gradient has the highest values of the entire year, respectively of 0,6^o C/100 m between 600-1000 m, of 0,4^o C/100 m between 1000-1300 m, of 0,7-0,8^o /100 m between 1400-2000 m and of 0,6^o C between 2000-2500 m.

c_3) The law of increasing the level of nebulosity with altitude

The annual evolution of nebulosity is influenced by a series of factors among which the atmospheric circulation and the succession of various baric formations, respectively their correspondent fronts.

The mountain, through its vertical extension in the low atmosphere (the troposphere), has a differentiated nebulosity from one altimetry stage to another, thus emphasizing the increase along with the altitude according to a nebulosity gradient.

The calculated average data show that the annual average nebulosity grows in altitude with an average gradient of 0,1-0,2 tenths/200 m. This growth is more acute during summer than during winter, when the contrast is lower, or it may be mentioned as a decrease of the nebulosity along with altitude. The increase of the nebulosity along with altitude is being accentuated up to the superior optimum level of condensation, at an altitude of 1800-2000 m, over which the situation changes.

During the cold season of the year, the sector of the relief over 2000 m altitude is generally placed above the layer of Stratus clouds having limits under 2000 m altitude, thus the degree of nebulosity results to be comfortably low. In spring, the nebulosity reaches its maximum value of 7,5-8,5 tenths per month (the maximum nebulosity being registered in May) at altitudes of 2000 m and more, due to the thermo-dynamic convection and to the frequent advections of humid ocean air masses.

Towards summer, the nebulosity decreases, its lowest degree being registered during the autumn months, having values of 5,3-5,4 tenths, caused by the high regime of atmospheric pressure with its specific anticlimax of the air, and the characteristic spreading of the cloudy systems.

A differentiation in the horizontal plan may be noticed in the annual regime of nebulosity. This is accentuated by the differences between the sector exposed to the dominant circulation from West and North-West and the umbrageous sector, differences that can exceed 0,5 tenths in the lower and medium sectors of the versants. Thus, from May to August, at an altitude of 600-900 m, the South versant benefits of a nebulosity that represents less than 0,85 of that on the North versant.

The same situation appears in December, but with a less extension in time and space. In spring, as a result of the intensification of the atmospheric circulation and of the amplification of the thermo-convective processes, during noon and evening time a maximum of nebulosity can be noticed on all levels and directions, and a minimum during night and morning time as well. During summer, the thermo-convective processes, the general and local circulation (the valley breeze) are intensive and facilitate the processes of condensation during the day, so that the nebulosity reaches the maximum, having values of 6,5-8,4 tenths.

During the night, due to the lack of convective movements and because of the presence of descendent movements of the air (the mountain breeze), the clouds are spreading and the sky becomes clearer, therefore the nebulosity reaches the minimum of the day, with values of 4,0-6,0 tenths. The differences are highly reduced, with a ratio of 0,99 in the mountain area between altitudes of 1000-2300 m, in between May - August.

The ratio of the differentiation is almost of 1,00 at altitudes of 2300-2400 m, emphasizing the fact that the atmospheric circulation has almost the same effects both on the slopes above the wind and on the ones under the wind.

The atmospheric nebulosity, as a component of the geographic mountain, landscape directly and indirectly influences its characteristics.

Thus, by reducing the degree of transparency of the atmosphere, the quantity of the direct solar radiation received by an active unit of surface (cal/cm^2/min) is reduced as well; respectively the degree of diffuse radiation increases, representing the main energetic source for the mountain geosystem.

Likewise, the rising of the nebulosity along with the altitude determines the concentration of the clouds with precipitations at certain optimum levels of condensation and, concurrently, the increase of the amount of precipitations in a year, the enhancement of air humidity and the level of shadowing the active surface with the altitude, the growth of the consumption of caloric energy that is necessary for the evaporation of humidity (table 2).

Table 2. The altitudinal repartition of the main climatic elements in the Romanian Carpathians.

