

# THE VEGETATION FROM THE SUPERIOR BASIN OF MOLDOVA, SUPPORT FOR SUSTAINABLE TOURISM DEVELOPMENT

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## **Abstract:**

*Through this study based on specialized documentaries and field research, we are looking for the promotion of the bio geographical potential of the Superior Basin of Moldova in which the forest vegetation prevails. The biodiversity and the exceptional aesthetic ambiance create the favourable premises for the development of ecotourism and the diversification of touristic activities in this area. The valuation of the bio geographical potential has in sight the vulnerability of the vegetation at anthropic actions and emphasizes on the protection measures and conservation of the environment. Our approach try to understand and analyze some of the components and natural ecosystems within the area of the Moldova valley, on the territory of the Suceava County, by emphasizing their scientific, biological, educational, and tourist importance. We can conclude that the development of future solutions in managing the problem on a local scale must necessarily be correlated with the regional, national and European policies and strategies. The existence of the nine natural reservations in Moldova Basin on the territory of the Suceava county can be considered, with no reserve, as an opportunity of sustainable development of tourism, through the strategies of territorial development. The sustainable development of the analyzed region, represents a priority that should be based on the local resources and strategies for territorial development.*

**Key words:** sustainable development; natural capital; biodiversity; vegetation; ecological tourism; protected plants

**JEL classification:** Z32

## **1. INTRODUCTION**

The emergence and spreading of sustainable development concept has brought about a new vision on natural ecosystems, due to the changes that have occurred within them and to the middle and long-term consequences: the increase of vulnerability degree, the reduction of connectivity or the isolation of various components of the natural capital. The continuous sprawl of the settlements, especially of the urban ones, has led to a total or partial substitution of the natural and semi-natural ecological network, as well as to its alteration through simplification, fragmentation and connectivity restriction.

A more pragmatic definition of sustainable development shows that it equally requires the following: “the capitalization of natural resources within the limits of the endurance capacity of the ecological systems, the preservation of biological diversity within the confines of protected areas, the ecological reconstruction of the ecosystems degraded by human impact, and protection measures integrated in the sectoral development strategies interested in internalizing the environmental costs and in assessing the impact of anthropogenic activities on the ecological systems” (Petrișor, 2009).

Our approach seeks to understand and analyze some of the components and natural ecosystems within the area of the Moldova valley, on the territory of the Suceava County, by emphasizing their scientific, biological, educational, and tourist importance (Cocerhan, 2009).

Biological diversity is extremely important, especially due to its ecological, genetic, scientific (Cocerhan, 2009), educational, recreation and aesthetic value. By the on-site conservation of the ecosystems and natural habitats and by maintaining and restoring the viable populations in their natural environment, we may ensure the preservation of biological diversity. So, the diversity of biological systems is indirectly the support for the development of the ecological and semi-natural systems.

The role of vegetal cover is vital for keeping the natural balance. This is a protection buffer, which mitigates many of the negative impacts induced by human activities on the environment.

The role and functions of the biological resources in triggering and supporting the tourist phenomena cannot be fully assessed if they are analyzed in the general context given by the ensemble of natural and anthropogenic factors. And this is true even more as the vegetation is a decisive control in the creation of landscape (with an indisputable aesthetic function), while the fauna positively influences certain areas.

## 2. PROBLEM FORMULATION

**Location and limits.** The part of the Moldova watershed lying on the territory of the Suceava County overlaps three distinct terrain units: the Carpathians, the Sub-Carpathians, and the Moldova Plateau (Martiniuc, 1956). The study area may be delimited from three standpoints, as follows: a boundary of the watershed given by the water divide, an administrative boundary (of the various administrative units that lie totally or partly in the Moldova watershed) and a tourist boundary (Cocean, Vlăsceanu, and Negoescu, 2005), rather unclear, given by the main and secondary tourist axes. From reasons pertaining to the complexity of tourist phenomenon and to the necessity of quantitative analyses, it is easy to understand that, sometimes, the exact physico-geographical boundaries and even the administrative ones are less important.

The water divide that separates on the southwest the Moldova and Bistrița watersheds following the Obcina Mestecăniș connects the maximum elevations belonging to an eastern, lower ridge: Aluniș peak (1294 m), Lucina peak (1588 m), Chițcău peak (1430 m), Orata peak (1379 m) and Mestecăniș pass (1096 m). The water divide continues then with the highest altitudes: Giumalău peak (1857 m), Rarău peak (1651 m), Bâta Oblânc peak (1474 m) and Poiana Brazilor. To the north, northeast and east, the limit is given by the water divide separating the study area from the Suceava and Șomuzul Mare watersheds, along the following summits: Veju Mare peak (1494 m), Obcina peak (1270 m), Sihloaia peak, Hotarul peak (1137 m), Ciumârna Pass (1100 m), Poiana Prislor (1180 m), Cacica peak (803 m). In the plateau area, the elevations are less than 500 m. The southern boundary of the county overlaps most of the watershed, with slight deviations, following the maximum altitudes: Chițigaia peak (1194 m), Ceardac (911 m), and Dadeș peak (459 m), to the south, crossing then a tributary of the Târzia creek.

In the mountain realm, the Moldova watershed completely or partly overlaps the territories of fifteen administrative units and about the same happens in the Sub-Carpathian and the plateau areas.

In order to establish the key coordinates of the sustainable development pattern it is necessary to assess the quality of the historical data and information regarding the operation of the natural capital's components (Mazilu, 2009), in order to answer the following questions: What is the fragmentation degree of the habitats and what are the vulnerable components of the natural capital? An immediate answer starting from the field realities is given by the most vulnerable component, i.e. the vegetation, but problem statement requires correlations with previous studies.

