



EVALUATION OF POTENTIAL TRANSBOUNDARY IMPORTANT PLANT AREAS OF THE NORTH ALBANIA

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SYNOPSIS

In this paper are presented the most important sites for wild plants and their habitats that take place in the north part of the country. Important Plant Areas (IPAs) in Albania, include some of the most important natural values of the country from both biological and ecological point of view.

Northern Albanian IPAs represent a complex region that includes salt and fresh water ecosystems, high-forested mountains broken up by powerful tributaries and rivers, deep gorges most of which are almost inaccessible, alpine pasture, dolomite and limestone rocks that often form unrepeatably cliffs and steepness. The northeastern part of this region is composed mainly by serpentine substrate which creates another type of flora on it.

The different ecosystems create in this part of Albania a range of terrestrial, marine and freshwater habitats that are semi natural rather than natural, and offer a rich variety of plants and animals.

INTRODUCTION

During the past 50 years, Albania has assented and adopted many laws and other documents in order to protect nature, its resources and promoting environmental improvements. Albanian Government has approved the *Convention on Biological Diversity* (CBD) in January 1994 and a year later on 31 October 1995 the Government signed the *Convention on Conservation of European Wildlife and Natural Habitats* (Bern, 1979), that was ratified it on 2 March 1998.

The administration and protection of protected areas is based on Law No. 8906 dated 6 June 2002 "On protected areas". This law regulates the protection of six categories of protected areas, applied in the territory of the Republic of Albania. The categorization of areas, the status, and level of protection for each area is based on the criteria of the *World Centre of Nature Conservation* (IUCN).

Albania has undertaken a series of actions to fulfill its national and international obligations, thus the surface of the protected areas is increase year by years, and up

to now the protected areas cover up to 10.42% of the country total area (the new protected areas established after November 2007 are not included).

To achieve the goals of the Biodiversity Strategy and Action Plan and its obligations arising from the Target 2.14 of the *European Plant Conservation Strategy* in respect of Albanian IPAs, the Ministry of Environment, Forests and Water Administration (MoEFWA), has proposed sixteen potential sites as transboundary IPA from which six are take place in the north and the others in eastern and southern part of the country (XHULAJ *et al*, 2007).

IPAs are determinate as natural or semi-natural site exhibiting exceptional botanical richness and/or supporting an outstanding assemblage of rare, threatened and/or endemic plant species and/or vegetation of high botanical value, protected and managed as special sites (ANDERSON, 2002).

The northern protected areas are important not only for their botanical richness and habitats but also for other resources which society needs. In addition, they are important for the people who are living in these areas serving for recreation purposes, natural sources and as reservoirs for water supplies.

From the biogeographical point of view the northern Albanian IPAs are part of two regions: Mediterranean and Alpine region.

MATERIAL AND METHODS

Identification and site selection of Albanian IPA-s has been done according to the methodology of ANDERSON (2002), descript in the Plantlife International. This methodology was based on three specific criteria, presence of threatened species (Criterion A), botanical richness (Criterion B) and threatened habitats (Criterion C).

The presence of species that are endangered and rear in global, regional or national level and their sites were they are growing was evaluated based on the existing publications: CSIKI *et al.* (1926), MARKGRAF (1942), SCHÜTT (1936), DEMIRI (1983), VANGJELI *et al.* (1995), ANONIMOUS (1997), KASHTA & RAKAJ (2001), STEVANOVIĆ *et al.* (2003), DESFAYES (2004), XHULAJ & SHUKA (2007).

The sites with rich flora in national and regional context were done according to EUNIS Habitat of the level 2 (ANONIMOUS, 2006) whereas the present potential threats in habitats were observed during the fieldwork carried out by authors in the different periods of the 2004-2007 years.

Interpretation of the habitat types as well as the priority once was done based on *Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora* (DIRECTIVE 92/43/EEC, 1992), his resolution No 4, on *endangered natural habitats requiring specific habitat conservation measures* (T-PSV (96) 102, 1996), as much as in Interpretation Manual of the European Union Habitats (EUR25, 2003).

RESULTS AND DISCUSSION

General characteristics of Northern Albanian IPAs

The Northern transboundary Albanian IPAs are extended at the upper part of Drini River, beginning with Buna delta in northwestern border with Montenegro, up to Gjallica-Koritniku mountain range in the northeastern border with Kosovo.

There are six transboundary important plant areas in the north of the country: Buna Delta-Velipoja, Shkodra Lake, Rrapsha Gorge, Northern Albanian Alps, Pashtrik-Morina Pass and Gjallica-Koritniku (Fig. 1), with surface area of 3 527 ha, 15 493 ha, 125 ha, 35 000 ha, 8 722 and the last one 5 500 ha. Two first IPAs are formed through depositions of sediments and except of the water ecosystems they include alluvial virgin forests (STUMBERGER *et al.* 2008) and riparian vegetation, influenced by Mediterranean climate. All the others differ from the firsts because they have different substrate composition and are situated in the Alpine zone.