Altitude (m)	The annual average temperature of the air(º C)	The annual average amount of precipitation (mm)	The annual average speed of the wind (m/s)	The annual average no. of days with		
				Frost	Snow	Fog
2400 – 2544	-2,5	1250	11	265	275	320
2200 – 2400	-1,5	1200	10	250	260	290
2000 – 2200	-0,5	1150	9	235	245	260
1800 – 2000	1,0	1100	8	220	230	230
1600 – 1800	2,0	1050	7	205	215	200
1400 – 1600	3,0	1000	6	190	200	170
1200 – 1400	4,0	950	5	175	185	140
1000 – 1200	5,0	900	4	160	170	110
800 – 1000	6,0	850	3	145	165	80
600 – 800	7,0	750	2	130	140	50
The development gradient (100 m altitude)	-0,5	+ 32	+0,5	+7,5	+7,5	+15

c_4) The law of increasing the multiannual average amount of precipitations along with the altitude

The multiannual average of atmospheric precipitations increases along with altitude according to a vertical pluviometric gradient. The gradient has an average value of 30-32 mm precipitations/100m/year, this way resulting, 730-740 mm pp. at an altitude of 600 m, about 960 mm pp. at 1200 m, and 1100-1110 mm pp. at an altitude of 1800 m. at altitudes over 2500 m, the amount of precipitations decreases under 1200 mm/year. This decrease is caused by the going beyond the optimum level of condensation of steam, which is at an altitude between 1700-1800 m.

c_5) The law of abatement of the modeling capacity of the relief by exogenous agents along with altitude

This abatement of the capacity of modeling the relief appears firstly due to the decrease of the force of action of the modeling agents, and also due to the reduction of their number (figure 5).

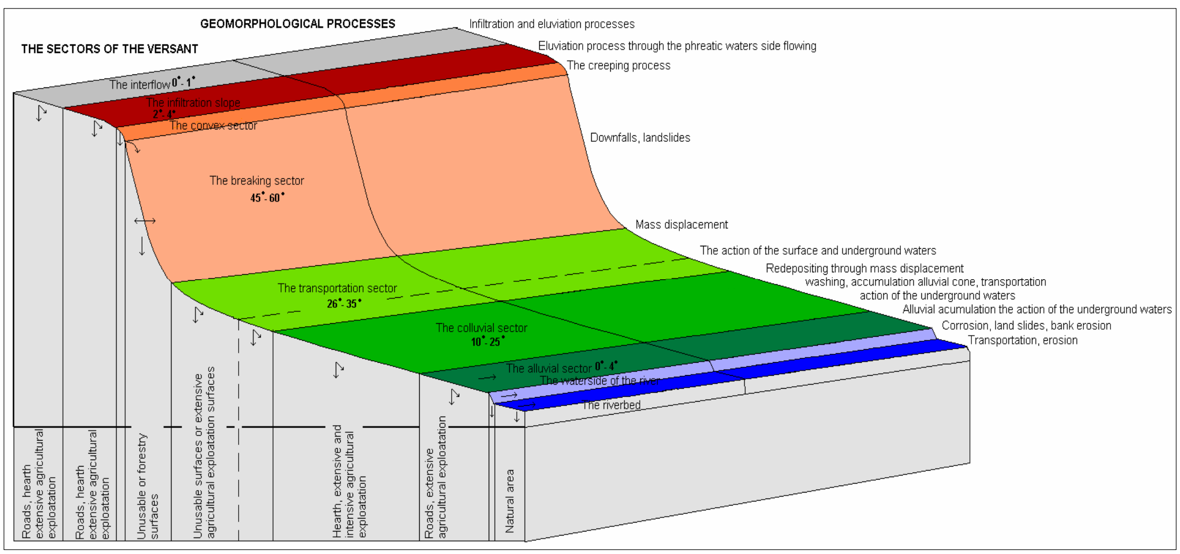

Figure 5. The slope sectors, the geomorphologic processes and their economic valorisation for geographical medium latitudes (after H. G. Dury, 1969, quoted I. Mac, 1986, p. 54, with additions).