At the same time, the development of future solutions in managing the problem on a local scale must necessarily be correlated with the regional, national and European policies and strategies (Mazilu, 2010). An opportunity in this respect is the Strategic Concept of Territorial Development Romania 2030 (SCTDR), which relies on a vision of territorial development capable to bring forth solutions derived from the needs and features of the various areas, which can contribute to a

balanced development of Romania and all the fields of activity. It is worth noting that special emphasis is placed on the sustainable development of tourism (Mazilu, 2009), (Mazilu, 2008), (Mazilu, Iancu, and Marinescu, 2008). Vădineanu (2004) (Vădineanu, 2004), estimated that the optimal level of the economic activities corresponding to the productive and support capacity of the local natural capital could be reached only around the year 2030.

## 2.1. Previous Research

The early investigations of the study area and the adjacent territories focused on the flora and fauna. As early as 1859, Fr. Herbich published a work referring to the flora of the Bucovina, which appeared in Leipzig (F. Volkmar Publishing House). But brief mentions on the Moldavia's flora and fauna were made very early by some foreign travelers, as well as by Dimitrie Cantemir in his *Descriptio Moldaviae*, a work commissioned by the Berlin Academy.

As we approach the present, the number of studies grows. V. Panait (1969) investigates the vegetation in the Moldovița watershed, focusing on the improvement of natural grasslands. The grasslands were also studied by Popovici et al. (1996). Several studies were accomplished for the territories lying in the neighborhood of our investigated area: Th. Chifu, N. Ștefan, D. Florea (1973), M. Răvăruț, E. Turenschi D. Mititelu, (1961) (The Vegetation in the Suceava Watershed). The topic was also approached by N. Barbu (1976), in a synthesis study focusing on the Obcinele Bucovinei (Smaranda, 2008), as well as by V. Tufescu (1970), C. Brânduș & C. Grasu (1991), in some works dealing with the Moldova Valley (Cocerhan, 2009).

The natural reserves were studied by T. Ștefureac (1967) and T. G. Seghedin (1983), while the relic and endemic flora of the Bucovina was analyzed by T. Ștefureac (1967, 1970). The forest vegetation was also approached both from the point of view of its relationship with the disasters (M. Marcian – 2002) and from the standpoint of the ownership rights (C. G. Leon, 1999). The spread of sustainable development concept and the tourism boom raised the problem of the better management of the protected areas (Smaranda, 2008).

## 2.2. Zonal and Intrazonal Vegetation on the Suceava County's Territory

The study area belongs to the Dacian Province, the Realm of the Eastern Carpathians. It is characterized by a great diversity of Central-European vegetal formations with Dacian endemic species. These are vertically arranged from the hilly area to the subalpine one. A specific feature of the study area is the indisputable prevalence of the forest. It covers 133,097 ha, i.e. 68.56% of the total area of the administrative units. Otherwise, almost the entire territory is included in the historical Bucovina area, which explains both the name (buc = oak) and the many toponyms derived from wooded areas. The forest is specific especially for the mountain realm, while to the Sub-Carpathians and the plateau its percentage gradually drops. The western part is occupied by conifers, the center by mixed forests, while to the east, in the area of the Obcinele Bucovinei, the oak is prevalent. In the contact area, there are oak forests mixed with beech and hornbeam.

Vegetation closely matches the climatic altitudinal zones. The topography is not just a support for the vegetation, but also an element that influences the spatial distribution of vegetal cover. The influence of topography (especially the indirect one) is well known, inasmuch as the altitude is responsible for the presence of the altitudinal zones, which are different depending on the slope aspect. But the topography also influences directly the vegetation through the slope gradient.

*2.2.1. Vegetation zones and subzones.* The vegetation in the Moldova watershed lying on the territory of the Suceava County vertically unfolds from the minimum elevation (286 m), which is found where the river leaves the county, to the Giumalău peak (1857 m). The altitudinal zones and subzones show the following floristic structure and composition:

*The broadleaf forest zone.* The Moldova Valley, from where emerges the mountains and as far as Păltinoasa, is included by many geographers into the Moldavian Plateau. C. Martiniuc considers this territory a geographical unit with distinct features, which he calls the "Piedmontane

plateau” (Martiniuc, 1956). The forest vegetation is made up of oak and beech, mixed with other broadleaf species like cherry, hornbeam and maple. The beech-conifers subzone (*Picea excelsa* and *Abies Alba*) develops in the piedmontane area of the Ciungi Massif and in the Mălini – Râșca Sub-Carpathian area. It also includes other broadleaf species, such as *Carpenus betulus*, *Tilia tomentosa*, *Quercus petraea* and *Quercus robur*. The beech subzone is prevalent in the eastern part of the Obcine, on the slopes of the Obcina Mare (Barbu, 1976, pp. 200-201) (Barbu, 1976) and in the Stănișoara Mountains, where “the mixed forests (beech-fir-spruce) cover almost entirely the mountain range, descending as low as the eastern marginal depressions” (Roșu, 1980, p. 213). Sometimes, the beech forms pure stands, but more often than not, it is mixed in different amounts with fir or spruce.

*The spruce-beech subzone* is a transitional one and it shelters a wide range of floristic elements. The basic components of these forests are spruce, beech and fir, the prevalence of which depends on the local conditions. For instance, in the southern part of the Obcina Feredeui and partly in the Obcina Mare the spruce prevails. Elsewhere, there are mixed forests composed of spruce, fir and beech, spruce and fir, or spruce and beech, which make up forest stands with irregular distribution. If usually, this altitudinal zone stretches from 750 to 1150 m, sometimes, due to the cold air masses that linger on the bottom of the depressions (thermal inversions), it climbs as high as 1400 m (the Tomnatic area in the Obcina Feredeui and the Plaiul Todirescu in the Rarău Mts.).

The spruce zone covers especially the western slope of the Obcina Feredeui, the eastern slope of the Obcina Mestecăniș and the ridges of the Giumalău and Rarău massifs. Fir appears as secondary element, while pine is a common feature of the watersheds of the right-hand tributaries of the Moldova River as far as Pojorâta.