The Alpine zone is most southern part of the European Alps in the line Dinarides-Albanides and is characterized by a diversity of rock formations where limestone and massifs of ultra basic rocks are predominating. The main formations constructing these tectonic zones are carbonates of Mesozoic, schist of Paleozoic and Paleocene. Carbonate rocks, which have a thickness of dolomites, are in shape of missives. Just at these rocks, the highest ridges are formed (altitude 2200-2500 m) and the sharpest of the alpine relief like Bjeshkët e Namuna, Block of Jezerca (the highest peak of Albanian alps, 2694 m), Kollata, Mali i Hekurave, Gjallica mountain etc. In the Albanian Alps, the quaternary depositions take an important place, conditioned by the intensive development of the neo-tectonic and erosion processes that characterize this Region (KABO, 1990).

Further more, during the last glaciations; the lakes have been drying due to the raising movements and their filling with many materials which have been transported by the river net. The Alpine rivers of Cemi, Shala, Valbona and Luma have created deep valleys and many canyons and terraces when they enter to water basins. Due to the northern geographic position, high altitude above sea level, and high quantity of the precipitations with average 2200-2400 mm of rain per year, the glaciations in Alps was more intensive.

The radial directions of the valleys and surrounding mountain ranges have conditioned the climate. The lower parts of this territory, especially western faces of them, are under Mediterranean climate influence, which penetrates through branches of Cemi and Drini river valley. The largest parts of the landscape are characterized by modified continental climate, whereas the highest, horse back of the mountain range above 2000 m a.s.l., have a mountainous climate. Above them, the climate is alpine which is represented by alpine floristic elements. Climate, hydrology, and soil have indicated to the different types of vegetation and a rich flora on it.

Figure 1. Distribution of transboundary IPAs in north Albania



Threatened Species of Northern Albanian IPAs

Northern IPAs are distinguished for their higher diversity of endemic near endemic and relict plant species that are growing in following natural and semi natural habitat types: Freshwater Habitats, Temperate Heath and Scrub, Sclerophyllous Scrub (Matorral), Natural and Semi-Natural Grassland Formations, Rocky Habitats and Caves and Forests.

Five globally and European threatened species; *Trapa natans*, *Cymodocea nodosa*, *Marsilea quadrifolia*, *Caldesia parnassifolia* and *Orchis albanica*, are growing on two first sites, **Buna Delta-Velipoja** and **Shkodra Lake** (Tab. 1). *Caldesia parnassifolia* which is found in northeastern shore of Shkodra Lake is a representative of paleotropic genus *Caldesia* which in Balkan represents the remnant of the tertiary hydrophilic flora (KASHTA & RAKAJ, 2003; STEVANOVIC, 1999). This sites are important and for the following species; *Hydrocotyle vulgaris* L. (Ex); *Lycium*

europaeum L. (CR); *Baldellia ranunculoides* (L) Parl. (CR) a European paleoendemic specie and near extinct species *Quercus robur* L. (Ex), which are protected by new order of the Albanian government (MoEFWA, 2007).

Rrapsha Gorge is smallest transboundary site in north, from the surface area (125 ha) point of view. It has a prolonged form that begins from Cemi River in the border with Montenegro and goes up to 900 m altitude. Despite of them, in this site grows seven threatened species; from which *Ranunculus hayekii* (Ex), *Minuartia velenovski* (R), *Viola kosaninii* (R) and *Rhamnus intermedium* (R) are globally threatened. Two last species are growing only in this site, that together with *Ramonda serbica*, *Sesleria robusta* ssp. *scanderbeggii* (endemic) and *Geranium dalmaticum* (near endemic) complete the number of threatened species of this site.

Flora of **Northern Albanian Alps** contains more than 1100 species that composes about 33% of the Albanian Flora. Flora of this area is closely related to the flora of southern European Alps. The origin of it is coming from the tertiary and this is shown through some relict species. Out from the relicts coming from this time can be mentioned two endemic species *Wulfenia baldaccii* and *Forsythia europaea*. The last one can be found only in the serpentine substrates.

The Northern Alps are inhabited by 51 threatened species, from which, 26 are globally threatened species, categorized according to IUCN criteria (WALTER & GILLET, 1998). Two species with Ex/E status (*Wulfenia baldaccii* and *Ligusticum albanicum*) have very limited distribution areal, whereas 25 others have rear (R) status. Six species from the total number are threatened in European level, two species are locally endemics with very narrow distribution areal and 17 others are categorized as near endemic species (see tab. 1). They occupy mostly the mountain areas, especially in semicaves or shadows and humid places.