Thus, according to the law of reducing the caloric potential along with altitude, the quantity of disposable caloric energy in the space decreases along with altitude; this type of energy represents the basic energetic resource for the evolution of the physico-chemical processes (physical disaggregating, chemical solution and dissolution, that act more actively when the caloric potential is higher) and the biogenic processes for modeling the relief. The precipitations increase along with altitude, according to the law, determines only the intensification of the processes of linear erosion, and this is only up to the optimum level condensation, after which, this one decreases in intensity due to the quantity reduction of the modeling agent. Between the altitudinal level (threshold) of the optimum of condensation, situated at medium altitudes of 1700-1800 m, and the level (threshold) of production the annual average temperatures of 0^{o} C, situated at average altitudes of 2000-2100 m, lies a relatively calm landscape area according to the evolution of the morphogenetic processes. In this area the predominance of the processes of accumulation, and of stocking the materials and energies from the alpine area (the accumulation of the disaggregated materials, water with various colloidal substances), prove that those materials constitute a storage for accumulating the necessary mass and energy for the processes that occur at lower levels of altitude. At the subalpine level, between altitudes of 2000-2100 m, the morphogenetic processes have a higher intensity, and they are represented by the frost – defrost processes that usually last for about 8 months a year (available data for temperate latitudes).

The evolution and manifestation of this law within the geographical space has a double connotation:

- it vertically governs the intensity and typology of the processes that are modeling the relief, which result in a specific configuration and typology of the forms of relief;
- It determines the possibility to economically valorize the forms of relief.

Thus, the superior levels of the versants (in case of the units of relief with low and medium altitudes – up to 1500 m), where the eluvial processes are predominant, and the declivity varies between $1\text{-}4^{o}$; these sectors are inhabited by people who develop and create small villages, holiday resorts, roads for access and practice an extensive agriculture. The middle sectors of the versants are morphologically the most active (because it is a transitional sector, having high declivity degree of $45\text{-}60^{o}$ and morphological processes represented by downfalls, landslides, alterations, disaggregating), this aspect putting them in the impossibility to be economically capitalized (natural surfaces, forestry, or extensive pasturages).

The inferior sectors of the versant have the best economic capitalization, and here we can notice the maximum density of settlements and communication network, as well as field benefits of an intensive agricultural usage.

d) The law of differentiating the caloric potential on the versants with various orientations and inclinations

Knowing this law is very important for practicing agriculture, silviculture, architecture and urbanism, energetics, having in view the fact that the surfaces with various orientations and inclinations are mostly frequent within the environment and predominant in the mountain space.

The differentiated orientation and inclination of the versants in a space, lead to important adjustments in the structure and the form of the natural geographical landscape, through the modification of the capacity of receiving caloric emanation. The differentiated capture of the caloric emanation causes specific states of the environment on the versants with different orientations and inclinations, according to the available energetic potential.

The manifestation of this law is being influenced by the geographical latitude and nebulosity.

The latitude determines latitudinal variations of the solar radiation intensity and of the capacity of absorbtion from behalf of its active surface, due to the decrease of the angle of incidence. Thus, according to the behaviour of the surface towards the solar radiation during the year, along with altitude, two situations can be differentiated here:

- on the versants oriented towards North and on horizontal surfaces, the solar radiation decreases with the altitude;
- on the versants oriented towards South, the degree of receiving the solar radiation increases with the altitude; the increase is higher at the moment of equinoxes and summer solstice, and lower or even missing at winter solstice (table 3).

Without any doubt, the latitudinal differentiations of the intensity of the solar radiation upon the national territory are practically insignificant under real circumstances, because of the intervention of the azonal factors. Still, in elaborating models and in modelling these differentiations have to be taken into account, especially in the case of some geographical processes and phenomena with a high sensitivity to the thermic factor. In this case the correction on latitude is applied.

