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BIOGEOGRAPHICAL REGIONALISATION BASING ON POTENTIAL VEGETATION. CASE STUDY: BISTRITA-NĂSĂUD COUNTY

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Abstract: The County of Bistrita-Năsăud lies in north-central Romania, at the border between the Transylvanian Plateau and the Eastern Carpathians. Its geomorphology features mountains and hills, laid out in a south and westward widely opened natural amphitheatre, with a difference in altitude of 2029 m. As a result, there is a rich, vertically zoned vegetation cover (including: alpine level, subalpine level, forest level, and sylvosteppe level). The vegetation of these zones was subject to important changes in time due to anthropic intervention, so that primary plant communities have been replaced by secondary ones, which are a main component of present-day landscape. In this context, the present paper tries to recreate the areas of initial, primary, or potential vegetation in the county. This is a necessary step in biodiversity preservation actions, in preparing plans of territorial management and planning, in touristic utilisation of some areas, in the process of ecological reconstruction of areas impacted by anthropic activities from the last two centuries, for the identification of new habitats to be included in the appendixes of the Habitats and Birds Directives, for increasing the number of protected areas by including new, *„untouched"* areas (not affected by overexploitation, fertilisation etc.), for converting natural / semi-natural forests and pastures in Natura 2000 sites etc.

Key words: biogeographical regionalisation, potential vegetation, Corine, Palearctic Habitats, Natura 2000, Eunis

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INTRODUCTION

In last decades, European scientists focused on developing habitat classification systems to point out the diversity of ecosystems that form the spontaneous living environment (part natural, part humanised) still existing on the continent. These systems are: CORINE (1991); The Habitats Directive (1992); Palearctic Habitats (1996, 1999); Natura 2000; Emerald (2000); EUNIS (1997 – 2005).

Basing on these classification systems, every nation created, subsequently, its own (more or less consistent) classification systems. In Romania, the paper "Habitats from Romania" is a significant contribution in this area, representing a first attempt to coherently describe the main types of habitats in the country, most of which being named and briefly presented in the habitats classification systems CORINE (1991) and Palearctic Habitats (1996, 1999). The same paper conducted a first correlation with the classification systems at European level, especially with that used for Natura 2000 (Donită et al., 2005).

Numerous studies on the distribution and structure of vegetation in Romania were conducted over time. Of greater importance are the works of Donită, Leandru (1960), Donită et al. (1980), Donită et al. (2005), Enculescu (1924), Enculescu (1938), Georgescu, Ciucă (1950), Georgescu, Doniță (1965), Ivan (1979), Petcuț (1955), as well as the *Atlas of the Socialist Republic of Romania* (SSR; 1976) and the *Geography of Romania* (1983).

The present paper attempts a linking to the EUNIS classification system basing on potential vegetation, according to the maps published by Ivan et al. (1992) and Bohn et al. (2000), on the example of the Bistrita-Năsăud County.

METHODOLOGY

For the biogeographic zoning based on potential vegetation in the county of Bistrita-Năsăud, following steps were performed:

- the analysis of potential vegetation in Europe, as mapped by Bohn et al. (2000) and the delimitation of main potential vegetation units in the county of Bistrita-Năsăud;
- the study of bibliography regarding the distribution and structure of vegetation in Romania and the county (Cocean et al., 2011, the *Atlas of the SRR*, 1979, the *Botanical Atlas*, 1980);
- the analysis of forest maps realised by the forest administrations in the county;
- the study of archives regarding forest and agricultural activities in the 19th century and of Austrian maps on Transylvania and the Năsăud Border Regiment (Lupşan, Onofreiu, 1998, The Map Collection from the National Archives in Bistrita-Năsăud);
- mapping of terrains covered by a particular type of vegetation;
- preparation of files for the description of potential vegetation.

RESULTS AND DISCUSSIONS

The term *potential vegetation* means the totality of plant associations in a region, developing outside human interference, only under the control of abiotic, mainly climatic and soil factors. The County of Bistrita-Năsăud lies in the central-north part of the country, at the contact area between the Transylvanian Plateau and the Eastern Carpathians, stretching over 5355 km^2. Geomorphologicaly, the county territory resembles the form of a natural amphitheatre, comprising two main hypsometrical levels – hills and mountains.

