http://www.grida.no/enrin/biodiv/biodiv/national/fyrom/index.htm

Biodiversity


Gentiana asclepiadea

Biotope diversity is the pre-requisite for the rich variety of plant species in the territory of Macedonia. The presence of numerous endemic and relict species is especially evident. It has been estimated that there are 3.500 highly developed plants in the Republic of Macedonia; lowly developed plants (moss, algae and fungi) have not been fully investigated yet.

There are 122 various plant communities (starting from aquatic to alpine ones), in particular: 21 aquatic and swamp communities; 8 halophytic communities; 2 steppe communities; 50 forest communities; and 51 mountain communities.

The Republic of Macedonia is rich with numerous medicinal and aromatic plants, forest fruits, seeds, mushrooms etc..

The dendroflora variety may be seen in the presence of 319 tree types, with more than 80 sub-species and varieties. Within forest eco-systems, more than 80 phytocenozes have been studied and identified. The forest cover is of huge importance for the protection of waters, the land and biodiversity maintaining.

The Republic of Macedonia disposes of an enormous richness of animal species distributed throughout its territory.

Invertebrates and one-cell organisms have not been fully investigated; research has been done only with a few groups of worms and insects, arthropoda and frog-related species.

Vertebrata have been subject to more detailed research. So far, 463 species have been identified, of which 55 fish species, 78 mammal species and 330 bird species. Research is currently under way with amphibia and reptiles, and it is at this stage estimated that there are 13 amphibian and 31 reptile species.

Ground fauna research in Macedonia must not be forgotten here, new sub-species of interest to science having been detected.

By the Law on Hunting, 127 game species have been placed under appropriate protection, of which 24 are mammal species and 103 bird species. Of these, 79 species (9 mammal and 70 bird) have been placed under permanent protection while 31 species have been protected by hunting closed seasons (6 mammal and 25 bird species).

The Republic of Macedonia is also rich with numerous sites possessing geological variety (geodiversity) and with areas containing landscape variety (landscape diversity).

Approximately 350 geo-morphological objects have been investigated so far that are distributed within the territories of 34 municipalities in the country.

From the aspect of landscape diversity, hydrographic objects are especially significant, among which the three tectonic lakes are especially to be distinguished, along with glacial lakes, certain watercourses of mountain rivers, swamps and other rural zones, pasture areas, the forest and mountain vegetation.

Last year a National Committee for National Biodiversity Strategy was founded within the framework of the Ministry of Environment. The Committee has prepared a draft report for preparing a National Biodiversity Strategy which has been submitted in the GEF World Bank. We are expecting their replay for financial support, after which the activities for the project realisation will begin.

Ecosystems - distribution, monitoring

Macedonia occupies the central part of Balkan Peninsula. In morpho-genetic view it is composed of a considerably composite structure. On this relatively small territory with an average elevation of about 800 m a.s.l. (30% of the territory is at an elevation bellow 500 m, 40% is between 500 and 1000 m, 20% from 1000 to 1500 m and about 10% is above 1500 m) three tectonic lakes, over 30 glacial lakes, 110 artificial accumulations (lakes and reservoirs) are presented, 15 mountains with peaks higher then 2000 m, about 15 valleys and about 35 1 larger or smaller rivers.

From the total area of The Republic of Macedonia (25.713 km2~), about 1.7% are covered by meadows, 17.5% by pastures, 34.5% by forests, the lakes areas takes about 2% and the rest is covered by arable land, forest land, settlements etc.

Due to the different natural conditions (relief structure, climate, hydrography, soil factor, as well as human influence), Macedonia is among rare countries in Europe considering the rich diversity of habitats.

Numerous wafer ecosystems are provided with rich shore vegetation, and deep gorges are source of considerable endemism and relicts. On this small region at lower elevations, big agricultural areas, meadows, pastures and even steppe-like-desert terrain are frequently met (Krivolak). Throughout the hill terrain agricultural areas are presented as well, than shrubberies, oak forests and rich pastures are common, while at an elevation over 1000 m a.s.l. various forest biotops are domination, ending with sub-alpine forests, followed by sub-alpine and alpine pastures the last being rich on glacial relicts and endemites.

Four phytogeographical regions can be distinguished in Macedonia which are characterised by different climate, elevation and, consequently, with different flora and fauna) composition. These regions are:

1. SUB-MEDITERRANEAN REGION - (40% of Macedonian territory). It is characterised by the presence of Ostryo-Carpinion orientalis Ht. alliance, and it is spread out mainly up to 600 m a.s.l.. Almost all human settlements are situated in this region.

2. SUB-CONTINENTAL, REGION - (37% of Macedonian territory). It is spread out mainly from 600 to 1200 m a.s.l. and characterised by predominance of Quercion frainetto Nt. alliance.

3. SUB-HUMID REGION - (22% of Macedonian territory), characterised by presence of Fagion illiricum Ht. alliance and it comprises two belts: belt with Fagetum submontanum Em (lower beech forest) spread out between 900 and 1250 m a.s.l. and higher belt, up to 1700 m a.s.l. with Fagetum montanum (mountainous beech forest) and Abieti-Fagetum Em (mixed beech and fir forest).

4. SUB-ALPINE REGION - the zone which takes only 1% of the Macedonian territory. It is spread out on the high mountains which highest peaks may be characterised as a real alpine region (above 2200 m a.s.l. in average).

According to Lopatin & Matvejev (1995) the following biomes (which in 1961 were ranked as a biogeographical provinces) are presented in Macedonia:

1. Mediterranean forests and maques. Typical biotops in this province are: forests of Pinus halepensis with evergreen shrubs and oases of dense mesophyllous tree and herb vegetation close to springs and other types of water.

2. Mediterranean semi-deserts. Typical biotops in this province are open terrains with semi-shrubs and sclerophyllous grasses with sparse needle-like shrubberies, stony sites on hilly terrains with skeletal soils and pour vegetation, dry stream-beds of temporal stream flows, lowland sites on deep soils with sparse grass cover and semi-shrubs.