Besides, the list of endangered taxa in national level is by far large. They belong to the categories of critical endangered (CR) and endangered (E) taxa, which are not included in table 1, but are facing a high risk in national context. These endangered taxa, which are protected by Albanian government (MoEFWA, 2007) are: *Acer hyrcanum* Fischer et. C.A. Meyer, *Athamantha turbith* Brot. ssp. *hyanaldii* Tutin, *Gentiana lutea* L., *Fraxinus excelsior* L., *Omalotheca pichleri* (Murb.) J.Holub., *Salix hastata* L., *Salix waldsteiniana* Willd., *Silene tommassini* Vis., *Valeriana saxatilis* L. ssp. *panicii* (Halascy et Bald.) Ockendon, *Verbascum nicolai* Rohlena, critical endangered (CR): *Achillea frasii* Schultz, *Aconitum lamarckii* Reichenb., *Aquilegia amaliae* Heldr. ex Boiss., *Centaurea haynaldii* Borbas ex Vuk., *Pulsatilla halleri* (All.) Willd., *Taxus baccata* L., *Tilia platyphyllos* Scop. etc.

The site of **Pashtrik-Morina Pass** is found in northeastern part, close to Northern Albanian Alps. It is composed by serpentine substrate in general, that determines a special flora on it. These substrates are characterized by low number of basiphilous-calcifugal plant and high number of endemics (STEVANOVIĆ et al. 2003).

Seventeen endangered taxa are recorded from this site; nine of them are globally threatened from which nine species have rear (R) status and one (*Polygonum albanicum*) is endangered (E). Pashtriku Mountain and Morina pass is the centre of the endemic of this site (tab. 1). The following taxa: *Centaurea candelabrum*, *Centaurea kosaninii*, *Genista hassertiana*, *Gentiana pneumonanthe* ssp. *nopcsae*, *Polygala doerfleri*, *Forsythia europaea*, *Sanguisorba albanica*, and *Veronica andrasovszkyi*, are recorded as Albanian endemics.

Finally, **Gjallica-Koritniku** site is situated between two branches of the Drini river, in northeast part of country. The high diversity of ecosystems and habitats as much as the bedrock structure, offer a variety of plants in Gjallica-Koritniku site.

There are about 23 endangered taxa that are included in the list of threatened species at northern Albanian IPAs (tab.1) from which; seven taxa are globally threatened, three are endangered in European level and the rest are endangered in national level. From the total number of threatened species mentioned above, three of them *Alchemilla albanica*, *Asyneuma comosiforme*, and *Silene nikolicii*, have very limited areal of distribution.

The area is also important for some National endangered species such as: *Arabis bryoides* Boiss. *Atropa bella-donna* L., *Berberis vulgaris* L., *Betula pendula* Roth., *Achillea grandifolia* Friv., *Alchemilla catachnoa* Rothm., *Athamantha turbith* Brot. ssp. *hyanaldii* Tutin, *Barbarea balcana* Pancic, *Botrychium lunaria* (L.) Swartz, *Lilium albanicum* Jav., *Pedicularis leucodon* Griseb., *Salix waldsteiniana* Willd., *Gentiana lutea* L., *Hutchinsia alpina* (L.) R.Br., and *Silene tommassini* Vis. which are not included in the table 1 (MoEFWA, 2007).

The high degree of local endemism in the northern transboundary IPAs (sixteen taxa), derives from the geomorphology of the site and from the relative of habitat isolation and high altitude (often above the tree-line), which leads to an interesting and often unique mountainous flora.

Botanical Richness and Threatened Habitats of Northern IPAs

Botanical richness and threatened habitats are two other important criteria to determinate a site as an IPA. The wider area of concern has a rich and diverse flora and vegetations, due to shearing the biotic and abiotic environmental factors, as well as the different substrates on it. Among these pointed out factors, the great amplitude of temperatures, relatively high humidity air and different landscape forms have create different habitats with large horizontal and vertical extension.

During fieldworks and literature studying, in northern transboundary Albanian IPAs, are identified sixteen EUNIS level 2 habitat types (tab. 2). These habitat types are part of A, B, C, D, E, F, G and H Habitats EUNIS Level 1. Great diversity of ecosystems and habitats offers variety of habitat types and subtypes and different plant communities. In the northern Albanian IPAs are identified 47 (Ci and Cii) natural habitats. Twenty-two from 47 habitats in the transboundary IPAs can be classified as

priority threatened habitats according to the Habitat Directive Annex I and Resolution No 4 (DIRECTIVE 92/43/EEC, 1992; T-PSV (96) 102, 1996).

Threatened habitats that are important for plants and animals' conservation, related with *Habitat Directive Annex I* and *Bern Conventions*, are given in table 3.