These, in turn, are also subdivided into following altitudinal zones: medium-high hills in the Transylvanian Plain (Comlodului, Lechintei, and Jimborului Hills), high hills such as the Bistritei Hill and the Someşului Mare Hills, medium-high mountains (Tibleş, Bârgău, Călimani Mts.), and high mountains (Rodnei Mts.). The altitude difference in the county is 2029 m (from 250 m in the meadow of the Someşul Mare River to 2279 m at the Ineu Pk. in the Rodnei Mts.), generating an altitudinal zonation of vegetation and a diversity of habitats.

Basing on field research and recent literature, we determined following types of potential vegetation (figure 1, table 1).

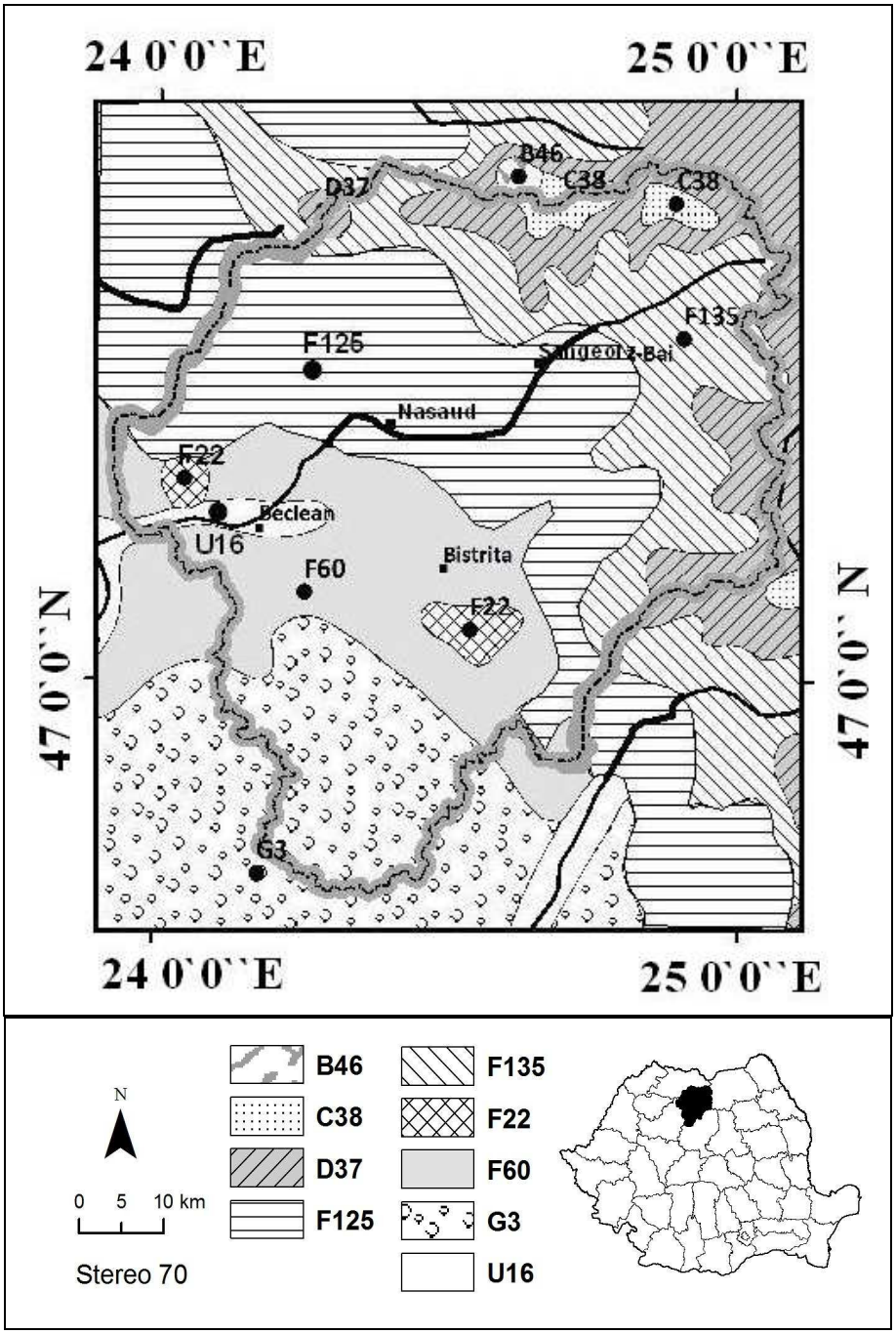

Figure 1. Bistrița-Năsăud County. Potential Vegetation Map
(Source: adapted after Bohn et al. 2000)