3. Sub-Mediterranean - Balkan forests. Typical biotops are: forests of Italian and Turkey oak, Ostria carpinifolia, Carpinus orientalis, flowering ash, Corylus colurna, forests of black pine, chestnut, Macedonian oak, Juglans regia, plain forests in river valleys etc.

4. Balkan - Middle-European forests. Typical biotops are: forests of mountain beech, mixed beech-fir forests, maple and birch, spruce, alder forests in river valleys, wet meadows, forest swamps and streams etc.

5. European forests of taiga type - fragmentarily. Typical biotops are: spruce forests, Scot-pine forests with blueberries, mixed forests with spruce and fir, spruce and beech, Pinus mugo, forest peat-bogs, forest cricks, swamps and lakes in above-mentioned forests.

6. European alpine rocky-grounds, tundra and alpine pastures -fragments. Typical biotops are different types of alpine rocky terrains, ueves, glaciers and pastures.

7. Mediterranean mountain forests on rocky-grounds. Typical biotops in this province are: Forests of molika (Pinus peuce), Pinus pallasiana, alpine rocky pastures with groups of huge blocks of rocks, vertical scarps, caves, rocky-grounds with large stones, taluses and avalanche areas etc.

8. South-Balkan mountain rocky-grounds and dry pastures. Typical biotops are: alpine pastures with rocky-grounds and shrubs, blueberries and other berry's fruits, groups of rocks and stones in the middle of the pastures, forward stony crests, rocky-grounds with large stones on slopes etc.

Unfortunately, the biogeography for Macedonia is not worked out in detail according to the suggestions of Lopatin and Matvejev. The large part of Macedonian territory is not studied almost at all, thus the percentage representation of these biomes is obscure.

Nevertheless, it is certain that Sub-Mediterranean - Balkan and Balkan - Middle-European forests are occupying the biggest area. The influences of Mediterranean, continental and mountainous climate are present in Macedonia. The harmless attack on biotop diversity during the last few decades has been done to swamps and flood forests by the action for

melioration of the land in Macedonia. It is worth noting that some by law declared natural resources were not spared than. Some of them were with international importance such was the Katlanovo swamp, near Skopje.

Flora

The flora-vegetational diversity of the Republic of Macedonia, as a part of the biodiversity in general, is very rich and diverse. This refers equally to the microorganisms, lower plants (algae and lichens), fungi and higher plants. The blue-green algae - *Cyanophyta*, of which around 220 taxons are known (Petrovska, 1997) as well as the diatom algae *Baccilariphyta (Diatomeae)* with approximately 450 speices (Stojanov) are the most studied algae. The remaining the algae speices have not been studied completely. In regards to the study of lichens, there is data for certain mountain masives (such as on Shar Planina Moountain) (Kushan, 1953, Murati, 1993). In the category of fungi there are approximately 100 species Ascomycetes and 1400 species *Basidiomycetes* of fungi known; yet they are still under a phase of intensive study (Torti, Karadelev).

In this region, the Central Balkan Peninsula, an interest in the flora and vegetation of the higher plants dates from the middle of the last century. Specifically since 1839 when the German botanist A. Grisebach visited Macedonia for the first time. He then presented the results of his research in the well known book "Spicilegium Florae Rumelicae et Bithynicae I-II" (1843-1844). Then follows a great number of botanists, florists and fitocenologysts, such as Formanek, Vandas, Grecescu, Dorfler, Adamovich, Degen, Javorka, Wetstein, Bornmuller, Herzog, Halacsy, Velenovsky, Rohlena, Ronniger, Rechinger, Hayek, Behr, Zahn, Maly, Murbeck, Zernjavski, Koshanin, Lindtner, Slavnich, Petrovich, Rudski, Stojanov, Soshka, Grebenshchikov, Jurishich, Horvat, Horvatich, Em i dr. They have all visited Macedonia several times or have worked on a herberium material from its teritory. They describe numerous species that were new for the science and lower taxons. After the Second World War, a number of Macedonian botanists appeared with their own research and studies, including: Micevski, Em, Nikolovski, Cirimotich (Matvejeva), Gudevski, Dzekov, Drenkovski, Rizovski, Cekova, Zabjakin, Shopova & Sekovski, Matevski, Janich, Kostadinovski ets. While at the same time, a number of foreign botanists showed interest in the flora and vegetation of Macedonia and published new floristic and fitocenologycal reports.

It is estimated that the higher plant flora in the Republic of Macedonia encompasses around 3 000 species within 147 families. The type *Lycopsida* (with three families, five genuses and six types), *Sphenopsida* (with one family, one genus and 13 taxons - 7 species and 6 lower taxons), ferns (*Filicinae*, with 15 families, 21 genuses and 60 taxons - 42 species and 18 lower taxons), *Coniferophyta* - with 4 families, 6 genuses and 22 taxons-15 species and 7 lower taxons, 50 families from the class *Dicotyledonae* with 235 genuses and 1630 taxons - 1028 species and 602 lower taxons. In the framework of the Macedonian Academy of Sciences and Arts through the edition of the "Flora of the Republic of Macedonia" and under the direction of the Academician Kiril Micevski there is intensive research on the remaining families of this class. The endemic and relict species are an exceptionally significant component to the floristic diversity of Macedonia. According to the Micevski's and

Matevski's data (1987) there are 137 endemic species within the teritory of the Republic of Macedonia; out of which 111 are exclusively connected to this teritory while the remaining species can be seen on the mountains bordering Greece, Albania, SR Yugoslavia and Bulgaria.

The vegetational diversity in the Republic of Macedonia is also rich and diverse. According to the available data, there are over 260 associations which are included in more than 90 unions, 50 orders and around 30 classes. The water, muddy, phalophita as well as maddow vegetation are relatively well studied. The antrophogenous influence is the bigest above these are vegetational species and part of them can be seen in fragmented state. The vegetation of the hilly grasslands is currently under intensive study and its finalization is expected soon. In the upcoming years, significant attention will have to be paid to the valley vegetation from the mountain and subalpian belt; as well as to the mountain and high-mountain vegetation. Most of the researched vegetational species have to be revized in a sense of complience by types, as well as nomenclature's compliance with the International Kodex for phitocenological Nomenclature.