Table 1. Threatened species at IPAs in north Albania. Criterion A

	Taxon Name	IPA Crit.	Con. Stat.	Transboundary IPAs					
				1	2	3	4	5	6
1	<i>Alchemilla albanica</i> Rothm.	A(iii)	E				+		+
2	<i>Alkanna scardica</i> Griseb.	A(iv)	R				+		+
3	<i>Amanita caesarea</i> (Fr.) ex Schw.	A(iv)	E				+		
4	<i>Aquilegia dinarica</i> G.Beck.	A(i)	R				+		
5	<i>Arabis scopoliiana</i> Boiss.	A(ii)	CR						+
6	<i>Asyneuma comosiforme</i> Hayek & Janch.	A(i)	R						+
7	<i>Asperula scutellaris</i> Vis.	A(iv)	R				+		+
8	<i>Astragalus fiale</i> Degen.	A(iv)	R				+		
9	<i>Buxbaumia viridis</i> (Moug. ex Lam. & DC.) Brid. ex Moug. & Nestl.	A(ii)					+		
10	<i>Caldesia parnassifolia</i> (L) Parlatore	A(ii)			+				
11	<i>Campanula albanica</i> Witasek	A(iv)	E				+		+
12	<i>Carduus kernerii</i> ssp. <i>skardicus</i> (Griseb.) Kazmi.	A(iv)	R				+		
13	<i>Carduus ramosissimus</i> Pancic.	A(i)	R				+		
14	<i>Centaurea candelabrum</i> Hayek & Kosanin.	A(i)	R					+	
15	<i>Centaurea kosaninii</i> Hayek.	A(i)	R					+	
16	<i>Cephalaria pastricensis</i> Doerfler et Hayek.	A(iv)	E					+	
17	<i>Cerastium dinaricum</i> G. Beck & Szysz.	A(ii)					+		
18	<i>Chaerophyllum coloratum</i> L.	A(i)	R					+	
19	<i>Cirsium boujartii</i> (Piller & Mitterp.) Sch. Bip.	A(i)	R						+
20	<i>Crepis albanica</i> (Jav.) Babc.	A(i)	R				+		
21	<i>Crepis baldaccii</i> Halacsy.	A(i)	R				+		
22	<i>Crepis bertisceae</i> Jav.	A(i)	R				+		
23	<i>Cymodocea nodosa</i> (Urica) Ascherson.	A(ii)		+					
24	<i>Dioscorea balcanica</i> Kosanin.	A(iv)	E						+
25	<i>Edraianthus serpyllifolius</i> (Vis.) DC.	A(iv)	R				+		+
26	<i>Fistulina hepatica</i> Bull. ex Fr.	A(iv)	R				+		
27	<i>Forsythia europaea</i> Deg. et Bald.	A(iii)	R					+	
28	<i>Fritillaria messanensis</i> Raf. ssp. <i>gracilis</i> (Ebel) Rix.	A(ii)	E				+		+
29	<i>Genista hassertiana</i> (Bald.) Bald.	A(iii)	R					+	
30	<i>Gentiana pneumonanthe</i> L. ssp. <i>nopcsae</i> (Jav.) T.Wraber.	A(iii)	R					+	
31	<i>Geranium dalmaticum</i> (G.Beck) Rech.fil	A(iv)	R			+			
32	<i>Geum bulgaricum</i> Panc.	A(ii)					+		
33	<i>Halascya sendtneri</i> (Boiss.) Dörfler.	A(i)	R					+	
34	<i>Ligusticum albanicum</i> Jav.	A(i)	Ex/E				+		
35	<i>Lunaria telekiana</i> Jav.	A(iii)	CR				+		
36	<i>Knautia albanica</i> Briq.	A(iv)	R						+
37	<i>Malcolmia illyrica</i> Hayek.	A(iv)	E				+		
38	<i>Mannia triandra</i> (Scop.) Grolle.	A(ii)					+		
39	<i>Marsilea quadrifolia</i> L.	A(ii)	E		+				
40	<i>Melampyrum doerfleri</i> Ronniger.	A(i)	R				+		
41	<i>Melampyrum heracleoticum</i> Boiss. & Orph.	A(i)	R				+		
42	<i>Micromeria parviflora</i> (Vis) Richb	A(i)	R				+		