For each type of potential vegetation, an evaluation sheet was created, containing habitat extension, primary associations, and secondary associations as a result of the removal of initial vegetation, geographical features, and ecological issues regarding the respective vegetation formations (tables 2 – 13).

Table 1. Major potential vegetation units in Bistrița-Năsăud County
(Data source: after Bohn et al., 2000)

Bohn Code	Potential Vegetation Units
B	Alpine vegetation
B46	Meadows on siliceous rocks
C	Subalpine vegetation
C38	Mountain pine formations
D	Meso-hygrophile coniferous and mixed forests
D37	Spruce and spruce-fir forests
F	Mesophyle broadleaf or mixed forests
F135	Fir-beech, and spruce-fir-beech forests
F125	Sub-Carpathian beech forests
F60	Mixed sessile oak – hornbeam forests with Lathyrus hallersteinii
F22	Sub-Carpathian oak forests with Carex bizoides, Molinia caerulea, M. arundinacea
G	Thermophile broadleaf forests
G3	Transylvanian mixed oak forests combined with steppe meadows
P	Halophile vegetation
R	Common reed and Pond sedge stands, aquatic vegetation
S	Swamps
U	Wet meadows
U16	Meadows with hardwood (Ash, Elm) combined with riparian aspen and willow forests, together with oak-hornbeam forests

Table 2. Evaluation sheet for alpine vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

B	**Alpine vegetation**
B46	Meadows on siliceous rocks
Habitat	Rodnei Mts. (the peaks Pietrosul Mare, Rebra, Puzdrele, Corongiș, Piatra Albă, Gărgălău, Ineu, IneuT, Coasta Netedă, GalaTiu, Buhăiescu, Anieșul Mare, Omul)
Primary vegetation	Carex curvula, Primula minima, Festuca supina, Potentilla ternata, Oreochloa disticha and Juncus trifidus, Salix kitaibeliana, Rhododendron myrtifolium, Vaccinium myrtillus, Vaccinium vitis-idaea,Vaccinium gaultherioides, Anthoxanthum odoratum
Secondary vegetation	Agrostis rupestris, Festuca ovina, Silene acaulis, Poa alpina, etc.
Geographical features	Altitude: 2100–2300 m; Climate: T = 1,0– -1,5^0 C; P = 1300–1450 mm, windy areas; Relief: north- and north-east-oriented, medium to high steeped slopes and ranges; Underground: slate; Soils: Humus-silicate soils, Lithosols
Ecological issues	Vegetation is degraded by human activities (grazing, road building, tourism). Erosional processes on touristic and animal paths caused the formation of gullies and debris fields. Through intensive grazing, the native meadows of Festuca supina and Potentilla ternata degrade and transform into Nardetum strictae alpinum or subalpinum associations.

Table 3. Evaluation sheet for subalpine vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

C	Subalpine vegetation
C38	Mountain pine formations
Habitat	Rodnei Mts., Bistricior Massif
Primary vegetation	Mountain pine shrubs (Pinus mugo) associated with swiss pine (Pinus cembra), meadows with Rhododendron myrtifolium,Vaccinium myrtillus, Vaccinium vitis-idaea
Secondary vegetation	Alnus viridis, Salix silesiaca, Salix herbacea, Ribes petraeum, Juniperus sibirica, Pinus cembra, Deschampsia flexuosa, Homogyne alpina, Luzula sylvatica, Oxalis acetosella, Calamagrostis villosa, Nardus stricta, Festuca supina, Luzula luzuloides, Deschampsia flexuosa, Potentilla ternata, Geum montanum, muşchi (Hylocomium splendens, Polytrichum juniperinum, Pleurozium schreberii)
Geographical features	Altitude: 1550–2100 m; Climate: Temp = -0,2^0-3,0^0 C; rain = 1250–1425 mm; Relief: steep slopes, glacier and glacio-nival cirques, deflated plateaus; Rocks: slate, eruptive rocks; Soils: Humus-silicate soils, andisols, superficial with rich skeleton and acid reaction.
Ecological issues	Anthropicaly removed vegetation for the expansion of grazing land. Through overgrazing, sub-alpine meadows can transform into areas dominated exclusively by Nardus stricta. Ecological reconstruction is needed in order to stop the shrinkage of mountain pine areas and linear erosion.