Table 3. The daily quantum of the direct solar radiation (cal/cm²/day), uniform transparency tests (p=0.6) (after Fărcaş I., 1981).

The surface	The latitude	March, 21	June, 22	September, 22	December, 23
Horizontal	48°	290	558	290	49
	44°	312	570	312	59
	The difference	-22	-12	-22	-10
South, 90➡	48°	333	196	333	159
	44°	300	164	300	159
	The difference	+33	+32	+33	0
North, 90➡	48°	-	19	-	-
	44°	-	36	-	-
	The difference	-	-17	-	-

The direct solar radiation on a normal surface depends on the atmospheric mass that is being circulated through and on the transparency of the air, as well. When the atmosphere is transparent, the average intensity of the solar radiation/hour brings out uniform variations, with accentuated increases and decreases around 12 o'clock. When the atmospheric transparency decreases with 3-5 tenths, it determines a decrease in the intensity of the solar radiation of about 50% of the solar constant (Fărcaş I., 1981). Reducing the atmospheric transparency when the clouds are present causes a perturbation of the symmetric form of variation (as compared to the one at 12 o'clock) and of the intensity of the solar radiation. The influence of this nebulosity upon asymmetry and intensity is more powerful during the winter months and in the first part of the year. Thus, the intensity of the flux of the direct solar radiation, on a regular surface from the surface point of view, depends on nebulosity and latitude. When the atmosphere lacks in nebulosity (p=0,6), the daily regime and intensity of the direct solar radiation have a symmetric evolution. From the point of view of the daily regime of the intensity of the direct solar radiation three types of surface are differentiated:

- surfaces that have an almost identical daily regime with the horizontal surface; the maximum intensity of the radiation is around 12 o'clock, besides which accentuated increases and decreases are produced. This kind of regime is characteristic to the surfaces with a Southern orientation;
- twin surfaces with a symmetric orientation (E-W; NE-NW; SE-SW), for which the maximum intensity of the variation is produced before, and respectively in the afternoon. At the same time, at morning and night hours, a shift in the maximum values can be observed, at the increase of the values of the inclination angle. The shift is more pronounced on the surfaces oriented towards South-East and North-West, and it is milder on those having a South-East South-West orientation. It has been noticed that the shift is stronger at the summer solstice and weaker at the winter solstice.
- the North oriented surfaces behave just like a horizontal surface at winter solstice, under the aspect of the received solar radiation, reaching maximum intensity at 12 o'clock; during summer two maximum levels of radiation can be noticed, before and after noon. These maximum levels shift towards the morning and night hours depending on the inclination of the slope.

At a medium level nebulosity (p=0,8), the intensity of the solar radiation registers noticeable modifications if we compare it to the state of normal transparency of the atmosphere. The nebulosity influences both through the decrease of the values of intensity, and the perturbation of the daily regime. Thus, the nebulosity induces alterations in the regular course of the daily variation, which is present on surfaces with opposite orientations (E-W; NE-NW; SE-SW), as well as in the symmetry between the spring equinox and the autumn one. The nebulosity influence is stronger on the surfaces with Northern orientation, especially during the winter months. The influence is weaker on the South oriented surfaces, yet symmetry is conserved, but during winter around 13 o'clock we can still observe a rather pronounced shift in the maximum value (figure 6). Likewise, the perturbations are stronger on the surfaces having a symmetric orientation (E-W; NE-NW; SE-SW), in which case, during winter and autumn, the maximum influence is weaker on the East oriented surfaces than on those West oriented. During this season, the surfaces from the West sector are advantaged by minimum nebulosity at afternoon hours. During the warm season, the situation is reversed, so that the surfaces whose extension is towards E, NE and SE are more privileged than those having the exposure towards W, NW, SW, yet with certain exceptions that can be noticed only in spring time.