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The presence of the endemic, relict and rare flora species in the Republic of Macedonia is of exceptional importance for science. According to the studies that have been undertaken up to this point, it has been concluded that there are a large number of such species. Data specific to the more significant endemic, relict and rare flora species in the Republic of Macedonia is shown in the following list:

List of endemic, relict and rare flora species In the Republic of Macedonia

Endemic plant species

Viola arsenica	*Vernascum adenantum*	*Centaurea grbavacensis*
Astragalus cernjavski	*Asplenium macedonicum*	*Astragalus gracanini*
Viola alsarenis	*Moeringia minutiflora*	*Saturea fucarekiana*
Verbascum scardicolum	*Verbascum herzogi*	*Pulsatilla halleri ssp. macedonica*
Potentilla doerfleri	*Campanula debarensis*	*Saturea adamovicii*
Centaurea galicicae	*Tulipa marianae*	*Sempervivum macedonicum*
Centaurea tomorosii	*Hedysarum macedonicum*	*Pedicularis limnogena*
Crocus pelistericus	*Salvia jurisicii*	*Verbascum pachyurum*
Dianthus capinensis	*Ferulago macedonica*	*Alkanna noneiformis*
Silene viscariopsis	*Sambucus deborensis*	*Tulipa scardica*
Centaurea kozjakensis	*Colchicum macedonicum*	
Centaurea marmorea	*Pedicularis ferdinandii*	

Ilirian, Scardo-Pindus and Moesina endemics

Sesleria corabensis	*Narthecium scardicum*	*Dianthus scardicus*
Silene lerchenfeldiana	*Draba korabiensis*	*Onobrychus scardica*
Sempervivum macedonicum	*Sideritis scardica*	*Carex rigida var. macedonica*
Solenanthus scardicus	*Asperula dorfleri*	*Crocus scardicus*
Lilium albanicum	*Pinus peuce*	*Rhamnus ruopestris*
Digitalis viridiflora	*Kenthratus junceum*	*Pancicia serbica*
Abies borisii regis	*Draba scardica*	*Anthyllis aurea B.*

Relict plant species

Thymus oehmianus	*Campanula formanekiana*	*Viola kosaninii*
Crocus cvijici	*Ramonda nathaliae*	*Acer heldreichii*
Pinus heldreichii	*Pinus peuce*	*Ostrya carpinifolia*
Ruscus hypoglossum	*Narthecium scardicum*	*Swerthia punctata*
Taxus baccata	*Trolius europaeus*	*Rhamus rupestris*
Gentiana asclepiadea		

Boreal, arctic relicts

Trifolium pilczii	***Vaccinium uliginosum***	***Carex laevis***
Dryas octopetala	***Carex curvula***	***Arabis alpina***
Arctostaphylus uva ursi	***Carex rigida var. macedonica***	***Salix retusa***
Salix reticulata	***Salix herbacea***	***Primula minima***

FAUNA – STATE OF STUDY, ABUNDANCE, ENDANGERMENT

Macedonian fauna is insignificantly investigated, especially when protozoan animals and invertebrate component are concerned. Thus, only a very few groups of invertebrates are studied up to now (Table 1). From the annelid group, only two classes (*Oligochaeta* - the group which is studied the best, and *Hirudinea* - leeches); from *Plathemintes* only *Tricladida* order, from *Nemathelmintes* just nematodes (*Nematoda*) and from molluscs just a small group of snails have been studied.

From arthropods (*Arthropoda*) represented with more than 1.000.000 species, the part of *Branchiata* with about 100 known species and a several groups of insects have been studied.

Dragon-flies (*Odonata*) are represented with 45 species in Ohrid and Prespa region.

In dipterous insects (*Diptera*) order, *Chironomidae* and *Syrphidae* are under investigation. 200 day butterfly species are representing butterfly order (*Lepidoptera*) in Macedonia.

The fauna of underground waters is sufficiently investigated. These investigations were conducted by Dr. Stanko Karaman and he even described orders new for the science.

Table 1. The state of study of Macedonian animals - Invertebrates

Group	Number of known spices in the world	Subgroup	Number of known spices in the world	Number of known spices in Macedonia	Institutions (persons) which have been studying or are studying corresponding group currently
Annelids Annelida	8 800	Oligochaeta Lumbricidae	2 400 250	- 41	Institute of Biology-Skopje
Plathelminthes		Tricladida	-	29	Hydro-biological Institute-Ohrid
Nemathelminthes		Nematodes (Nematoda)	10 000	forest (60)	Institute of Biology-Skopje
Molluscs Molusca	128 000	Gastropoda aquatica Gastropoda terestria	- -	90 118	Natural History Museum-Skopje
Crabs Crustacea	25 000	order Cladocera subclass Copepoda Decapoda subclass Ostracoda	8 500	47 130 5 95	Natural History Museum-Skopje Natural History Museum-Skopje Mladen Karaman, Montenegro Natural History Museum-Skopje
Insects Insecta	950 000	Dragon flies (Odonata)	5 667	45 (for Dojran and Prespa)	Institute of Biology-Skopje
		Ephemeroptera	2 000	56	Institute of Biology-Skopje
		Plecoptera	3 000	30	Institute of Biology-Skopje
		Trichoptera	2 000	70	Institute of Biology-Skopje

		Butterflies (Lepidoptera) day-Ropalocera night-Microlepidoptera	**100 000**	**200 1 047**	**Natural History Museum-Skopje**
		Dipterous (Diptera) - (Syrphidae) (Chironomidae)	**150 000 500**	**256**	**Prirodnonaucen Museum-Skopje Institute of Biology-Skopje**
		Hymenoptera Symphyta	**250 000**	**60**	**Natural History Museum-Skopje**
		Coleopterans (Coleoptera) - Curculionidae - Scotyloidea	**350 000 35 000**	**1 000 124**	**Natural History Museum-Skopje**

Presently 55 fish species, 78 mammal species and 330 bird species are under study and are known for Macedonia. Other vertebrate groups, although they are not investigated, are presumably represented with 13 amphibian species and 31 reptiles (Table 2).