Table 4. Evaluation sheet for meso-hygrophile forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

D	Meso-hygrophilic coniferous or mixed forests
D37	Spruce and spruce-fir forests
Habitat	Rodnei, Tibleşului, Bârgăului Mts., Bistricior Massif, Călimani Plateau (Poiana Tomii Glade, the ridge Dl. Negru-Poiana Cofii-Tiganca-Piciorul Scurt)
Primary vegetation	Spruce (Picea abies), Silver Fir (Abies alba), Swiss Pine (Pinus cembra)
Secondary vegetation	Festuca rubra, Agrostis capillaris, Scorzonera rosae, Festuca nigra, Festuca carpatica, Juniperus sibirica, goat willow (Salix caprea), bilberry (Vaccinium myrtillus), blackberry (Rubus hirtus), red raspberry (Rubus idaeus), matgrass (Nardus stricta)
Geographical features	Altitude: 1400-1850 m; Climate: T = 1,0^0- 4,0 ^{0} C; P = 900–1400 mm; Relief: massifs, ridges, very steep slopes with various orientations; Rocks: slate, andesite, volcanic agglomerate, sandstone; Soils: pre-podzol, podzol, and cripto-podzol soils, andisols, superficial to medium development, highly acid, oligobasic, humid
Ecological issues	Intense deforestation to extend pasture and farmland in the 18th and 19th centuries, and subsequent soil amelioration for regeneration and economic means. Where conditions proved favourable, the natural limit of spruce forests descended by 100 – 150 m (Tibleş and Bătrâna Massifs). Silvicultural activities are carried out mainly on large properties by forestry districts, while small properties have a poor management. In last years, an intense insect activity was observed (Ips typographus), especially in areas whit no silvicultural practices (removal of fallen trees and stubs, cleansing of torrents, etc.). The reforestation of areas with no other utilisation and of those degraded by erosion is imperative.

Table 5. Evaluation sheet for mesophyle forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

F	Mesophile, deciduous or mixed forests
F135	Fir-beech and spruce-fir-beech forests
Habitat	Rodnei, Tibleşului, Bârgăului Mts., Bistricior Massif, Călimani Plateau
Primary vegetation	Silver fir (Abies alba), beech (Fagus sylvatica), spruce (Picea abies)
Secondary vegetation	Meadows with Festuca rubra and Agrostis capillaris, shrubs of Sambucus racemosa, associated with Salix caprea, Sambucus nigra, Salix silesiaca, Betula pendula, Sorbus aucuparia, Calamagrostis arundinacea, Rubus hirtus, Rubus idaeus, Fragaria vesca, Urtica dioica, Impatiens noli-tangere, Luzula luzuloides.
Geographical features	Altitude: 700-1400 m; Climate: 4-7^0 C, 800-1200 mm; Relief: slopes and ridges, hillocks, with various orientation and fragmentation; Rocks: slate, andesite, volcanic agglomerate, sandstone; Soils: brown acid, brown eumesobasic, andisols
Ecological issues	Intense deforestation to extend pasture and farmland in the 19th and 20th centuries. Where amelioration activities for regeneration and economic utilisation were applied, the exploitation of conifers caused the extension of clean beech forests.