*The subalpine zone* of the Eastern Carpathians generally develops starting from 1650 m altitude. In the Rarău massif, however, this altitudinal zone starts at 1550 m and climbs as high as the maximum elevation in the area (Giumalău peak, 1857 m). The dominant species is mugo pine (*Pinus mugo*) mixed with juniper (*Juniperus communis*), blueberry bushes (*Vaccinium myrtillus*), lingonberry (*Vaccinium vitis idaea*) and dwarf willow (*Salix*).

The herbaceous vegetation forms grasslands with diverse composition, which suffers the pedoclimatic influence of the previously mentioned forest vegetation zones.

*The grasslands in the beech zone.* These grasslands are mainly composed of *Agrostis tenuis*, *Festuca rubra*, *Festuca pratensis*, *Dactylis glomerata*, *Lolium perennis* and *Poa pratensis*, which also spread on the low terraces of the Humor Valley and along the Moldova watercourse. The prevalence of leguminous plants ensures a high nutritive value to the forage mass.

*The grasslands in the beech-conifer zone.* These are secondary vegetal associations, which generally appear in the aftermath of deforestations. They can be spotted mainly in the Moldovița Depression, along the Moldova Valley between Vama and Molid, as well as in the Obcina Mare, in the form of glades. The most common species that make up these grasslands are *Festuca rubra*, occupying the areas of the former beech woods, and *Agrostis tenuis*, which has replaced the forests consisting of beech and fir. Less widespread are *Nardus stricta* and *Arrhenaterium elatius*, which thrive on the areas formerly covered by beech or mixed forests (Barbu, 1976, p. 212).

*The grasslands in the spruce zone.* This type of vegetal association is specific for the Moldova-Sadova depressionary corridor, more exactly for the alignment Izvoarele Moldovei-Moldova-Sulița-Benia-Breaza-Măgura-Sadova-Câmpulung Moldovenesc. At the same time, it is also found in the Lucina and Botuș depressions, as well as in the Răchitiș-Muncel-Pojorâta depressionary corridor (Barbu, 1976, p. 211). The grasslands are made up of *Festuca pratensis*, *Festuca rubra*, *Nardus stricta* and frequently of blueberry bushes (*Vaccinium myrtillus*), juniper (*Juniperus communis*) and birch tree (*Betula verrucosa*). The grassland quality depends on the soils, which are favorable for certain vegetal species. For instance, the skeletal rendzina soils offer good conditions for the development of *Poa nemoralis* and *Carex Montana*, vegetal associations with low nutritive value (Barbu, 1976, p. 212).

**2.2.2. Intrazonal vegetation.** Intrazonal vegetation does not comply with the latitudinal and altitudinal zonation, but it is found in areas with different local conditions, having an insular or

linear appearance. In this category, we may include the floodplain vegetation (making up linear formations along the rivers), the swamp associations, the saxicolous associations, found in the rocky perimeters, and the halophytic vegetation developing on the salt-affected soils, which appears on confined areas.

**The floodplain vegetation.** The woody vegetation consists of floodplain forests. Upstream Molid village, the Grey Alder (*Alnus incana*) prevails, while downstream of it, the dominant species are the willows (*Salix alba*, *Salix purpurea* and *Salix viminalis*) in association with white poplar (*Populus alba*), and, less frequent, with black poplar (*Populus nigra*). In some areas lying along the Moldova and Moldovița valleys, *Myricaria germanica* is common. The herbaceous vegetation makes up grasslands, the productivity of which is influenced by soil fertility and drainage. On the higher floodplain areas, where soils have good drainage, one can see grasslands with *Festuca pratensis* and *Lolium perennis*.

**The swamp vegetation.** Generally, the swampy areas are small, because the lithological formations are pervious. Most of them are found in the mountain area.

### 2.3. The Role of Vegetation and its Importance for the Natural Ecosystems

On the whole, the vegetation role is manifold: food source, fuel and especially raw material. However, its most important role is that of turning the atmospheric carbon dioxide into organic matter. By this process, the solar energy is converted and stored, while the air is purified and enriched in oxygen. Air purification is done by carbon dioxide consumption, while oxygen enrichment is the natural result of the photosynthesis process, which takes place after the formula:  $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{solar energy} = \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$ .

By this process, the solar energy is stored in an organic substance resulting from the chemical reaction between the water absorbed from the soil and the carbon dioxide taken from the air, while the oxygen is returned to the atmosphere. The process has a twofold importance for the animal life, to which it ensures food and oxygen. For the anthropogenic activities, the associations with high vegetal mass create special availabilities, as follows: exceptional aesthetic environment, clean air, raw materials and various possibilities for tourist activities, with strong emphasis on ecotourism (Cocerhan and Spânu, 2009).

The association of ecotourism with the imperatives of sustainable development and nature conservation must comply with the following criteria: preserving the biological and cultural diversity; supporting the sustainable development by ensuring jobs to local population; sharing the benefits of the social-economic activities with the local communities, securing their support and participation in the management process (Mazilu, 2010), (Cocerhan, 2012).

The forest distribution and composition is the result of a bunch of conditions generated by the geospheres, but in their turn, these suffer the influences of the forest. The forest biosphere, which is influenced and even controlled by the features of the other geospheres, has in its turn manifold positive influences on the first ones (i.e. on air, water, soil, lithology etc.). At the same time, it is a valuable resource and a favorable environment for its flora and fauna (Chiriță, 1981). Forest influences are felt not only within its confines, “but also outside its perimeter, no matter if the adjacent areas are natural or humanized” (Chiriță, 1981).

### 2.4. Hesychasm – Local Specific Form of Forest Sustainable Conservation

“Hesychia” means silence, inner stillness. Hesychasm means to reach the inner peace by an incessant prayer in which one mentions repeatedly the name of the Savior. However, in order to reach the peace of mind the hermits looked for the physical silence, retiring themselves in the middle of nature, away from the turmoil of the secular world.