Table 2. The state of study of Macedonian vertebrate animals

Group	**Number of known spices in the world**	**Subgroup**	**Number of known spices in the world**	**Number of known spices in Macedonia**	**Institutions (persons) which have been studying or are studying corresponding group currently**
		Fish (Pisces)	**34 600**	**55**	**Institute of Biology - Skopje Agricultural Faculty - Skopje Hydro-biological Institute - Ohrid Institute for Fishery - Skopje Natural History Museum - Skopje**
		Amphibians (Amphibia)	**1 900**	**13**	**Institute of Biology - Skopje Natural History Museum - Skopje**

Vertebrates Vertebrata	**45 000**	**Reptiles (Reptilia)**	**5 500**	**31**	**Institute of Biology - Skopje Natural History Museum - Skopje**
		Mammals (Mammalia)	**4 170**	**78**	**Institute of Biology - Skopje Faculty of Forestry - Skopje Natural History Museum - Skopje**
		Birds (Aves)	**9 708**	**330**	**Institute of Biology - Skopje Faculty of Forestry - Skopje Natural History Museum - Skopje**

The more important institutions that are investigating biological resources among others are: Institute of Biology - Skopje, Hydrobiological Institute - Ohrid and Natural History Museum - Skopje.

A certain part of invertebrate component and considerable part of vertebrate fauna are objects of excessive exploitation, even uncontrolled export (snails, frogs, turtles) and there are no measures in order to stop this treading up to now (Table 3). The Red book for vertebrate animals in Macedonia is in the stage of preparation, which we believe will not have any particular role if this problem would not be solved by introducing of Law and by joining of Macedonia to appropriate international agreements (especially Washington and Rio Conventions) and their strict obeying by responsible custom offices.

Table 3: The review of exported quantities of plants and animals from The Republic of Macedonia (for 1994)

Type of bioresource	Exported quantity (in kilograms)
Mushrooms	**465 921**
Snails	**1 037 282**
Medicine plants	**230 306**

In 1994 the following organisations were ransoming medicine plants:
1. A.D., Alkaloid, Skopje
2. ZZ Agrocentar, Strumica
3. Jugotutun-Gorica, Vinica

4. A.D. Lozar, Titov Veles
5. D.O.O. Kooperacija so maloprodazhba-Sveti Nikole

Forest fruits were ransoming:
1. Napredok, village Samokov-Makedonski Brod
2. P.O.S. Ishrana Berovo

Medicine plants and forest fruits were ransoming:
1. Z.P.P.Z. Kooperant-Radovish
2. ZIK Strumica DOO, Kooperacija-Strumica
Z.P.P.Z. Kooperant-Bitola
A.D. Agrokoop-Kichevo

Hunted deer in 1994

Type of deer	number of hunted specimens	Type of deer	number of hunted specimens
Red deer	2	Brown bear	27
Fallow deer	8	Wild boar	695
Roe deer	8	Rebit	16 830
Chamois	37	Partridge	25 385
Mouflon	2	Rock partridge	1645

The protection of zoological biodiversity is not satisfactory at all, which stays for the protected natural reserves as well. The last is mainly due to the lack of ranger offices.

COMMUNITIES - STATE OF STUDY, ABUNDANCE, ENDANGERMENT

Macedonia is rich on various plant communities, starting from water up to alpine communities. Up to now 21 water and swamp phytocoenoses, 8 halophytic, 2 steppe-like, around 81 'forest and 51 mountain associations have been recognised.

Among hydrophytic communities two of them are of a special interest. Lemnetospirodeletum polyrrhizae aldrovandetosum (H-ic et Micev. 1960) is distributed only in the Prespa Lake coastal area. The phytoceonosis Potameto -Vallisnerietum is mainly restricted in Prespa Lake as well and in Ohrid Lake is only presented fragmentarily (Micevski, 1969).

Among halophytic plant communities (11) which are developing without exception in Ovche Pole we should mention those of the alliance Thero-suadetum of which only one community was described: as. Suadetum maritimae balcanicum which is new association. Thespecies Suaeda maritima is dominating in this community, which is developing only on solonchak soils and is among the most distributed halophytic communities.

The *Puccinellion convolutae* alliance is represented by five communities in Ovche Pole area. They are all new for the science, which implies that they are Macedonian endemic communities:

1. *As. Camphorosmetum annuae balcanicum* - it is developing on solonchak soils or on the eroded solonec soils.

2. *Puccinellietum convolutae* - This community is developing on solonec soils and spatially is well represented.

3. *Hordeo-Trifolietum parviflori* - it is developing on the sites with solonec soils, but few cm lower than the surrounding terrain.

4. *Camphorosmetum rnonspeliacae* - is developing in the form narrower or broader belts near the larger channels and also like small oases with 1-3 m diameter.

5. *Pholiureto-Plantaginetum balcanicum*- vicarious South-Balkan association which is rather rare, occupying very small areas and it is connected to micro- depressions, where the water is staying longer.

The alliance *Cyperio-Spergularion Salinae* (Sl-ik, 1939) is represented with only one Macedonian endemic community: *Crypsidetum aculeatae balcanicum* (Micevski, 1965), which is developing in small depressions and channels in Ovche Pole.

The presence of "Steppe" vegetation is very important for Macedonia. It is distributed in the area between Titov Veles, Shtip and Krivolak. At this area two endemic steppe-like communities belonging to the alliance *Satureio-Thymion* (Mic, 1970) are dominating: as. *Brachipodio-Onobrychetum pindicolae* - connected to Paleogene sediments, and it is appearing as two sub-associations and numerous facies, and, as. *Astragalo-Morinetum* - connected to Paleogene sediments as well, specially to taluses, which are formed by degradation of marl or sandstone along the steep slopes of hills and ravines. It is appearing as two sub-associations as well.