Table 6. Evaluation sheet for Subcarpathian Beech forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

F125	Subcarpathian Beech forests
Habitat	Rodnei, Tibleşului, Bârgăului Mts.
Primary vegetation	Beech (Fagus sylvatica), Sycamore maple (Acer pseudoplatanus), Wych elm (Ulmus glabra)
Secondary vegetation	Meadows of Festuca rubra, Agrostis capillaris, shrubs of Corylus avellana, Crataegus monogyna, Rosa canina.
Geographical features	Altitude: 700-1200 m; Climate: T =4-7^0 C, P = 800–1200 mm; Relief: mild to medium inclined slopes with various orientations, ridges, plateus, valley floors; Rocks: slate, sandstone, andesite; Soils: brown eumesobasic, brown acid, deep – medium deep, low – medium acid, eumesobasic, humid soils.
Ecological issues	Deforestation to extend pasture and farmland in the 19th and 20th centuries. Amelioration silvicultural activities for regeneration and economic utilisation.

Table 7. Evaluation sheet for Sessile Oak - Hornbeam forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

F60	Sessile Oak – Hornbeam forests with Lathyrus hallersteinii
Habitat	Central part of the county – Bistrita Hills, Lechinţa Hills, Unguraşului Hills
Primary vegetation	Sessile Oak (Quercus petraea), Hornbeam (Carpinus betulus), Field Maple (Acer campestre), Small-leaved Lime (Tilia cordata), Wild Service Tree (Sorbus torminalis)
Secondary vegetation	Mesophile meadows with Agrostis capillaris and Festuca rubra, shrubs of Crataegus monogyna, Rosa canina, Cornus sanguinea, Evonymus verrucosus, Ligustrum vulgare, Viburnum lantana, Prunus spinosa, Hippophaë rhamnoides.

Geographical features	Altitude: 300–850 m. Climate: T =6-9^0 C, P = 600–800 mm; Relief: mild – medium slopes with various orientation, ridges, plateaus; Rocks: sandstone, clay, and marl; Soils: brown eumesobasic, brown acid, brown alluvial clay soils, deep, optimal hydrated, eutrophic.
Ecological issues	Amelioration treatment in sessile oak forests for regeneration and economic utilization caused the development of Carpinus betulus facies. Ocasionally reforestations with Pinus sylvestris and Picea abies.

Table 8. Evaluation sheet for Subcarpathian Oak forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

F22	**Subcarpathian Oak forests with Carex bizoides, Molinia coerulea, Molinia arundinacea**
Habitat	Ciceului Hills, BistriTa Hills
Primary vegetation	Oak (Quercus robur), exclusively or with small amonuts of hornbeam(Carpinus betulus), sessile oak (Quercus petraea), birch (Betula pendula), common elm (Ulmus procera), wild pear (Pyrus pyraster), black alder (Alnus glutinosa), aspen (Populus tremula), small-leaved lime (Tilia cordata), field maple (Acer campestre), Tatar maple (Acer tataricum)
Secondary vegetation	Meadows with Agrostis tenuis, shrubs of Crataegus monogyna, Rosa canina, Cornus sanguinea, Evonymus verrucosus, Ligustrum vulgare, Viburnum lantana, Prunus spinosa.
Geographical features	Altitude: 300–500 m; Climate: T =8- 9^0 C, P = 600–750 mm; Relief: slopes and ridges, old terraces outside floodplains; Rocks: sandstone, rhyodacite; Luvisoils – pseudogleyed, deep, mesobasic, with alternating humidity, mesotrophic.
Ecological issues	Amelioration treatment in oak forests for regeneration and economic utilization caused the development of Carpinus betulus facies.

Table 9. Evaluation sheet for thermophilous deciduous forest vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

G	**Thermophilous deciduous forests**
G3	Mixed Transylvanian oak forests in association with steppic meadows
Habitat	Southern part of the county – the Transylvanian Plain (Lechința Hills, Jimborului Hills, Comlodului Hills)
Primary vegetation	Turkey oak (Quercus cerris), Hungarian oak (Quercus frainetto)
Secondary vegetation	Prunus spinosa, Crataegus monogyna, Rubus caesius, Rosa canina, Evonymus verrucosus, Pyrus pyraster, Ligustrum vulgare, Rhamnus cathartica, Humulus lupulus, Clematis vitalba, Cornus sanguinea, Evonymus europaeus, Rosa gallica, Veronica chamaedrys, Plantago media, Jasminum fruticans, Amygdalus nana, Prunus fruticosa, Cornus mas, Vicia tenuifolia, Bromus inermis, Origanum vulgare, Asparagus verticilatus, Festuca valesiaca, Poa angustifolia, Poa bulbosa, Dactylis glomerata, Agropyron repens, Agrimonia eupatoria, Phleum phleoides, Teucrium chamaedrys, Calamintha clinopodium
Geographical features	Altitude: 400-500 m; Climate: T=8-9^0 C, P=600-800 mm; Relief: slopes and ridges; Rocks: sandstone, marl, and clay; Brown alluvial clay soils.
Ecological issues	Amelioration treatment in oak forests for regeneration and economic utilization caused the development of Carpinus betulus facies.