The Romanian monks were fond of the quiet woods and the simple life lived in the mountain wilderness, as was recorded by the Romanian religious literature. For instance, St. Daniil Sihastrul, who is considered “a great teacher of the wilderness and a counselor of the monks”, after moving from hermitage to hermitage, finally retreated in 1470, when the Putna Monastery was

consecrated, to the Voreneț area, „where he carved a cell into the stone, beneath the Hawk Rock. Here, he lived a humble life for another twenty years in the love of God (...) (Chiriță, 1981). About the devout Iov the Hermit is said: Iov the Hermit repented at the Bogdănești Monastery – Suceava, where he lived humbly for a few years at the end of the 14th century. Then, wishing to pray the Lord incessantly, he retreated in the secular forests beneath Mount Pleșu (...) (Chiriță, 1981). Gathering around him more than fifteen monks, he established in the woods a small seclusion place, which was long known as the Iov's hermitage, before changing the name into the “Iova Glade”. This was the hermitage of the monks belonging to the Bogdănești-Râșca Monastery. For centuries on end, until today, watchful hermits have forced themselves here to a humble life (Chiriță, 1981). Another argument for the hesychasm emerges from the Arhim's writings. Ioanichie Balan: “... Around the Moldovița Monastery (before 1402), as everywhere else, hermits fallen into oblivion had been living a humble life since the 13th and 14th centuries. Some would remain unknown until their death; others were living for a while as hermits in the forest glades and then returned to the monastery”. For instance, the devout Isaia the Hermit from Moldovița (Chiriță, 1981), after he lived a humble life in different monasteries, “craving the life of the old-time hermits, retreated in peace in the forests around the monastery. There, he made himself a hut and continued to lead a humble existence in prayer and self-remembering” (Chiriță, 1981).

The entire life of the Romanian people was strongly connected with the forest: the lodge, the mill, the church, the furniture and the tools, all were made of wood, before other materials take prevalence. So, we may speak above all of “a Romanian civilization of wood, with specific forms, for about fifteen hundred years (...)”(Chiriță, 1981). The wood was the material used for the building of the first churches and hermitages on the Moldova valley. In the Suceava land, the wood architecture is a remarkable chapter of technical civilization and artistic expression; by its distinctive features, it is part of the national and European cultural patrimony” (Chiriță, 1981). Nearly every time when a stone building was erected, the remnants of older wood edifices were unearthed. Otherwise, the architecture of the wood churches was at the origin of the Moldavian architectural style.

The woods played a special role in the life of the Romanian people in general and in the monastic life in particular. The forests where the hermits used to retreat in order to be away from the world and close to God provided them shelter, food and tranquility. In the study area, there are humble places of worship made of wood. Although they have a modest appearance, they have a great historical and artistic value (Table 1).

### 3. PROTECTED NATURAL AREAS

The ascending progress of human society in a rhythm more and more alert, made pressure on the environment particularly incisive. The growth of the number of population and the necessity of larger surface of habitation, quantity of food and some different materials picked up in nature, and the establishment of another lifestyle have led a more and more alert degradation of the environment. The attitude of those responsible on our country's territory has been in consensus with the approach on global level. Among the first ways of protecting some areas in the Middle Ages has been the declaration of owners of some areas as “fenced-in district”: “<The law> of the fenced-in district, mentioned in the era of Matei Basarab, proves that this institution was ancient and was part of <the tradition of the land>” writes C. C. Giurescu, (Cocerhan, 2010) and further defines “fenced-in district” as:

*“Fenced-in districts were forbidden or reserved places, in which no one was allowed to enter to cut wood, reap hay, to feed cattle, hunt, and fish or to pick the fruits of the forest, without the prior consent of the owner. Those who contravened, who broke the “law” of the fenced-in district, were punished and the sentence varied, from the seizure of their cart and oxen, the axe, hunting and fishing tools and clothes to cutting of a hand or even hanging.” (Cocerhan, 2010), (Cocerhan and Năstase, 2011).*

As in the Western Europe, initially, these restrictions were meant to limit the access of the masses to the natural products offered by the forest, especially by hunting. This was a first step taken closer to realizing the idea that resources are limited and some may even disappear irreversibly. In Bucovina, the first official regulation regarding the regime of the forests was given in 1786 and in Moldova in 1792. The regulation considering the exploitation of the forests in Bucovina was published in the time of the emperor Iosif II, with the title "Forest polity" (Cocerhan, 2010). Even though in this counter time, Romania had been trying to keep up with the European legislation, in 1872 hunting is legislated, in 1896, fishing, and in 1881 the first Forest Code of Romania is released. This first code has a special importance regarding the regulations concerning the exploitations of wooden mass. It has been applied until 1910. Even the republished code in 1910 takes many of the old one's stipulations. Among the progressive stipulations of this act was also the direct and active involvement of the state in the managerial activity of the forestry areas. Support was given for those who respected the principles of exploitation of the forestry fund or for those who reforested fields (awards, cash for reforesting, reduction of taxes). The less praiseworthy part was the discriminatory regime regarding the forests from the mountain zones and the lower ones. Its effect was a great liberty for the large landowners in the hill and plain to cut down broad surfaces of broadleaf forests, especially oak and beech, with disastrous ecological consequences. It was a brutal intervention in that epoch in the forested area. The idea of conservation extends to forests and other elements, especially after, in 1819, Alexander von Humboldt introduces the phrase "monument of nature". Being conscientious of the touristic importance of the Bucegi and, in the same time, of the necessity of protection of the ecological integrity. Spiru Haret, in 1900, proposes the foundation of a national park. In Bucovina, the clerical Fund, proposes in 1907, at the request of Austrian authorities, as a protected area, the forest Slătioara. The completion of this demarche it is not made until 1925 by the Romanian government (Cocerhan, 2010). In 1931, The Commission of the Monuments of Nature appears. The first monuments of nature decreed by it were edelweiss (at the proposal of Alexandru Borza) and *Nymphaea thermalis*. On the segment of environment preservation, in time, numerous governmental or non-governmental organism and organizations are born. In the end, the International Congress of preservation of the nature, after elaborating a resolution, has decided the establishment of the International Union for Conserving Nature, fact which took place a year later (1948), at Fontainebleau (Spânu, Fuțăr, and Cocerhan, 2012). This international institution has founded a system of classification of the protected areas, depending on the purpose pursued, gathering up to ten categories (1978), system improved in 1994, limiting itself to only six categories of protected areas. The system is applied nowadays too.