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43	<i>Minuartia baldaccii</i> (Halacsy) Mattf. ssp. <i>skutariensis</i> Hayek.	A(i)	R					+		
44	<i>Minuartia bosniaca</i> (G.Beck) K.Maly.	A(iv)	R						+	+
45	<i>Minuartia velenovski</i> (Rohlena) Hayek.	A(i)	R				+	+		
46	<i>Moltkia doerfleri</i> Wettst.	A(i)	R						+	
47	<i>Narthecium scardicum</i> Kosanin.	A(iv)	R					+		
48	<i>Orchis albanica</i> Goelz et Reinhard	A(i)	R		+	+				
49	<i>Petasites doerfleri</i> Hayek.	A(i)	R					+		
50	<i>Phyteuma pseudorbicularis</i> Pant.	A(i)	R					+		
51	<i>Pinus heldereichi</i> H.Christ var. <i>leucodermis</i> Antoine.	A(i)	R					+		+
52	<i>Pinus peuce</i> Griseb.	A(i)	R					+		
53	<i>Plantago reniformis</i> G.Beck.	A(i)	R					+		
54	<i>Polygonum albanicum</i> Jav.	A(i)	E						+	
55	<i>Polygala doerfleri</i> Hayek.	A(i)	R						+	
56	<i>Potentilla visianii</i> Pancic.	A(i)	R						+	
57	<i>Ramonda serbica</i> Pancic.	A(ii)	R				+	+		+
58	<i>Ranunculus hayekii</i> Dorfl.	A(i)	Ex				+			
59	<i>Ranunculus scutatus</i> Waldst et Kit.	A(iv)	R					+		
60	<i>Rhamnus intermedius</i> Steud.et Hochst.	A(i)	R				+			
61	<i>Sanguisorba albanica</i> Andras. et Jav.	A(i)	R						+	
62	<i>Saxifraga grisebachii</i> Deg. et Dorf. <i>porophylla</i> sensu Hayek.	A(iv)	R					+		+
63	<i>Saxifraga scardica</i> Griseb.	A(iv)	R					+		
64	<i>Scrophularia bosniaca</i> Beck.	A(i)	R					+		+
65	<i>Sedum serpentini</i> Janch.	A(i)	R						+	
66	<i>Sesleria robusta</i> Schot ssp. <i>scanderbeggii</i> (Ujhelyi) Deyil.	A(iii)	E				+			
67	<i>Sesleria wettsteinii</i> Dorfl et Hayek.	A(iv)	E					+		+
68	<i>Silene macrantha</i> (Panic) H.Neumayer.	A(i)	R					+		+
69	<i>Silene retzdorffiana</i> (K.Maly) Walters.	A(iv)	E					+		
70	<i>Silene nikolicii</i> (Seliger & T.Wraber) Stevanovic & Nikolic	A(iv)	CR							+
71	<i>Stachys beckeana</i> Dorfl. & Hayek.	A(i)	R					+		
72	<i>Teucrium arduini</i> L.	A(i)	R					+		
73	<i>Thesium auriculatum</i> Vandas.	A(i)	R					+		
74	<i>Thlaspi mycrophyllum</i> Boiss. et Orph.	A(iv)	R							+
75	<i>Trapa natans</i> L.						+			
76	<i>Trifolium wettsteinii</i> Doerfler et Hayek.	A(iv)	R						+	+
77	<i>Valeriana bertiscea</i> Pancic.	A(i)	R					+		+
78	<i>Verbascum nicolai</i> Rohlena.	A(i)	R					+		
79	<i>Veronica andrasovskyi</i> Jav.	A(iii)							+	
80	<i>Viola allchariensis</i> G. Beck ssp. <i>gostivarensis</i> W. Bec. et Born.	A(iv)	R					+		
81	<i>Viola speciosa</i> Pant.	A(i)	R					+		
82	<i>Viola beckkiana</i> Fiala.	A(i)	R					+		
83	<i>Viola elegantula</i> Schott.	A(i)	R							+
84	<i>Viola kosaninii</i> (Degen) Hayek	A(i)	R				+			
85	<i>Wulfenia baldaccii</i> Degen.	A(i)	Ex/E					+		

Abbreviations: IPA Crit. = IPA Criteria; A(i) = globally threatened; A(ii) = European threat, taxa from Bern Convention Appendix 1, Habitats Directive Annex IIb and Habitats Directive Annex IVb; A(iii) = threatened national endemic, Albanian red books; A(iv) = threatened near endemic/limited range, Albanian red books; Con. Stat. = Conservation Status; Albanian transboundary IPAs: 1 = Buna Delta-Velipoja, 2 = Shkodra Lake, 3 = Rrapsha Gorge, 4 = Northern Albanian Alps, 5 = Pashtrik-Morina Pass, 6- Gjallica-Koritniku.

From the table 3 and our data collected during fieldworks result the following priority threatened habitats that require special measures for their protection: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*); Oak-hornbeam forests; European dry heaths; West Mediterranean xeric grassland; High oro-mediterranean pine forests; Balkanic montane [*Nardus stricta*] swards; Western Mediterranean and thermophilous screes.

The habitat diversity is reported by vegetation types and plant communities and the presence and potential threats were recorded.