Table 10. Evaluation sheet for halophilic vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

P	Halophilic vegetation
Habitat	In areas with salt formations (Băile Figa Spa Resort, Săsarm, Blăjeni, Caila, Sărata, Sărățel, Cepari, Slătinița etc.)
Primary vegetation	Artemisia salina, Artemisia pontica, Armeria maritima Willd, Salicornia herbacea, Suaeda maritima, Salicornia herbacea, Aster tripolium, Aster transilvanica, Aster lemnosa, Festuca pseudovina, Cynodon dactylon, Poa bulbosa, Achillea setacea, Alopecurus pratensis etc.
Secondary vegetation	Hordeum murinum
Geographical features	Altitude: 300-400 m; Climate: T =8-9,5^0 C; P = 600–800 mm; Relief: plain surfaces and excavations, mild slopes; Underground: sandstone-clay and marl; Salty solonchak soils.
Ecological issues	Halophilic vegetation has an intrazonal character, as it is linked to the occurrence of salt formations. Some surfaces are affected by fallowing because they are not used in agriculture. Where vegetation is grazed, nitrification contributes to their degradation. Some areas with halophilic vegetation became nature reserves (La Sărătură –Blăjenii de Sus, the Salt Mountain from Sărățel).

Table 11. Evaluation sheet for reed and sedge formations, and aquatic vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

R	Reed and Sedge formations, aquatic vegetation
Habitat	In river meadows, on lakeshores, and in micro-depressions, where high moisture is permanent
Primary vegetation	Reed (Phragmites australis), bulrush (Typha angustifolia), club-rush (Scirpus lacustris), Juncus effusus, Juncus trifidus, pond sedge (Carex hirta)
Secondary vegetation	-
Geographical features	Plain or slightly irregular surfaces; Sandstone, marl, and clay; Hydromorphic and alluvial soils.
Ecological issues	Some areas with hydrophilic vegetation became nature reserves, such as Tăul lui Alac from Zagra with Salix cinerea, Carex elongata, Alnus glutinosa, Lysimachia vulgaris, Phragmites communis, Calistegya sepium.

Table 12. Evaluation sheet for marsh vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

S	Marshes
Habitat	In excavations and on plain surfaces in wet areas.
Primary vegetation	Phragmites australis, Typha augustifolia, Scirpus lacustris, Juncus trifidus, Carex hirta, Sphagnum, Eriophorum scheuchzeri, wooden species: alder (Alnus glutinosa, Alnus incana), white willow (Salix alba), aspen (Populus tremula).
Secondary vegetation	-
Geographical features	Altitude: 200–2100 m; Climate: T = -8,0-9,0^0 C, P = 600–1400 mm; Relief: plain terrains, wet, poorly drained excavations; Peaty underground; Organic soils: histosols, low acidic to neutral, acidic and highly acidic.
Ecological issues	Some swampy areas have been drained and transformed into pastures with Festuca. In mountain areas, they became high moors with Sphagnum robustum, Sphagnum magellanicum, Sphagnum cuspidatum, Carex pauciflora, Drosera rotundifolia, Polytricum strictum, Pleurosium schreberi (eg. Tinovul Larion from the Bârgău Mts., Tăul Muced in the Rodnei Mts.).