### 3.1. Natural Reservations

In the study domain there are protected area which can be included in three out of the six categories: Category Ib (The wild area) (Peștera liliecilor), Category III (Natural monument) (Klipa with triassic limestones, Pârâul Cailor – geological, Moara Dracului, Piatra Buhii) and Category IV (Area of habitats/species management), (Secular Forest Slătioara, Secular Forest Giumalău, Secular Forest Loben, Cheile Lucavei, Fânațele montane Todirescu, Pădurea Roșoșă, Piatra Pinului and Piatra Șoimului, Pietrele Doamnei, the apthycus layers of Pojorâta, Tînovul Găina-Lucina, Răchitișul Mare). Out of the protected areas mention above, those referring to the vegetation are divided into only two categories, III and IV (Annex 1; Table 1).

**Table 1. Natural reservations of the vegetation in Moldova area of Suceava county.**

NO	Reservation Name	Cat	Reservation Type	Custodian	Administration localization	Area (m <sup>2</sup> )	Nature 2000 site overlapping the reservation
1	Secular Forest Slătioara	IV	Forest Reserve (Secular spruce fir and species of communitarian interest)	Direcția Silvică Suceava	Stulpicani	1064,2	Rarău- Giumalău
2	Secular	IV	Forest Reserve (Secular	Direcția	Pojorâta	309,5	Rarău- Giumalău

	<b>Forest Giumalău</b>		spruce fir)	Silvică Suceava			
<b>3</b>	<b>Roșoș Forest</b>	IV	<b>Forest Reserve</b> (Secular spruce fir)	Direcția Silvică Suceava	Moldovița	205,0	-
<b>4</b>	<b>Secular Forest Loben</b>		<b>Forest Reserve</b> (Secular spruce fir)	Direcția Silvică Suceava	Moldovița	483,0	-
<b>5</b>	<b>Todirescu mountain hay fields</b>	IV	<b>Botanical-hay field reservation</b> (Flora species of communitarian interest)	Direcția Silvică Suceava	Stulpicani	38,1	Rarău- Giumalău
<b>6</b>	<b>Tinovul Găina – Lucina</b>	IV	<b>Botanical reservation</b> (Dwarf birch tree)	Direcția Silvică Suceava	Moldova Sulița	1,0	Găina-Lucina
<b>7</b>	<b>Răchitișul Mare</b>	IV	<b>Botanical reservation</b> (Strugurele ursului)	Direcția Silvică Suceava	Breaza	116,4	-
<b>8</b>	<b>Pietrele Doamnei-Rarău</b>	III	<b>Mixt reservation</b> (Includes geological formations and endemic flora species)	Direcția Silvică Suceava	Pojorâta, Crucea	933,0	Rarău- Giumalău
<b>9</b>	<b>Cheile Lucavei</b>	III	<b>Mixt reservation</b> (Of geological-geomorphological interest and vegetation with protected elements)	Direcția Silvică Suceava	Moldova Sulița	33,0	Găina-Lucina

Source: A.P.M. Suceava

### I. Slătioara Secular forest

In 1907, the Ministry of Agriculture of Vienna requests from the Administration of the Cleric Fond in Bucovina area proposals for future natural reservations. Two locations are suggested: the secular forest of Rarău and Putna forest. This has taken a slow start: it was only in 1913 that a habitat of 408 hectares but the declaration of the reservation was issued by the Romanian Government by ministerial decision re-actualized in 1941 with H.C.M 284 and included in Law no. 5 of year 2000, number 2723. The surface suffered fluctuations over time: 671,11 hectares upon instatement, 295,28 hectares in 1931 at Slătioara, it was added another 292,92 hectares on Mountain Giumalău and 65 hectares from the Todirescu hay fields as a buffer area. In 1974 it had 609 hectares and in present it holds 1064,20 hectares assigned under the administrative domain of Slătioara village.

If the initiative, at the beginning of the 20th century was issued from the Religionary Fund of Bucovina, after the first World War the struggle for including other areas in the protected category was lead by professor Mihail Gușuleac (1887-1960) from the Science Faculty of Cernăuți (also a member of the Romanian Academy). Secular forest Slătioara is placed on the east slope of Rarău, in the Slătioara brook basin (Spănu, Fuțăr, and Cocerhan, 2012).

This brook is formed by the confluence of four other small brooks: Văiuga with Valea lui Ion and Valea Ursului with Valea Ceargăului. Slătioara is a tributary on the left side of Suha brook. The above mentioned valleys separate almost parallel interfluvies with rising altitudes towards Mount. Todirescu and Popii Rarăului. The area altitude is ranged between 790 m and 1353 m (according to the map from APM Suceava – 1487 m). The peaks on which this forest is settled are Bâta Neagră, Bâta cu Plai and Bâta Lesei. In this area we can find altitudes of 1000 m to over 1400 m.

The geological sub-layer is consists of the external flank of the syncline Rarău, with a wildflysch built-up at the surface. The term wildflysch is given because of a chaotic built-up of flinch elements together with different genetic and temporal elements: volcanic rocks, limestone klippe. The forest, sometimes with multisecular trees, is composed of mainly resinouses: spruce fir (*Picea excelsa*), fir (*Abies alba*), forest fir (*Pinus sylvestris*) and also isolated specimens of larch tree (*Larix decidua*). We can also mention decidous species such as the beech (*Carpenus betulus*)



and, along the brooks, willows and alders (Spânu, Fuțăr, and Cocerhan, 2012), (Seghedin, 1983, p. 47).