The aquatic habitats of Buna and Shkodra Lake are important for more than 145 aquatic plant species and riparian vegetation growing along their banks. Their vegetation is composed mainly by floating vegetation, vegetation of benthic hydrophytes and helophytic vegetation. Floating plant vegetation was represented from *Ass. Lemno-Spirodeletum*, *Ass. Hydrocharitetum morsus-ranae* and dominated by *Lemna minor*, *Spirodela rhizoides*, *Hydrocharis morsus-ranae*, *Hydrocotyle vulgaris* etc.

Table 2. EUNIS level 2 habitat types in transboundary IPAs. Criterion B

EUNIS Level 2 Code	Botanical Richness Assessments for Northern Albanian IPAs
	EUNIS Level 2 Habitat
A2	A2 Littoral sediments
B1	B1 Coastal dune and sand habitats
C1	C1 Surface standing waters
C2	C2 Surface running waters
C3	C3 Littoral zone of inland surface water bodies
D5	D5 Sedge and reedbeds, normally without free-standing water
E1	E1 Dry Grasslands
E2	E2 Mesic Grasslands
E4	E4 Alpine & sub-alpine grasslands
F3	F3 Temperate & mediterraneo-montane scrub habitats
F4	F4 Temperate shrub heathland
G1	G1 Broadleaved deciduous woodland
G3	G3 Coniferous woodland
G4	G4 Mixed deciduous & coniferous woodland
H2	H2 Screes
H4	H4 Snow or ice-dominated habitats

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Vegetation of benthic hydrophytes were represented by the associations: *Nymphaeetum albo-luteae*; *Potameto-Najadetum*; *Nymphoidetum peltatae*; *Myriophyllo-Nupharetum lutei*; *Potametum perfoliati*; *Potametum lucentis* and *Ass. Trapetum natantis*. Indicator species of this vegetation are: *Trapa natans*, *Nuphar*

lutea, *Nymphaea alba*, *Nymphoides peltata*, *Potamogeton perfoliatus*, *Myriophyllum verticillatum*, *Myriophyllum spicatum*, *Ranunculus trichophyllus* etc.

Helophytic vegetation was represented from the following associations: *Typhetum angustifoliae*; *Scirpo-Phragmitetum* which are inhabited from species like as: *Phragmites australis*, *Typha angustifolia*, *Scirpus* sp., *Carex* sp., and *Cladium mariscus*.

Expansion of floating leaved macrophytes to the free open water is viewed in eastern shore parts of the lake and Buna river banks. This tendency is accelerated by the meso-eutrophication process that is happening in the Shkodra Lake and Buna River. From the study result that 19 hydro- and hygrophilous plant species are rare or endangered (KASHTA, 2007). Some of them like as: *Trapa natans*, *Nymphoides peltata*, *Sagittaria sagittifolia*, *Hydrocotyle vulgaris*, *Hydrocharis morsus-ranae*, *Caldesia parnassifolia*, *Marsilea quadrifolia*, and *Baldellia ranunculoides* are growing only here or and in one other place in Albania.

There is a small woodland forest entirely composed of broadleaf plant in Velipoja, part of broadleaved deciduous woodland habitats. It is the area where it grows the almost extinct species of *Quercus robur* and generally dominated by willow (*Salix* sp.) *Alnus glutinosa*, *Fraxinus angustifolia*, *Ulmus campestre*, *Tamarix* ssp, *Vitex* ssp, *Rubus* sp. etc. This forest is very important for the nesting birds.

The terrestrial vegetation of transboundary IPAs is composed by vegetation of shrubby and woody plant communities and the vegetation of herbaceous plants. Three vegetation regions are recognized within the vertical inclination; the vegetation of the lowlands, up to 400-900 m a.s.l, dominated by oak belt, vegetation of beech belt and conifers, mixture with broadleaves species in the middle elevation part of the mountains (from 900/1000 m up to 1800 to 2000 m) and the vegetation of pastures and meadows in sub-alpine and alpine region above 1800 m a.s.l. Beside of them, birch and beech forest in many cases cover large areas in hilly or smooth mountainous slopes. The vegetation of terrestrial sites is represented by following classes: **Querco-Fagetea** Br-BI et Wlieg. 37, *Order: Quercetalia robori-petraea*; Alliance *Quercion robori-petraea*; **Erico-Pinetea** Horvat 1959; *Order: Erico-pinetalia Horvat 1959*; Alliance: Pinion leucodermis Horvat 1946, **Vaccinio -Piceetea** Br.-Bl. in Br.-Bl., Sissingh et Vliieger 1939; *Order: Piceetalia excelsae* Pawlowski in Pawlowski, Sokolowski et Wallisch 1928; Alliance: *Erico-Pinion mugo* Leibundgut 1943 nom. Invers.