The areas with refugium forest communities are of a special importance for Macedonia. The most important of them are:

Lower-Vardar - Valandovo - Strumica - Dojran refugium area

The close distance of Eu-mediteranean is very important for this area. The main entrance of Mediterranean climate is along the river Vardar valley and another from Struma valley in Bulgaria toward Strumichko Pole. The pseudo-maque is spreading along the river Vardar until Demir Kapija, and partially near Strumica lowland, Valandovo and Dojran region. Sclerophyllous *Quercus coccifera var. calliprinos* and *Phillyrea media* are predominating as a result of human influence. *Platanus orientalis* in stripe-like coenoses is joining river flows. Among numerous omni-mediterranean species, other East-Mediterranean species such as:

Pinus nigra var. pallasiana, Juniperus excelsa, J. foetidissima, rare Arbutus andrachne, Marsdenia erecta and Periploca graecca are a putting a special mark on this area.

Refugium forest vegetation is partly meso-termophyllous with Middle-European dendroflora *(Fagus, Acer pseudoplatanus, Ulmus glabra, Carpius betulus)*, occasionally with pronounced evergreen component *(Taxus baccata, Ilex aguifolium, Buxus sempervirens, Ruscus aculeatus)*. Phytocoenoses with *Castanea sativa, Juglans regia, Platanus orientalis, Tilia tomentosa, Carpinus orientalis* and *Alnus glutinosa* are especially interesting, developing on more humid micro-sites. Headera helix is very common on these refugium sites, both as a liana or covering the soil. Mixed communities of ash *(Fraxinus angustifolia)* with Periploca graeca and Ruscus aculeatus; coenoses of Pinus nigra ssp. pallasiana with existing *Quercus coccifera*; juniper *(Juniperus excelsa)* with Prunus webbii; river banks plain communities are characterizing this special refugium area.

Refugium area Tikvesh

Through the region between Titov Veles, Kavadarci and Shtip, river Vardar is flowing through wide valley with flat and low hilly relief. There is no forest in this area and even trees are rare. Very important are the plane stands along the stream Vatashka Reka valley, wild peach (Prunus tenella) shrubbery with Ephedra major at Golem Ljubash and other places.

The landscape is changing recently. The large areas are being irrigated now and former winter pastures have been turned into corn fields and other agricultural plantations, orchards, vineyards etc. Afforestation is carrying out here successfully.

Refugium area Taor Gorge of the river Vardar with the Pchinja gorge

Tikvesh valley is narrowing towards the north in Taor gorge where the steep slopes are covered by dense green vegetation. These are mainly shrubberies of Syringa vulgaris with Buxus sempervirens, Phillyrea media, Jasminum fruticans and Carpinus orientalis, which are bound in a floristically rich community. The very steep right side of the river Pchinja, before confluenting Vardar, is covered by the forest of juniper (Juniperus excelsa), the species which is distributed on other places in both gorges as well, either individually or in groups. Staphylea pinnata, very rare in Macedonia is also developing in this community.

Refugium area river Treska canyon (Poreche)

About 60 km in length, in meridian direction, the Treska river-bed is cut deeply through mountain parts of Jakupica mountain from the east side and Pesjak with Dobra Voda and Suva Gora from the west. At the end, the gorge is extremely narrow and at the place called Matka Treska is entering the Skopje valley. In this canyon flora rich in relict species is developing, among which considerable number are local endemites.

ln the refugium forest vegetation, coenoses of Quercus trojana in lower and Pinus nigra var. pallasianai in upper vegetation belt are playing an important role. Refugium beech communities are represented at considerably less extent spatially. They are distributed along the numerous rivulet, dales, and ravines leading in Treska and they are characterized with small areas. Restricted at Western-Macedonian region, Laburnurn alpinum ("dobrocvet") is growing here as well, in beech forest on siliceous bedrock, were recent forest vegetation is prevailing.

Refugium area of river Crna Reka with gorges Raec and Blashnica

After leaving the Pelagonia flat-plain till Tikvesh valley the river Crna Reka canyon is spread out, 80 km in length. The river is flowing between Selechka Planina mountain and Orle-Galchin massif from the left side and Mariovo hills and Vitachevo plateau from the right side. Through pretty high mountain passes the warm Aegean climate is penetrating in the canyon. On the other hand, the climate with summer and winter extremes has its influence from Tikvesh valley. Nevertheless, the conditions for development of sub-Mediterranean vegetation, enriched by sub-Mediterranean floral element in the canyon are established. Pseudo-maque, but without Quercus coccifera, bright small woodlands of Juniperus excelsa, with Pytillyrea media, and here and there with Arbutus andrachne, coenoses of thorny Primus webbii, coenoses of Quercus trojana with Pistacia terebinthus are characteristic for the vegetation of the Crna Reka canyon.

Refugium area Jama

Mountain pass Jama, through which the road from Kichevo to Debar is passing, mainly on the calcareous terrain, through forests of a mixed composition, at some places with sub-Mediterranean characteristics, then through Turkey oak forests, sessile oak and beech forests. Special importance of that vegetation is represented by wild chestnut (Aesaculus hippocastanum). It is developing in thermo-mesophyllous coenoses, in Ostrya carpinifolia coenoses, then in beech coenoses, on sites of Aceri-Fraxinetum and Ostryo Fagetum. But, in the river-bank vegetation of Garska Reka river, tributary of Radika, than along the river Crni Drim, at the places where it is not covered by the present lake, wild chestnut is growing on the rocks together with Alnus glutinosa and Salix elaeagnos.

Refugium area Mavrovo - Radika

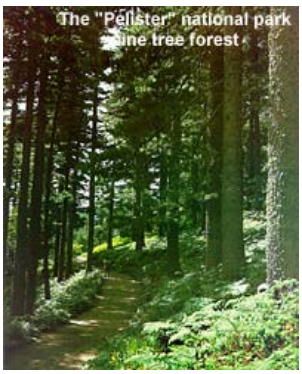

The "Mavrovo" national park

Meso-thermophyllous broad-leaved forest is spread out on limestone bedrock due to the influence of the Adriatic sea which is not very far a way. At separate places the chestnut takes place in these forests. Fir stands are developed at elevations above 1200 m. Spruce, mostly mixed with fir, is present as a forest stand on the western slopes of Shara mountain, at the border of its entire areal. Ostrya carpinifolia and Acer obtusatum, two representatives of IIirian flora are the special characteristics of refugium communities of this area. Shrubberies of Myricaria germanica are, the most probably, refugium stands as well. 'They are distributed along the Alluvium of Radika and most of them are flooded after the establishing of the -lake at the lower flow of the river. At the edges of Mavrovo valley the sub-endemic species Primus cocomilia is often present.