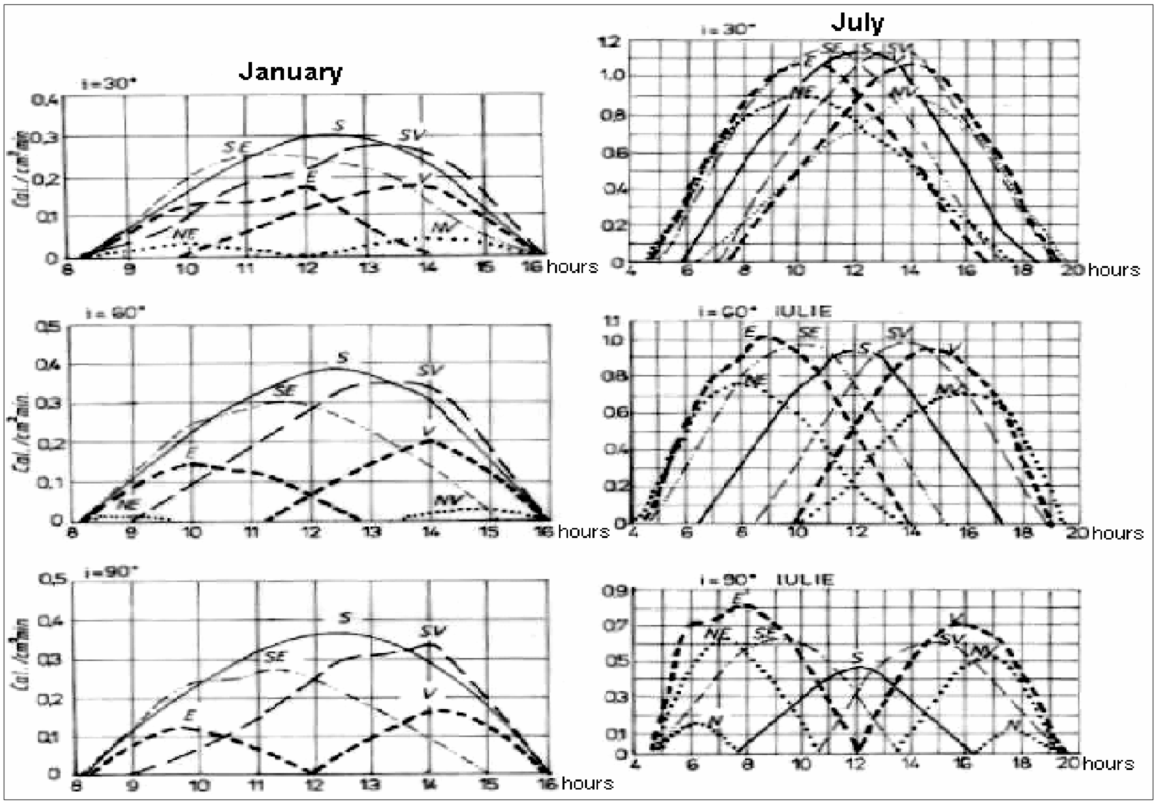

Figure 6. The average intensity of the direct solar radiation per hour on the surfaces with various orientations and inclinations for medium nebulosity, in the first day of the month (calculated values, after I. Fărcaş, 1981)

Knowing this law is of great practical importance for agriculture, silviculture, architecture, urbanism, and energetics, having in view the fact that the surfaces that have various orientations and inclinations are the most frequent to be found in the environment and the more predominant in the mountain space.

The implications of the concept of natural organization of the mountain space in the mountain rural economy

As the altitude grows, the mountain space, which represents about ⅓ of the Romanian territory, may be considered as a progressively disfavoured area for human activities, as compared to the hill and plain ones. This is due to an intensification in the action of a series of restrictive factors, whose behaviour is determined by "the mountain law", which eventually is reflected in the type of rural economy, present forms of inhabiting, economic efficiency of the productivity, the everyday problem of the population etc.

Based on the interpretation of the conceptual model of natural organization of the Romanian mountain space, some parameters, meant to express the level of socio-economic favourability of the mountain space on scales of altitude, may approximately be highlighted, (table 4).

