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Biological diversity and its impact on the area of Vjosa Valley

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Summary

Vjosa Valley stretches in the southeast of Albania, whereas the Vjosa River, flowing through it, springs from the Pindi mountains in Greece. Vjosa Valley represents a transnational area of considerable biodiversity values, in terms of habitat, flora and fauna diversity and for the presence of rare, Balkan and endemic species. It is the only place in Albania where *Arbutus andrachne* grows. It is considered to be a typical zone of floristic links between Albania and its neighbouring countries, Greece in particular. In addition to the scientific values, this zone in the South of Albania is well known for its cognitive and landscape values as well as its great potential for tourism development. The paper reports information on the identification of bio-climatic zones and plant associations and shows some utilization of biological diversity.

Keywords: Vjosa valley, bio-climatic potential, biological diversity, forest management, forest resources, traditional use of plants.

1. Introduction

The Vjosa Valley is famous for its large biological diversity stemming from the great altitude variation (200 - 2000 m above the sea level), the numerous microclimates because of the steep and mountainous relief, the edaphic and geological variety as well as the use of forests and plants in several, mostly traditional, forms (Tab. 1).

Tab. 1. Forest species of Vjosa Valley

Forest species	Area in ha
Pine tree	11,661
Fir	6,036
Oaks	38,518
Shrubs	61,214
Beech	1,320
Poplar	1,175
Chestnut + walnut + acacia	966
Broad leaf tree, etc	14,477

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The main objectives of this paper was the identification of biotypes and habitats of the area under study in the framework of the CORINE project, especially those biotypes which have particular importance for the nature preservation in Albania and Europe (following the methodology of CORINE biotypes).

The final objective was to make a database of the selected biotypes useful as well as classify the habitats and species according to the standard ways with the purpose of assisting the development of information system about nature and supporting the development of national policies for nature protection. The study of bioclimatic potentials and their connections with vegetation constitutes another objective.

2. Materials and methods

The studies concerning the Vjosa Valley vegetation (Aussenac, 1973; Dida, 1996; Gocobbe, 1969; Anonymous, 1997) and the reports drawn up after the latest surveys have allowed to identify some CORINE habitats as compared with the literature (Giordano, 1972). The coordination of habitats is made through PHYSIS system.

Habitats constitute the basis for site selection and their description. It is crucial to formulate the list of units that serve to describe the habitats. One of the criteria for the identification of significant sites for the preservation of the European natural resources relies on the presence of representative habitats.

The bioclimatic potential was studied by means of the following indicators:

P.E.T. (Potential Evapotranspiration) = 1.6(10t/I)a x p

E.E.T. (Effective Evapotranspiration) = LR + Rup

P.B.I. (Potential Bioclimatic intensity) = E. E.T. (E.E.T. - D)

Climate - vegetation Paterson's coefficient CVP = TvPGK/Ta 300x100

The mapping of the bioclimatic intensity distribution and of values for climate-vegetation coefficient was made according to the following ranking:

P.B.I.:>600; 599-500; 499-450; 449-400; 399-350; 349-300; <300.

C.V.P.:<200 low; 200-299 average; 300-399 high; 400-599 very high; >600 superior.

Study of links between P.B.I. and C.V.P. values and the forest vegetation.

P.B.I. and C.V.P. values were transferred into 1:100,000 maps and data on

the productivity of the forest species were collected. The analysis of correlation by means of multi-regressions were studied as well.

3. Results and discussion

3.1 Identification of bio-climatic zones and their connection with the vegetation

In order to estimate the bioclimatic potentiality, Potential Evapotranspiration (PET), Effective Evapotranspiration (EET), Potential bioclimatic intensity (PBI) and the Climate-Vegetation - Productivity (CVP) coefficient, were calculated and transferred into 1:100,000 maps. With regard to PBI, two zones were recognized in terms of their height above sea level (Tab. 2). First zone, from height 300 to 700 m, occupies the forest area of 4,833 ha; second zone, from height 700 to 2,500 m, occupies the forest area of 29,841 ha.