Refugium area Strazha

On the mountain pass, between the Polog flat-land and Kichevo valley, at an elevation of 1050 to 1150 m, on the Bistra mountain slopes three forest communities are altering: beech, sessile oak - represented with its eastern variant and black horn-beam. Beech and oak coenoses are covering the siliceous ground and Ostya's stands are on the limestone. The relict component is present in the composition of all three communities. The presence of many species at an unusual low elevation is remarkable.

Refugium area Pelister



In sub-alpine region of Baba mountain, Pelister massif, a considerable area is covered by endemic-relict pine "molika" (Pinus peuce). One of its primarily site is situated there. However, molika was spreading, and it is spreading now as well, toward mountain elevation belt on the sites of climatogene beech-fir forest. There, this pine is taking over long team ago deforested sites. At this secondary site the molika demonstrates more intensive growth, but it is more susceptible to fungal parasites which are the reason for decay of older stems sapwood. The consequences of this are common wind-falls and loss of valuable timbers.

In the very favourable growth conditions at the sub-alpine region, the mixed molika--beech coenosis is represented.

Ohrid - Prespa refugium area

Except for the Ohrid and Prespa lakes, this refugium area comprises a part of the Crni Drim gorge with the mountain Jablanica, near the border with Albania. The water surfaces of the lakes are mildening temperature extremes, both daily and seasonal, and increasing the ear relative humidity. Except for this, Mediterranean climate, though weakened, is penetrating through mountain passes, thus, improving the already existing favourable conditions for plant growth, for maintaining of their species richness of many relict species. In this context, the south-east coast of Ohrid lake is very interesting, which is exceptionally rich, containing Mediterranean and other thermophyllous species, among which trees and shrubs as well.

Refugium forest communities are comprising a considerable area on the mountain Galichica. Coenoses of Quercus trojana, Juniperus excelsa - alone or with J. foetidissima, wild chestnut (Aesculus hippocastanum) on the rocky sites, than the last remainder of Pinus leucodermis forest in the sub-alpine region, destroyed long ago, then also the sub-alpine shrubberies of Cytisanthtis vadiatus, are examples of refugium vegetation abundance in this area.

On the Prespa side of Galichica mountain among the refugium communities, similar to those on the Ohrid side, the coenoses of Juniperus excelsa, are of a special interest. They are covering almost the entire area of the small island Golem Grad.

On the mountain Jablanica, in the north-west of Ohrid lake the chamephytic coenosis of Erica carnea is very interesting. It is covering a large area on the siliceous ground there (brechia-conglomerate) and reaching the east border of its areal on the Balkan Peninsula.

Refugium area Nidzhe - Kozhuf

Nidzhe - Kozhuf is a mountain range extending in south-east - north-west direction. Its east border is included in the lower-Vardar refugium area. The biggest complex of coniferous, pine forest in the R. of Macedonia, spread out on more than 10,000 hectares on the north-west

and north side of these mountains, which is strongly partitioned is one of the most important features of these mountains. The pine forests are mainly composed of black pine on Kozhuf, and Scot pine is distributed on siliceous bedrock on higher and colder Nidzhe mountain. The molika-pine on Nidzhe mountain is occupying limestone areas at present. Molika-pine was covering larger areas in sub-alpine region on siliceous bedrock in former times. Only traces of this are present now and large pastures with individual old stems and very sporadic samplings, are spreading on these areas now. Refugium black pine forests are represented on the different eruptive stones, Scot pine forest on limestone and on one peat-bog site - as a local appearance, at the Kozhuf massif. The refugium beech coenosis at an elevation of about 1000 m with Abies borisii-regis, Ilex aquifolium, Bruckenthalia spiculifolia is very interesting. Refugium pine communities on limestone are present on Nidzhe mountain, consisted of black pine (var. pallasiana) and molika-pine, and also Scot's pine in small areas, mainly on siliceous bedrock, the same as molika stands, now destroyed.

Refugium areas are depicting the conditions in which the refugium vegetation in Macedonia survived. This vegetation is represented mostly by broad-leaved, very rare coniferous coenoses, the former being thermophyllous and mesophyllous, rare xerophyllous, and the later oftently xerophyllous as well. Many species connecting the Balkan Peninsula flora with that of Crimea, Caucasus, Asia Minor and Middle Asia, namely relict species, are represented in refugium forest vegetation in Macedonia. We should mention the following: Juniperus excelsa M.V., J. foetidissima Wild, Pinus nigra Arn. subsp. pallasiana (Lamb.) Holmboe, Quercus trojana Webb, Platanus orientalis L., Celtis glabrata Stev., Podocytisus caramani - cus Boiss. et Heldr., Arbutus andrachne L.

There is insignificant care for protection of different plant communities in Macedonia, even in the case of relict, endemic and refugium, in spite of the attempts made by some scientists and scientific institutions to improve the situation (the example with the relict swamp community - Caricetum elatae near Ohrid).

Natural Heritage Categorization

In accordance with the 1973 Law on Natural Rarity Conservation, natural heritage values have been placed into four conservation groups, each of them having its own conservation regime:

1. General Natural Reserves- (national parks/NP; strict national reserves/SNR; scientific research natural reserves/ SRNR; areas with special natural features/ ASPN; characteristic landscapes/ CL);

2. Special Nature Reserves (SNR)

3. Specific Plant and Animal Species beyond Natural Reserves (SPASBNR)

4. Monuments of Nature (MoN)

Nonetheless, in view of the fact that the above mentioned classifying deviates from the natural heritage categorization international law (according to 1996 IUCN criteria), the latter has been implemented in the country; the following table contains the results of the recent categorization of the natural heritage protected.