## **II. Giumalău Secular Forest**

The reservation was legalized in 1941, through Ministerial Council Decision NO. 284 and reinstated according to Law NO. 5 from 2000, at NO. 2724. It stretches on the west slope of Giumalău Mountain, between 1230 and 1680 meters, with a total surface area of 309.5 hectares. The forest was declared a reservation thanks to professor's Mihai Gușuleac diligence. It consists of pure rammel of spruce fir (*Picea abies*) and has an important role in research, one being able to monitor and evaluate the evolution dynamics of the spruce fir forest in the absence of anthropic activities.

## **III. Roșoșa Forest and Secular Forest Loben**

There are two forest reservations of relatively recent date that were declared protected areas in 2007 according to the G.D. NO. 2007, with the approval of the Commission for the Protection of the Nature Monuments of County Council Suceava, NO. 1111 and 1112 from 02.05.2006. The Roșoșa Forest is situated in the Roșoșa Mountain area, in the superior basin of Moldovița, towards the watershed with the Suceava basin, with a total surface of 205 hectares. Secular Forest Loben, with a span of 483 hectares, is also located in the Moldovița basin on a small affluent on the left side (Loben brook), from upstream of village Rașca. Both reservations are made of old forests and are key witnesses for the unaltered evolution of the spruce firs (Spânu, Fuțăr, and Cocerhan, 2012).

## **IV. The mountain hay fields from Plaiul Todirescu**

The reservation's administration is from Stulpicani village, Slătioara. It can be reached either following the road from the eastern side of Câmpulung Moldovenesc city or from the centre of Frasin city on the road to Ostra, through Stulpicani, Gemenea and Slătioara. Plaiul Todirescu with the mountain hay fields occupy the west slope of Mount Rarău, between 1200m and 1492m at the upper side Secular Forest Slătioara, on the interfluve Moldova – Bistrița.

In 1931 it was proposed as a buffer area for the Secular Forest Slătioara, with a 65 hectares area. Today the reservation's area is 44 hectares. Because of the altitude influenced climate, the fenologic cycle is shorter (May – September) and the blooming is delayed, most plants bloom in July. It is the month in which the reservation displays its multicolored plant landscape. The border between the forrest and the meadow with a micro transition area in which there can be found, isolated, spruce firs (*Picea abies*), beech (*Fagus silvatica*) and field ash (*Sorbus aucuparia*). The meadow is made of a diversity of plants, many of which endemic or protected, thus justifying the reservation status of this area: leopard's bane (*Arnica montana*), vinețeaua (*Centaurea austriaca*), various bellflowers (*Campanula abietina*, *Campanula spatula*, *Campanula persicifolia*), monk's hood (*Aconitum anthora*), clocotișul (*Rhinanthus glabra*), globe-flower (*Trollius europaea*), numerous daisies (*Chrysanthemum leucanthemum*) and many others (Spânu, Fuțăr, and Cocerhan, 2012), (Seghedin, 1983, p. 47).

## **V. Găina-Lucina Tinov**

With a small area, of only 1 hectare, the tinov is found on a small affluent of Lucina brook called Bilcani. It's not very far from Lucina Stud Farm. It was declared a reservation in 1932. Being a tinov, it's basin is covered with a peat soil (with *Sphagnum*), suitable for the dwarf birch tree (*Betula nana*), mixed with cranberries.

## **VI. Răchitisul Mare**

The reservation protects an element of circumpolar Nordic flora – bearberry (*Arctostaphylos uva-ursi*) mentioned since 1859 by the Austrian scientist Franz Herlich, on the sinuous roads and gabbro fields from “the Moldova valley at Groapa and Breaza” (Spânu, Fuțăr, and Cocerhan, 2012). The site is found on the west slope of Obcinile Mestecăniș, on Dl. Răchitișul Mare, between Tătarca Mare brook and Tătărçuța brook, affluents on the right side of Moldova between Breaza de Sus and Benia. The altitudes exceed 1000 meters. It was declared a natural reservation in 1955 (MCD 1625/1955) and is mentioned in Law no. 5/2000 at number 2725. The reservation shelters, besides the glaciari relict of great floristic importance, the bearberry (*Arctostaphylos uva-ursi*) and forest vegetation (forest pine, spruce fir, birch tree), dwarf shrubs (cranberry - *Vaccinium vitis-idaea*,

blueberry bush – *Vaccinium myrtillus*) and a rich grassy vegetation (mouse ear - *Hieracium transsylvanicum*, bellflower - *Campanula persicifoli*, mountain carnation - *Dianthus carthusianorum*, “curechiul de munte” - *Ligularia sibirica*) etc.

### VII. Lady's Rocks Reservation

The name has historical signification, reminding of Mrs. Elena, the wife of Petru Rareș, which, according to the legend took shelter here in 1538. The area, with its massive limestone cliffs (klippe), presents interest because it shelters rare vegetation such as the Argințica glacier relict (*Dryas octopetala*) and numerous endemic elements: the bellflower (*Campanula Carpatica*), Nottingham catchfly (*Silene nutans*), columbine (*Aquilegia nigricans*) etc. (Spânu, Fuțăr, and Cocerhan, 2012).

On the limestone sub-layer, in hidden places, grows the delicate lion's foot, protected but endangered because tourists still harvest it. The access to the reservation (with an area of 933 hectares) can be achieved from three sides: from Chiril on Bistrița valley or from Moldova valley from the east side of Câmpulung city, on Pârâul Alb and from Pojorâta, on Izvorul Giumalăului brook.