Tab. 2. Bioclimatic Indicators

Above Sea level (m)	PET (m/m)	EET (m/m)	PBI (m/m)	CVP (m/m)
1	2	3	5	6
100	823	560	433	1278
200	800	529	405	1087
300	779	486	364	825
400	759	491	371	776
500	739	495	375	756
600	722	498	375	740
700	705	502	395	726
800	688	473	372	618
900	671	461	360	561
1000	656	470	381	544
1100	639	439	349	500
1200	623	419	324	515
1300	605	360	300	460
1400	590	383	300	500

In relation to CVP (Tab. 3), two zones were recognized in terms of their height above sea level. First zone, from height 100 to 800 m, occupies the forest area of 21,392 ha; second zone, from height 800-2,400 ha, occupies the forest area of 17,146 ha.

CVP, conventionally expressed from 1 to 5, is strongly related to the tree height (correlation coefficient = 0.527), to the volume expressed in m^3/ha (correlation coefficient = 0.315), and to the annual average growth given in m^3/ha (correlation coefficient = 0.267).

Tab. 3. Data on the forest areas grouped according to CVP

CVP	Forest Area (ha)	
600	21,392 pine, beech chestnut, fir, etc.	High potential, but damaged areas with a low biodiversity
400-599	17,146	Moderate potential; poor productivity; interventions are needed for vegetation rehabilitation

Regarding the potential bioclimatic intensity, statistical analysis indicates a correlation coefficient of 0.197 that links the values of PBI with the annual average growth (m^3/ha) and a correlation coefficient of 0.014 with the volume (m^3/ha).

For CVP, the regression equation is: *X1 = 4.920 +(-0.062).X2*

in which :X1 is CVP and X2 is the tree height.

The regression equation that links CVP and production in m^3/ha is expressed as

X1 = 4.320 + (-2.187) X3

in which: X3 = volume (m^3/ha)

and climate-vegetation-productivity (CVP) coefficient and the annual average growth, are expressed by the *regression equation,*

X1 = 4.354 +(-0.235) X4

in which :X4 = average growth m^3/ha/year.

Based on the above, we argue that the potential bioclimatic intensity (PBI) dissemination matches exactly the vegetation dissemination in the territory of the studied districts as compared to the dissemination of CVP for forest species. Oscillations of the above bioclimatical indicator values, create conditions for the growth and development of a large number of plant and animal species, covering the coast up to the highest mountain peaks.

The high bioclimatic potentials of the studied territories are proved by the high productivity of forests belonging to the first and second category of production according to KRAFT, for the black pine, beech, Scotch oak (*Pinus silvestris L.*), durmast oak (*Quercus petraea*), Adriatic oak (*Quercus cerris*), Canadian poplar, etc. that cover the forest areas surrounding the meteorological stations of Mali i Dajtit (Dajti mountain), Qafë Krrabë, Domgjon, etc, where PBI takes values above 500 m/m during the period of vegetation activity.

In the forests of categories IV and V of production, particularly for the Adriatic oak, durmast oak, Hungarian oak (Quercus frainetto), beech and shrubs, of Lauretum zone, the current productivity is very poor.

3.2 Study of vegetation and identification of plant associations

Vjosa Valley belongs to two countries, Albania and Greece, and is crossed by one of the most important rivers known for the presence of some migratory fish (Lutra, etc.). It has got a rich landscape especially for a considerable number of protected birds.

Being a small valley, it has suffered from some damages; the road along the valley is a continuous strain on the wild life (species). The uncontrolled grazing, woodcuttings, hunting and fishing are ongoing concerns for the whole area. In the context of the Protected Areas, Vjosa Valley was proposed to be considered a protected landscape.

The main part of the valley is occupied by the shrub associations, dominated by *Arbutus andrache* (*Andrachno-Quercetum ilicis*), whereas along the river bed there are other communities, like *Salicetum triandrae* etc.

3.3 The most widespread plant associations in Vjosa Valley

Class: *Quercetea ilicis* Br Bl. 36

Order: *Quercetalia ilicis* Br Bl 36

Alliance: *Quercion ilicis* Br Bl 36

Andrachno Quercetum ilicis Br Bl 34

Cisto Ericetum arborea H-ic 57

Salvio Flometum fruticosae Quez. 67

Class: *Quercetea pubescentis* (Oberd 48) Doing Kraft 55

Order: *Quercetalia pubescentis* Br Bl 32

Alliance: *Ostryo Carpinetum* Ht. 58

Querco Carpinetum Ërab. 54.