The forests are conserved in natural and semi natural states, except the lower parts of landscape where the human impact is more frequent. Anthropogenic impact in the upper part of landscape is not very abundant. From the observations carried out during the field trips and from the existing bibliographic data, we have identified as being the most important plant associations of the entire area the following:

Plant Associations of *Dioscoreo-Carpinetum orientalis* (dominant *Dioscorea balcanica*, a tertiary relict species with limited distribution area) and Ass. *Betuletum verrucosae koritniensis*, are the most important associations of the site Gjallica-

Koritniku. As result of the negative human impact, this association now is presented in the brushwood forms.

The coniferous woods are rear and represented by species such as; Black Pine (*Pinus nigra*), Bosnian Pine (*Pinus heldreichii*) and Norway spruce (*Picea abies* (L.) which not forms the real forest, but mixture one with other species, especially beech (*Fagus sylvatica*). Most abundant they are in Alps and Gjallica Mountain. Two major plant communities that they form are: *Ass. Fago–Pinetum heldreichii*, grows in slope areas, from 1300 m to 2100 m altitude. *P. nigra P. heldreichii, P. abies. Pinus mugo* and *Juniperus communis* that are growing on heaths or calcareous grasslands are more abundant on it. *Ass. Ostrio–Fagetum* and *Ass. Fagetum moesiaca montanum* are the biggest woody plant community, extended over all the IPAs from 900 up to 1700 m a.s.l. The illegal wood cutting, mostly for fire, poses a serious threat to some forest species in this last plant community.

The influence of sub-Mediterranean climate through Drini river valley is represented by following forest associations: *Ass. Ostrio–Quercetum cerris.*, *Ass. Quercetum pubescentis–cerris.*, *Ass. Carpinetum orientalis scardicum.*, *Ass. Quercetum trojana*, on western and south-eastern exposition slopes. This association climbs up to 900-1100 m, depends from the exposition.

Plant communities of the high mountain grasslands are represented by *Ass. Carici–Narthecium scardici*, *Onobrychido-Festucion*, *Daphno-Festucetalia*, *Poetum violacea*, *Festucion bosniaca* and *Campanulion albanica* and around snow patches *Ass. Salicion retusae* and *Edraiantho seslerion*. In this association are included species with arctic-alpine origin and endemic species which belong to the tertiary period. Indicator relics of the tertiary are species; *W. baldaccii*, *P. doerfleri*, *S. macrantha*, *N. scardicum*, *Carex flava*, *C. fusca*, *Pinguicula balcanica* etc.

The central and northeastern parts of the landscape and its habitats belongs to the Paleozoic era (Devonian and Ordovician period), whereas the other parts originates from Mesozoic era. From tertiary relics can be mentioned the following species: *C. kosaninii*, *C. candelabrum*, *P. visianii* and woody forest plants species of *Acer obtusatum*, *Ostria carpinifolia*, *Quecus trojana* and *Taxus baccata*.

Finally the formations of *Pinus heldereichi* H.Christ var. *leucodermis* Antoine, and beech forests, are respectively at a very good and good conservation status compared with other broadleaved forests in the lower zone mentioned above. The state of vegetation looks better in the upper part of the beech belt and mountainous meadows; but even there overgrazing is present as well.

The data reported below are mostly based on case studies and historical data from various sources, since there is no inventory or frequently monitoring of species and ecosystems for Albanian protected areas.

Table 3. List of priority threatened habitats and threatened habitats in the northern transboundary Albanian APAs. Criterion C