### VIII. The Gorge of Lucava Reservation

The road leading to the Lucina stud farm, not far from the exit of Moldova Sulița, passes through Cheile Lucavei, a result of Lucava brook, which penetrated the triassic pearl spar barrier on the side of the sinclinal Rarău. The reservation (33 hectares) presents geomorphological interest but also shelters protected plant species: bearberry (*Arctostaphylos uva - ursi*) and lion's foot (*Leontopodium alpinum*) (Spânu, Fuțăr, and Cocerhan, 2012).

## 3.2. Protected Plants

The demographic growth, in the course of history, has generated an expansion of the anthropic domain and an invasion of the natural ecosystems. At a world scale, the phenomenon was noticed early even though at first the economy aspect was of greater importance (Example: the royal hunting grounds). With the passing of time other characteristics for an area to become protected were taken into account: the research, instructive and touristic potential.

There are many plants which possess unique qualities (aesthetic, medicinal etc.) which were harvested without regard to the regeneration capacity according to the species population. To this was added the demographic growth which caused a chain reaction: the necessity of food – the necessity of space – the invasion and destruction of the ecosystems. In the area studied we have identified numerous protected plant species: lion's foot (*Leontopodium alpinum*), leopard's bane (*Arnica montana*), globe-flower (*Trollius europaeus*), columbine (*Aquilegia vulgaris*), turk's cap lily (*Lilium martagon*), “curechiul de munte” (*Ligularia sibirica*), “foaie groasă” (*Pinguicula Montana*), “gențiană” (*Gențiana kochiana*), lily of the valley (*Convallaria majalis*), snake's head (*Fritillaria meleagris*), lady's slipper orchid (*Cypripedium calceolus*), sundew (*Drosera rotundifolia*), mountain peony (*Rhododendron kotschy*), yew (*Taxus baccata*), rose daphne (*Daphne cneorum*).

3.2.1 “*Albumița*”, (lion's foot) (*Leontopodium alpinum*), also has other name depending on the region. The scientific name comes from the inflorescence's shape resembling that of a lion's foot. It was the first plant declared a natural monument thanks to biologist Alexandru Borza recommendation (1931). It's the symbol of mountain hikers lovers. “For its delicateness and beauty, it's also been called the “queen's flower”, as a queen among flowers” (Seghedin, 1983, p. 47). “The plant's reputation is due to the appearance, a wonder of nature. When you see it covered in silver lint (“flocosică” how the Romanians call it) among the other green plants, without thinking you reach out for it.” (Simionescu, 1973, p.119). We must also add the advice from E. Pop sent to most of the people who wrote about this monument of nature: “Insistent notice to those which, with all the official warnings, will not overcome their temptation: to break or to cut only the top part, to spare the organ from which the flower will be reborn; their sin will be lesser.” (Pop apud Băltărețu, 1980, p. 235). Still, nowadays there is the possibility to grow this flower and to eliminate the

extinction of the natural vegetation (Pop apud Băltărețu, 1980, p. 235). Lion's foot is located in the area of the Moldova Basin, on the limestone cliffs of Piatra Doamnei, in Cheile Lucavei and Cheile Moara Dracului.

3.2.2. *Leopard's bane* (*Arnica montana*) enriches the meadows in June – July with its orange colored flowers. Together with other protected plants it can be found on Plaiul Todirescu. It has a root the shape of a rhizome and a reddish stem. A medicinal plant highly appraised for its therapeutic properties: cicatrization effect, vasoconstriction, decongestive, stimulates immunity and has benefic effects for the respiratory pathway. Only the flowers are used for therapy. "Because in Suceava county this plant was harvested for medicinal purposes in excessive amounts until 1971, by protecting it we avoid its total destruction and assure its perpetuation. The plant is harvested from hydrographic basins by rotation, once every 2 years, with the obligation of leaving at least 1 flower per square meter with the root intact." (Seghedin, 1983, p. 47).

3.2.3. *Globe-flower* (*Trollius europaeus*), on the superior valley of Moldova, on Plaiul Todirescu, blooms in August, has a yellow-green almost golden flower with green inter-veins on the exterior side. It also has therapeutic qualities when used in very small quantities (2g/infusion), in combination with other plants, for prostate cancer.

3.2.4. *Columbine* (*Aquilegia vulgaris*) can be found both in the wilderness and planted. It prefers the sunny spots and the limestone sub-layer. It blooms in July in diverse colors: white, pink, blue and lilac. Often appears along Moldova's and Moldavița's water course – planted, and in bright hay fields.

3.2.5. *Turk's cap* (*Lilium martagon*) is a protected species in almost all of Europe. It has an inflorescence with 3 to 11 pink - red flowers, dotted with dark – purple spots. Can be found in the Lucina hay fields.

3.2.6. "*Curechiul de munte*" (*Ligularia sibirica*), is a plant studied since the beginning of the XIXst century and mentioned by Franz Herbach for the Țapul, Lucina, Cocosul and Găina area (Spănu, Fuțăr, and Cocerhan, 2012) (Seghedin, 1983). Can reach 150 cm in height, has short rhizome with lateral roots. The flowers are golden yellow.

3.2.7. "*Foaie groasă*" (*Pinguicula montana*) has leaves displayed in a rosette shape, yellow-greenish with viscosities. Measures 5-15 cm, the leaves also have a digestive function – it secretes a sticky, digestive substance which dissolves the insects that are trapped in it. It is a carnivorous plant as an adaptation to the environment. The flower blooms until July, with a blue – violet color. It can be found in the Secular Forest Slătioara in the Lătoace rocky area (Simionescu, 1973, p.119). The leaves also have therapeutic properties (caughing, asthma and more).

3.2.8. *Gențiana* (*Gențiana kochyana*). In the Câmpulung, Oușor and on the Todirescu plateau region there is a flower called "ghințură". It is a plant of a special gentleness, with flowers of clear sky color, with a blooming period from May (*Gențiana kochyana*) to September (*Gențiana asclepiadea*). Outside of the blueish tint it can rarely be found in yellow (Simionescu, 1973, p.119).