Table 13. Evaluation sheet for floodplain vegetation in the Bistrița-Năsăud County
(Data source: modified, after Doniță et al., 2005)

U	Floodplains
U16	Floodplains with hartwood (ash, elm) in combination with riverside coppices of poplar and willow, along with oak-hornbeam forests
Habitat	The Someşului Mare floodplain downstream the inflow of the Cormaia river
Primary vegetation	Alnus glutinosa, ash (Fraxinus angustifolia), elm (Ulmus laevis, U. minor), oak (Quercus robur); on higher ground: linden (Tilia tomentosa, T. cordata), hornbeam (Carpinus betulus), rarely poplar (Populus alba, Populus nigra); on lower ground: Acer campestre, Malus sylvestris, Pyrus pyraster, rarely Acer tataricum
Secondary vegetation	Meadows with Agrostis tenuis, riverside coppices with Alnus glutinosa, Salix alba
Geographical features	Altitude: 200-250 m; Climate: T =9,5-11^{0}C, P = 500-600 mm; Relief: plain surfaces, sometimes floodable; Rocks: alluvium, clayey-loam, gravel. Young, floodplain brown clay alluvial soils, alluvial soils – developed, deeply gleyed, eubasic, moistured, eutrophic.
Ecological issues	Floodplain vegetation suffered important changes in time, as human settlements developed, causing widespread deforestations. The floods of 1970 and 1974 triggered major changes in the morphology of floodplains, so that, nowadays, these regions are in ecological and functional unbalance.

CONCLUSIONS

According to the regionalisation scheme based on potential vegetation, the County of Bistrita-Năsăud comprise following primary vegetation, in altitudinal zonation: thermophilous deciduous forests, mesophile deciduous or mixed forests, meso-hygrophilic coniferous or mixed forests, subalpine vegetation, and alpine vegetation. These vegetation associations suffered important changes during time under the impact of human activities; their shrinking contributed to the occurrence of secondary vegetation associations such as subalpine meadows, and mountain and hill pastures. Herding and grazing caused the nitrification of soils and the occurrence on these pastures of some special, ruderal formations.

In certain areas with favourable geomorphological and climate conditions, the natural limit of forests has been lowered by 100 – 150 meters through deforestations done for grazing land extension. It is the case of the magmatic massif Tibleş, where, above the limit of spruce forests (1650 – 1700 m) a supra-forest level occurred (Mac, Tudoran, 1990), formed of meadows with Festuca rubra, Agrostis capillaris, Nardus stricta, and shrubs of Vaccinium myrtillus and Vaccinium vitis-idaea (the sector Bran-Tibleş-Arcer). The same phenomena can be observed on the Bătrâna Massif in the Rodnei Mts., and the Bistricior Massif in the Călimani Mts. (1990 m), where the removal of spruce forests and pine shrubs (Bistricior) gave place to grazing land areas.

In other locations, the structure of the initial vegetation was modified by the introduction of new, soil-protecting species. Notable actions were the reforestations with spruce and pine, or the locust tree plantations in the hill region of the county.

Knowing the areas of potential vegetation can be useful in activities of biodiversity preservation, of elaboration of territorial management plans and planning, in touristic utilisation of some areas and in the process of ecological reconstruction of areas affected by human intervention in the last two centuries.

In respect to biodiversity preservation, the biogeographic regionalisation basing on potential vegetation is very useful for:

- re-evaluation of the list of protected areas in the county and nationwide;
- Identifying new sites for habitats insufficiently covered by the present list;

- identifying new habitats to be included in the Annexes of the Habitats, and Birds Directives;

- increasing the number of protected areas by including new, unaffected areas (not subjected to overexploitation, fertilisation etc.);

- converting natural and semi-natural forests and pastures in Natura 2000 sites, after changing their management plans to meet the stipulations of the Habitats, and Birds Directives;

- suggesting projects of ecological reconstruction for most of the areas in hill and plain regions (forests as well as meadows).

Aknowledgements

The present work represents a part of the research results processed in order to elaborate the visiting strategy for the Protected Areas of Bistrița-Năsăud County, initiated by the Babeş-Bolyai University-Faculty of Geography-Bistrița Division, as a part from the reference material prepared for the project *"The inventorying and evaluating of the protected areas of Bistrița-Năsăud County"*, proposed by the *„Ruralis Association of Rural Development"* and advanced for financing to the Agricultural and Rural Development Direction of Bistrița-Năsăud District, on the axis 4 LEADER, as well as a part of the project *„The Biodiversity-The forgotten dimension of the environment„* supported by the City Hall of Bistrita. The authors acknowledge to anonymous reviewer for their thoughtful suggestions and comments.

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