Quercetum trojanae St. 62

Andracho-Quercetum ilicis

It is a formation dominated by *Arbutus andrachne, Quercus coccifera, Quercus ilex, Arbutus unedo, Phillyrea latifolia, Pistacia terebinthus, Pistacia lentiscus, Olea europea var. oleaster, Juniperus oxycedrus,* etc.

Alneto-Saliceto amplexicaulis

Formation dominated by *Salix purpurea, Salix amplexicaulis,*

Salix triandra, etc

Ostryo-Carpinion orientalis

Formation with the main alliance *Carpinetum orientalis illyricum,*

Thus, deciduous forests in the Illyrian region, replace associations of Carpinion betuli illyricum or the vegetation climaxta *Ostryo carpinion adriatian or Ostryo-Carpinenion.*

3.4 Biodiversity and its use in Vjosa Valley

There's a special tradition of using biological diversity in this area:

Primula officinalis: as a medicinal plant

Juglans regia: as fruit; used for jam production, sweet production; wool dyeing, treating the belt pains (cotyledon devisers), use of wood

Cydonis oblonga: as fruit; used to make sweets

Melissa officinalis: used as a medicinal plant (tea) to treat stomach diseases

Asplenium trichomanes: treating infections and sand of kidney

Ceterah officinalis: for kidney diseases

Teucrium pollium: used to cure hemorrhoids

Verbascum sp.: used as tea for lungs, laryngitis, caugh, etc (mixed tea)

Achillea millefolium: used as tea for stomach pain

Aristolochia rotunda: for heart diseases

Acanthus spinosa: against prostatitis

Rumex acetosa: used as salad and for preparing a typical regional pie

Atriplex hortensia: used as salad and for preparing a typical regional pie

Tilia tomentosa: as tea against laryngitis and also as an ornamental wood

Ocimum basilicum: for aroma and religious ceremonies.

Cotynus coggygria: dyeing and leather tanning.

Phlomis fruticosa: as a honey-producing plant

Salvia officinalis: drawing out medicinal extracts, for aroma and food

Sideritis raeseri: used as an aromatic tea for larynx and lung diseases

Laurus nobilis: as spices for dishes and for treating cough (mixed tea)

Juniperus communis dhe J. oxycedrus: to prepare rakii

Rubus ulmifolius: to prepare jam and rakii

Fikus carica ssp. Caprificus: to make jam

Genciana lutea: to comfort pains

Plantago major, P. lanceolata: to make some pomades for treating wounds

Matricaria camomila: as tea against stress

Corylus avellana: as fruit to make sweets

Lulebasani: for lung diseases and wound treatment (pomade)

Zea mays (mustaches): to treat infections and kidney sand

Arbutus unedo: to make rakii

Menta piperita: as spices

Origanum vulgaris: as spices

Malva sylvestris: to treat stomach diseases

Stipa pennata: used to decorate the interior premises

Trigonella corniculata: to protect clothes against moth

Orchis sp.div.: used for different teas.

Saliz purpurea: to make fences, protecting barriers against erosion; also pots, baskets

Rosa sp.: as a medicinal tea (mixed teas)

Cornus max: to cure stomach ache and prepare rakii

4. Conclusions

The region is famous for the richness of species, both endemic and sub-endemic, singling out Sideritis raeseri and Ajuga piskoi.

The natives are well-known for the traditional and interesting use of natural resources, particularly those having food values, etc.

Often the intensive and irrational use of forests has brought about a critical and threatening loss of plants. Therefore, the recommendations for the application of forest policies and the multi-functional and sustainable

integrated use of forest eco-systems give to this paper a useful and practical character in terms of their use and territory management.

Vjosa Valley represents a zone of great biodiversity values and an important place for birds. It is a bridge with the neighbouring and other European countries from the floristic viewpoint.

Many Balkan, sub-endemic, threatened and Corine species are met in the Vjosa Valley.

For the above values, Vjosa Valley contains biotypes of national and European importance and preferential attention should be paid in the future to its protection and conservation.

For this purpose, it is essential to support national or regional research projects related to Vjosa Valley.

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