3.2.9. *Lily of the valley* (*Convallaria majalis*). From a horizontal rhizome and the upwards oriented extremity lanceolate leaves sprout with nerves ranging from 8 to 18 cm, which overgrow the inflorescence type flowers: 5-20 white flowers, beautifully scented. It can be found in the wilderness in the Câmpulung Moldovenesc area on Mountain Măgura but also planted in gardens (Simionescu, 1973, p.119).

3.2.10 *Fritillary* (*Fritillaria meleagris*) also called "bibilică" in the Sasca-Baia area in locations with high humidity. It has a flower stem of 20-30 cm and odorless, checkered, brown-purple flowers.

3.2.11. *Lady's - slipper Orchid* (*Cypripedium calceolus*) is an especially delicate type of orchid. "When you see it for the first time, you stop in front of it as if it was a renowned painting you always wanted to see up-close. Suddenly you can't even tell: is it jewelry made out of sapphires, rubies and diamonds when the dewdrop stops in its corolla? Is it a rare butterfly or a lost humming bird?" (Simionescu, 1973, p.119). The orchid can be found in the Slătioara – Câmpulung area, usually on calciferous, dark locations.

3.2.12. *Round - leaved sundew* (*Drosera rotundifolia*). It grows in oligotrophic peat bogs and because of the extremely poor soil suffered a mutation transforming into a carnivorous plant to compensate for the lack of nutritious elements. The small drops of sticky, nice scented substance, which glitter in the sunlight, gave its name. The shiny beads at the top of the small pins are actually a digestive liquid for the trapped insects. It can be found in the Găina – Lucina Tinov (Spănu, Fuțăr, and Cocerhan, 2012).

3.2.13. *Mountain Peony* (*Rhododendron kotschy*). Its name derives from the Greek words “rhodon” = rose and “Dendron” = tree. It has red-purple flowers which bring color to the area in July-August. Although called a peony it must not be mistaken for the *Paeonia officinalis*, the actual peony. The plant has therapeutic qualities: the flowers, with a smell resembling cherries, can be made into syrup or jam (Simionescu, 1973, p.119).

3.2.14. *Yew* (*Taxus baccata*). The yew, which at times formed clusters of forest, can only be found in hard to reach sites and rarely in groups. The endangerment of the species came from two fronts: the exploitation of the hard wood that it provides and the deliberate destruction. Animal breeders caused the destruction because the leaves of the yew contain a certain poison, called taxane (more specifically a glycozil). In the area studied yew specimens were found in the Moara Dracului reserve, in Putna Valley, Pojorâta, Câmpulung Moldovenesc, Slătioara. A peculiar one was located at Capul Câmpului with an age of over 350 years.

3.2.15. *Rose Daphne* (*Daphne cneorum*), in June – July, in the Secular Forest Slătioara there can be seen a flower with an inflorescence in the shape of a flower head, reddish like an shrub of about half a meter in height. The flowers resemble that of the lilac, with an almond smell. The fruits are black and poisonous (Simionescu, 1973, p.119).

#### 4. CONCLUSIONS

The sustainable development of the analyzed region, the Moldavian area, in the Suceava district, represents a priority that should be based on the local resources and strategies for territorial development. Tourism doesn't affect so much the natural environment as other economic activities do. Conservation of the natural environment can be achieved as long as there is an equilibrium between socio-economic system and surrounding environment (Scutariu, 2016, p. 138). Valuable touristic resources exist in this space with opportunities for creating a durable tourism plan which can assure the long-term development of the region, such as the Forest Reserves Secular Forest in Slătioara, Secular Forest Giumalău, Pădurea Roșoșă, Secular Forest Loben, botanical reservations Tinovul Găina – Lucina and Răchitișul Mare, or the mixt reservations Pietrele Doamnei - Rarău and Cheile Lucavei. In their domain reside numerous species of endangered, protected plants of great importance to the natural ecosystems.

Their disparition through uncontrolled exploitation would contribute to the impoverishment of the natural ecosystems and disrupting the natural balance, reason for which it is necessary to promote the ecological tourism. In conclusion, the touristic capitalization of the vegetation can be based on multiple types of tourism: ecotourism, sylvo tourism, sylvo therapy, landscape therapy and chromotherapy, or, in association with the climatic elements, climatotherapy can be practised, “green” therapy and different outdoors activities: hiking, trekking, harvesting medicinal plants, berries, fruits etc.

**Table 2. Wooden churches in the Moldova watershed on the territory of the Suceava County.**

S.No	THE NAME OF THE ADMINISTRATIVE UNIT	SETTLEMENT	DEDICATION OF THE CHURCH	YEAR OF FOUNDATION
1.	BOGDĂNEȘTI Commune	BOGDĂNEȘTI	Sts. Voievozi wooden church	1805
2.	BOROAIA Commune	BOROAIA	The Dormition of the Virgin Mary wooden church	1808

3.	CÂMPULUNG MOLDOVENESC City	CÂMPULUNG MOLDOVENESC	The Fire Squad wooden church	2005
4.	CORNU LUNCII Commune	BĂIȘEȘTI (sept.1499)	Sts. Voievozi wooden church	1778
5.	DRĂGUȘENI Commune	DRĂGUȘENI	The Dormition of the Virgin Mary wooden church and St. Spiridon church	1780
6.	FORĂȘTI Commune	FORĂȘTI	St. Nicholas wooden church	1764
7.	FUNDU MOLDOVEI Commune	COLACU	St. Nicholas wooden church	1800
8.	GURA HUMORULUI City	VORONEȚ	The Hermitage church	ant.1472*
9.	VAMA Commune	VAMA	Ascension of Jesus wooden church	1783
10.		MOLID	St. Anne Hermitage –old style (2000-under construction )	2000

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**ANNEX 1. The basin of Moldova River within Suceava county map (vegetation and natural reserves)**