After the qualitative evaluation of the favourability degree of the mountain space for the socio-economic activities, some conclusions may be drawn:

- at altitudes of 1400 – 1600 m, the possibilities for working outside are diminished up to 35%, as compared to the plain area, due to unfavourable weather;
- the effective time for working outside (the actives in agriculture, forestry people, shepherds, people working in constructions) is being shortened with about 75 hours (2,5%) for each 100 m altitude, respectively from 2650 hours (85%) between altitudes of 600-800 m, up to 1450 hours (45%) between an altitude of 2200-2400 m, taking 3100 hours as the reference point for the annual planning;

Tabel 4. The level of favourability of rural economy in the mountain area in comparison with the one in the hill and plain areas as a reference level (100 %) (after T. Măruşca, 2001).

The altitude (m)	The chances to work outside	Difficulties of holding activities in unfavorable conditions of climate	Supplementary efforts to rationate the animals in the indoor feeding	The level of accomplishing the optimum animal production	Estimated exepenses for the same animal product
1400 – 1600	75	125	150	50	200
1200 – 1400	80	120	140	60	180
1000 – 1200	85	115	130	70	160
800 – 1000	90	110	120	80	140
600 – 800	95	105	110	90	120
0 – 600	10	100	100	100	100
The development gradient (altitude of 100 m)	-2,5%	+2,5%	+5%	-5%	+10%

- the decrease in the capacity of the physical work handled by man, caused by the variation of the climatic parameters (temperature, precipitations, humidity, insolation, wind, air pressure), could determine the characteristics of the climatic comfort in relation to the human organism. The thermic state of the air influences the thermic receptors of the skin. According to the temperature of the air, the organism will receive a surplus of heat at an air temperature of 28-30^{0}C (22,5^o C), which would be the equivalent effective of the air – EEA which gives the warm sensation to a man dressed normally (outside), or it will get colder at a temperature of under 21^o C, respectively (17,5^{o}C EEA). Between 21-28^o C respectively 17,5-22,5^{o}C EEA), the organism neither loses, nor gets any heat (Stoicescu C., Munteanu L., 1976). It was observed that, in the conditions of a static air and of one saturated with vapours; a man's sensation of warm could only be determined by the alteration of a single weather element, the temperature of the air (table 5). If the degree of saturation of the air remains unchanged, the impact of heating of the air upon the body produces the feeling of heat; meanwhile, the dropping of temperature produces the sensation of cold in the static and unsaturated with water vapours air. The heat sensation is influenced by two meteorological elements, that is, temperature and air moist. Any change in the above mentioned meteorological elements produces a change in the sensation of heat or cold that the body can feel. In the relationship temperature-wind we observe that for low temperatures the wind produces a decrease in the bodily thermic comfort, amplifying the sensation of cold. On the contrary, for high temperatures, the wind lowers the actual temperature, producing thermic comfort by eliminating the sensation of overheating.

Table 5. Some of the possible relationships between temperature (the dry and moistened thermometer), moisture and wind so that the body should have a sensation of a 20^0 TTS temperature (thermic comfort state), actually felt.

The Dry thermometer (^{0} C)	The Moistened thermometer (^{0} C)	Relative humidity (%)	The wind speed (m/sec)
22,0	16,5	58	0,0
23,0	14,7	40	0,0
23,0	17,5	60	0,5
24,0	13,2	37	0,0
24,0	18,0	56	1,0
24,0	24,0	100	2,5
25,0	16,0	38	1,0
25,0	20,0	63	2,0
25,0	23,2	84	3,0