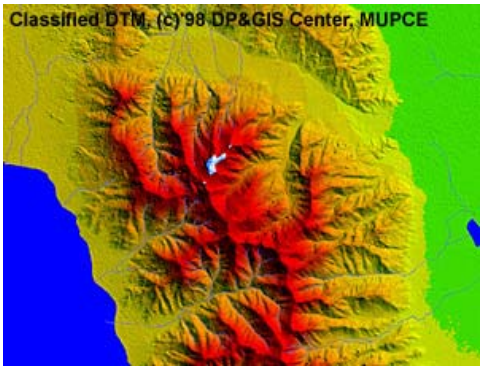
It may be seen from the table that the categorization covers 141 protected natural heritage object with a total surface area of 237.330 ha, or 7,11% of the total surface area of our country. Yet, due to their specific importance, we would like to point out here to our activities for biodiversity conservation and maintaining (covering plant and animal species and their habitats, all within the natural environment)

NATIONAL PARKS

GALICICA (Ohrid, Resen)

It has a total surface area of 22.750 ha and is located between the Ohrid and Prespa Lakes in the south-western part of the country. Within the Galicica NP, 41 species of woodlike plants, 40 species of bushes, 16 forest communities and 16 grassy communities. The Galicica National Park is characterized by a high incidence of relict and endemic plants. The following are especially significant among the relict plants: Morina persica, Ramondia serbica, Phelipea boissiri and Berberis croatica. Among endemic plants, the following are known: Centaurea galicicae, Centaurea tomorosii, Centaurea soskae, Helichrysum zivojini, Edrianthus horvatii, Festuca galicicae, Micromeria kocanini etc.. There are 10 amphibian species, 17 reptile species, 124 bird species and 40 mammal species.

PELISTER (Bitola, Prilep)

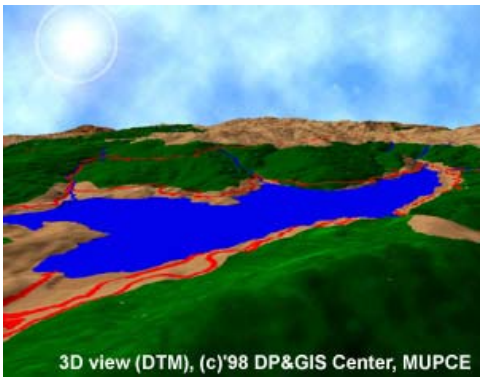


The Pelister national park is a part of the Baba mountain located in the south-western part of the Republic of Macedonia. There are 37 species of woodlike plants, 31 species of bushes, 18 species of forest communities and 27 grassy communities located within this national park. Among plant communities, the largest surface area is covered by pine forests covering exclusively a surface area of 1.174 ha, and there are also pine-fir, pin-beech, pin-beech-fir, beech and oak-beech forests. Among flora elements, the presence is especially significant of the five-needle pine molica (Pinus peuce)- a unique

species of tertiary age being present on only a few mountains in the Balkan Peninsula. It reaches its development peak on the Pelister Mountain on 1000 to beyond 2.200 m.a.s.w. Within high mountain layers, the following endemic plants may be found: Crocus peristericus, Dianthus myrtinervius, Sempervivum octopodes and Alchemilla peristerica.

As for the vertebrate fauna, there are 12 amphibian, 16 reptiles, 130 bird species and 37 mammal species, special attention deserved by the bear, the doe, the lynx, the wild goat, the deer, the wild boar, the stone partridge (Alcetoris graeca), the golden eagle (Aquila crhysaetos), the stone creeper (Tichodroma muraria) and the red-beak corax (Pyrrhocorax pyrrhocorax). Among the fish, the presence of the endemic Pelister trout is of special significance (Salmo peristerrious Karaman).

MAVROVO (Mavrovi Anovi, Rostuse)



It covers an area of 73.088 ha and is the largest national park of the ones already proclaimed in Macedonia. It includes the southern parts of the Sar Mountain, the western and central parts of the mountain of Bistra and parts of the Korab and Desat mountains. The highest peak is the Golem Korab - 2.764 meters high. The central part of the national park covers the Radika river valley and watershed where numerous interesting geo-morphological forms may be found: canyons, steep sections, variously shaped stones, caves etc..

The Park's vegetation is present with numerous plant species of tertiary origin. Forest communities may be sub-divided into several environmental groups. In the lowest parts, along the Radika and Mala Reka rivers, where there is a high impact of the Mediterranean climate, sub-Mediterranean thermo-xenophybile forests may be found with communities of blagun-belgrabic forests. At highly steep and hard-to-reach sections, within the Radika canyon part, Quercus pubescens and Ostrya carpinifolia and Carpinus orientalis may be found. Mostly present in the park is the community of mountain beech forests (Fagetum montanum) that constitutes a level layer with an amplitude of 1.300 to 1.550 meters. Relatively huge areas are also covered by the community of the mountain beech forest of fir (Abieti fagetum). The existence of Picea excelsa is of a local character. It may be found only on one site- along the upstream sections of the Adzina river, that is the utmost south location within Europe. Due to the high variety of its relief and the abundance of its mezo- and micro-environmental conditions, the Mavrovo national park has an exceptionally abundant flora stock consisting of more than 1000 species of higher-developed plants, of which 38 forest species, 35 bush species and some 100 rare or endemic species in the Balkan Peninsula. There is also great variety with the park's fauna. It consists of 140 bird species of which the following are significant: the gray falcon (Falco peregrinus Tunst.), the imperial eagle (Aquilla heliaca Sav.), the golden eagle (Aquila chrysaetos L.), the forest owl (Strix aluco), the great owl (Bubo bubo), the meadow harrier (Cricus pygargus), the steppe harrier (Circus macrorus), 11 amphibian species, 12 reptile species and 38 mammal species. Among the mammals, the most significant are the following: the bear (Ursus arctos L.); the lynx (Lynx lynx L.), the wild goat (Rupicapra rupicapra L.); and the wildcat (Felis silvestris Schreb.).