Nr	Hab. code	Criterion C-threatened habitat	IPA Cri.	Con. status
1	22.13	22.13 Eutrophic waters	Cii	Be. Con.
2	31.2	31.2 European dry heaths	Ci	Be. Con.
3	31.63	31.63 Subalpine tall herbs with bushes	Cii	Be. Con.
4	3140	3140 Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	Cii	H.D.An. I
5	3220	3220 Alpine rivers and the herbaceous vegetation along their banks	Cii	H.D.An. I
6	3240	3240 Alpine rivers and their ligneous vegetation with <i>Salix elaeagnos</i>	Cii	H.D.An. I
7	3280	3280 Constantly flowing Mediterranean rivers with Paspalo-Agrostidion species and hanging curtains of <i>Salix</i> and <i>Populus alba</i>	Cii	H.D.An. I
8	34.311	34.311 Helleno ballkanic [<i>Satureja montana</i>] steppes	Cii	Be. Con.
9	34.112	34.112 [<i>Sempervivum</i>] or [<i>Jovibarba</i>] communities on rock debris	Cii	Be. Con.
10	34.37	34.37 Serpentine steppes	Ci	Be. Con.
11	34.51	34.51 West Mediterranean xeric grassland	Ci	Be. Con.
12	35.73	35.73 Balkanic montane [<i>Nardus stricta</i>] swards	Ci	Be. Con.
13	37.8	37.8 Subalpine and Alpine tall herb communities	Cii	Be. Con.
14	4060	4060 Alpine and Boreal heaths	Cii	H.D.An. I
15	4070*	4070* Bushes with <i>Pinus mugo</i> and <i>Rhododendron hirsutum</i> (<i>Mugo-Rhododendretum hirsuti</i>)*	Ci	H.D.An. I
16	41.1	41.1 Beech forests	Ci	Be. Con.
17	41.2	41.2 Oak-hornbeam forests	Ci	Be. Con.
18	41.74	41.74 Italo-Illyrian [<i>Ostrya carpinifolia</i>] sub-thermophilous [<i>Quercus</i>] woods	Ci	Be. Con.
19	42.17	42.17 Balkano-Pontic [<i>Abies</i>] forests	Ci	Be. Con.
20	42.245	42.245 Balkan Range [<i>Picea abies</i>] forests	Ci	Be. Con.
21	42.5C	42.5C South-eastern European [<i>Pinus silvestris</i>] forests	Ci	Be. Con.
22	42.62	42.62 Western Balkan <i>Pinus nigra</i> forests	Ci	Be. Con.
23	42.7	42.7 High oro-mediterranean pine forests	Ci	Be. Con.
24	42.71	42.71 [<i>Pinus leucodermis</i>] forests	Ci	Be. Con.
25	42.A9	42.A9 [<i>Juniperus oxycedrus</i>] woods	Ci	Be. Con.
26	53.3	53.3 Fen-sedge beds	Cii	Be. Con.
27	5130	5130 <i>Juniperus communis</i> formations on heaths or calcareous grasslands	Cii	H.D.An. I
28	5210	5210 Arborescent matorral with <i>Juniperus</i> spp.	Cii	H.D.An. I
29	6110*	6110* Rupicolous calcareous or basophilic grasslands of the <i>Alyso-Sedion albi</i> *	Ci	H.D.An. I
30	6120 *	6120 * Xeric sand calcareous grasslands*	Ci	H.D.An. I
31	6220 *	6220 * Pseudo-steppe with grasses and annuals of the <i>Thero-Brachypodietea</i> *	Ci	H.D.An. I
32	61.3	61.3 Western Mediterranean and thermophilous screes	Ci	H.D.An. I
33	6170	6170 Alpine and subalpine calcareous grasslands	Cii	H.D.An. I
34	6420	6420 Mediterranean tall humid herb grasslands of the <i>Molinio-Holoschoenion</i>	Cii	H.D.An. I
35	6520	6520 Mountain hay meadows	Cii	H.D.An. I
36	8110	8110 Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsetalia ladani</i>).	Cii	H.D.An. I
37	8130	8130 Western Mediterranean and thermophilous scree	Cii	H.D.An. I

38	8140	8140 Balkan screes	Cii	H.D.An. I
39	8210	8210 Calcareous rocky slopes with chasmophytic vegetation	Cii	H.D.An. I
40	9180*	9180* Tilio-Acerion forests of slopes, screes and ravines*	Ci	H.D.An. I
41	91B0	91B0 Thermophilous <i>Fraxinus angustifolia</i> woods	Cii	H.D.An. I
42	91E0*	91E0* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)*	Ci	H.D.An. I
43	91K0	91K0 Illyrian <i>Fagus sylvatica</i> forests (<i>Aremonio-Fagion</i>)	Cii	H.D.An. I
44	91L0	91L0 Illyrian oak-hornbeam forests (<i>Erythronio-Carpinion</i>)	Cii	H.D.An. I
45	9220 *	9220 * Apennine beech forests with <i>Abies alba</i> and beech forests with <i>Abies nebrodensis</i> *	Ci	H.D.An. I
46	9260	9260 <i>Castanea sativa</i> woods	Cii	H.D.An. I
47	9410	9410 Acidophilous <i>Picea</i> forests of the montane to alpine levels (<i>Vaccinio-Picetea</i>)	Cii	H.D.An. I
Abbreviations: Hab. code = Habitat code; IPA Cri. = IPA Criteria; Ci = Priority threatened habitats; Cii = Threatened habitats; Con. status = Conservation status; H.D.An. I = Habitat Directive Annex I; Be. Con. = Bern Convention; The sign "*" = Indicates priority habitat type.				

CONCLUSIONS

In northern transboundary IPAs there have been identified 85 threatened species, 55 of them are globally threatened and 15 others are locally endemics. Twenty-two from all natural habitats recorded in north sites, are priority habitats that need special measures for their conservation.

Some of the main threats to the habitats of northern transboundary IPAs are the overexploitation of the forests and shrubs combined with the overgrazing as well as fires.

The reconstruction and enlargement of the protected areas system as well as the establishment and strengthening of managerial capacities can be some of the future strategic plans for the Ministry of Environment, Forests and Water Administration which shall aim at improving the protected areas management, achieving the European Union standards and the Government's commitments for nature protection.

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