- the decrease in the open air pasturage duration, which is of about 160 days in between 600-800 m altitude and respectively of about 40 days in between 2200-2400 m;
- the increase in the duration of animal indoor feeding for which supplementary quantities of forage is needed (especially hay), under conditions of frequently not mechanized lands, big slopes, low temperatures and high frequency of rainfall, causing problems to the preparation of this basic forage in the mountain animal

breeding area. These aspects determine the increase of the degree of usage of the direct brute work force in animal breeding and of the costs of production as well. The increase of the duration of animal indoor feeding to over ⅔ of the extent of the year makes permanent cattle breeding at over 1400 m altitude impossible. At such an altitude the conditions of forage production (low temperatures, abundant rainfall, short period of vegetation, supplementary access and transportation costs, ecc) are really adverse requiring considerable physical effort;

- the decrease in production in the zooculture sector, so that the households situated at over 1400 m altitude reach only 50% of the product per animal as compared to the hill and pain areas, bearing almost double costs per product unit. The superior level of spreading for the seasonal shelters for the animal breeders is at about 2000 m altitude, this determined by the development of the sub-alpine threshold of the Juniperus – the last source of wood for food preparation and heating.
- the increase in the duration and the costs supported for heating the houses. The annual period in which heating the indoors is a necessity grows up to 10 days per each 100 m altitude, up to the threshold of 1800 m from which there is a constant need of permanently heating the indoors. Due to the medium annual temperature of the air and the increase of wind speed along with altitude, it can be observed an increase of the intensity in heating the indoors in order that the thermic comfort be maintained (about 20º C) under a thermo gradient of +0,35º C/100 m for the altitudinal interval of 600-2400 m (after T. Măruşca, 2001).
- the necessity of introducing a system of subventions, compensations and other supplementary facilities for the inhabitants of the mountain area as a consequence of the need to compensate the efforts in the economic production, to alleviate the harsh living conditions and to redress the standards of life to the life standards of those inhabiting the lower zones. If we take as basic reference the prices of the products produced at altitudes between 0–600 m, the subventions for those inhabiting the mountain areas would have to increase with 10% for each 100 m altitude (after T. Măruşca, 2001). Thus, a cow milk producer inhabiting a household at 1500 m altitude in Apuseni Mountains, who obtains 2500 l/foraged animal/year, can obtain the same efficiency from this activity just like a cow breeder from the Crişurilor Plain, who produces 5000 l/foraged animal/ year, in much more favourable environmental conditions (table 6).

Table 6. The level of subventions, compensations and other facilities necessary to the mountain area inhabitants in comparison with those inhabiting hill and plain areas, as a reference level (100%) (after T. Măruşca, 2001).

The altitude (m)	Subventions for the agricultural products	Compensations of energetic consumption for the household	The decrease of the price for building materials, farm equipment, animals	Tax reduction, interest taxes on credits, transport costs	Quota of expenses on utilities of communal use
1400 – 1600	100	75	50	75	0
1200 – 1400	80	60	60	80	20
1000 – 1200	60	45	70	85	40
800 – 1000	40	30	80	90	60
600 – 800	20	15	90	95	80
0 – 600	0	0	100	100	100
Gradient dezvoltare (100 m altitudine)	+10 %	+7,5 %	-5 %	-2,5 %	-10 %

Conclusions

The national mountain space represents a distinct spatial structure, organized by its own laws induced especially by the factor of altitude, which imposes itself both on the natural components and the anthropic specific forms of organization, giving birth to specific forms of adaptation.

These general aspects, but also the above mentioned peculiarities lead us to the following ideas:

- the national mountain space is still rather insufficiently known;
- it is still insufficiently valorised from an economic point of view, having into account the underlined potential categories;
- it represents a disfavoured area at a national level, despite the available potential;
- on the whole it is still dominated by a rural economy of subsistence;
- it underwent a graduate process of depopulation, as a consequence of the real harsh living conditions;
- It benefits of a low communication potential that does not respond to the actual needs of economic valorisation and dwelling.

In this light, we can assert that the national mountain space transformed itself from an economic first importance spatial category into an area developing problems that seem to be unsolvable at a first glance. This fake image can be overturned by simply thoroughly studying the organizational ways of the mountain space, a first intercourse in this sense being represented by the present paper.

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