STRICT NATURAL RESERVES (I CATEGORY ACCORDING TO THE IUNC)

1. Ezerani, on Prespa Lake - The most interesting part of Lake Prespa is located on the site between villages Sirhan and Asamati. This part is characterised by a wide zone of very shallow coast, send spruces that extend along the lake shore and the mud coast, and with a wide reed belt, which is represented with the Scirpeto-Phragmitetum Koch community, 1926. A great number of birds nest, feed and shelter themselves in this area (Micevski, 1994). Near the village Ezerani there is an inundated forest "Korija" represented by willow trees (Carici elongatae - Alnetum glutinosae, Rizovski). The shore on the site that stretches from the village Asamati to the Krani Village boasts rare reeds and the coast near the village Krani and the Greek border is characteristed by mud vegetation as well as a narrow reed belt. Erezani Reserve is characterised with a great variety of ornythfauna representatives (Micevski, 1996). Today, 96 species of birds are known to habitat Prespa Lake (Micevski, 1998). This information refers only to the species that are binded to the water community for whole their life. Sixty-one species from this number, or 63,5% are on the list of strictly protected species (according to the Balkan Convention, Annex II); three species (Pelecanus crispus, Pelecanus onocrotalus, Haliaeetus albicilla) are on the list of the most strictly protected species with international importance (Bon Convention, Annex I). Three bird species (Pelecanus srispus, Phalacrocorax pygmaeus, Haliaeetus albicilla) from Prespa Lake are on the European "Red List" of globally endangered animal and plant species. Seventeen bird species (or 35,4% of the total number (48) are under permanent protection by the Republic Institute for Cultural Monuments Protection - 1965) can also be found on Prespa Lake.

In 1995, through a proposal of the Society for studying and birds protection in Macedonia (DPZPM) and National Ramsar Commity, our country nominated Prespa Lake, together with the ornithological locality Erezani, for the World Ramsar List (International Ramsar Biro Certificate, Ramsar Convention Wetlands, 1995).

In 1996, the Parliament of the Republic of Macedonia declared this significant ornithological locality as the first strict natural reserve in the Republic of Macedonia. The declaration followed the valorisation of the natural values by eminent scientific institutions (Elaboration of the natural values valorisation on the Erezani locality for its declaration as an strict natural reserve, Micevski B., Team Leader, Institute for natural Rarities protection, 1995).

In 1997, the Government of the Republic of Macedonia presented a decision by which DPZPM was nominated for "Erezani" management. The same year, the Minister authorised for Environment has brought an PRAVILNIK for measure enforcement for the strict natural reserve "Erezani" protection.

In 1995-1997 period, DPZPM and the German Environmental Organization EURONATUR,

undertook an international project for the orintofauna protection of Prespa Lake, where the orintofauna of the strict natural reserve "Erezani" was also encompassed (included) (Report on Project Implementation, Project manager Micevski B., 1997; Broshure and poster about the project - in edition of DPZPM, RINRP and EURONATUR, 1996).

2. Tikvesh, in the Crna Reka gorge (ravine) - The Tikvesh Reserve is located on the most picturesque part of the ravine of the river Crna Reka. The locality is 30 km. from Kavadarci. It is a teritory of 10.650 ha and occupies an area of several natural ecosystems (mountain, forest, grass, river, lake and coast).The reserve's borders strech from the cape near the bay of the river Kamenichka Reka until the place where the Galishka Reka enters the Tikveshko Lake in lenth, and from the riverbed of the river Kamenichka Reka up to the north sides of the Orle and Galchin Peaks (on Drenska Mountain) in width.
From a biogeographical aspect, the reserve region occupies mountain and forest surfaces, as well as surfaces with bush and grass areas (PASISSTA). Coastal forestry flora represented by VRBJACI, is present where the mountain rivers empty into Tikveshko Ezero Lake. Otherwise the area is hilly to mountanious with many ravines and is under the influence of a mountain climate. The relief structure of the field, the climate, the hydrology, the geology, and the surrounding locality (from all sides it is surrounded by large mountain massif) has contributed to the reserve's development of a rich biological diversity. Studies have identified a presence of eight forest communities:

1. as. Querco-Carpinetum orientalis macedonicum Rud. 1939 apud. 1946;
2. as. Phillyreo-Carpinetum, Em 1957;
3. as. Pruno webii-Junipetum exelsae Em, 1962;
4. as. Orno-Quercetum petraea Em, 1962;
5. as. Festuco heterophyllae-Fagetum Em, 1965;
6. as.Querco-Ostryetum caprinifoliae Ht. 1954;
7. as. Botryochloo-Paliuretum B.J. 1973;
8. as. Campanulo-Inuletum aschersonianae Ht. 1949.

The reserve's forest communities are represented by woody, shrubby and grassy species of which seventy-one plant species have been classified as distinctly important for the natural ecosystems (ten woody species, twenty-four shrubby species, thirty grassy species, and seven species characteristic for rocky regions).
From the woody species the following are present: four types of oak (Quercus pubescens, Q. coccifera, Q. petraea and Q. ceris), BUKA (Fagus moesiaca), maple (Acer monspesulanum), GABER (Caprinus orientalis), wild FOJA (Juniperus exelsa) and the rare specie called "naked man" (Arbutus andrachne).
In addition to the floristic values of the reserve, the faunistic values are also significant. Here we can distinguish representatives from bird species ie. predatory birds which are classified as an endangered animal species within Europe and the World (Grubach B. 1984-1992). The ornithological value of the reserve is valorized according to the international standards (IUCN & ICBP) and the European Criteria ("Important Bird Areas in Europe," Grimmet & Jones, 1989).

This reserve represents one of the most significant localities for predatory birds in Europe. From the thirty-nine species of predatory birds that live in Europe, thirty-five species are registered in Macediona and tweny-three species (66%) are registered in the reserve. Of the birds registerd within the reserve, seventeen species (74%) are nesting birds. From the aspect of the rare and globally engdanged species that are represented in the reserve, the following species have been determined:

Pandionidae - Pandion haliaetus

Accipitridae -16 specieses:

Pernis apivoris Gr.	Milvus migrans L.	Accipiter genrilis L.
Accipiter brevipes S.	Accipiter nisus L.	Buteo rufinus Gret.
Buteo buteo L.	Hieraetus pennatus Gm.	Hieraetus fasciatus Vi.
Aquila heliaca Sav.	Aquila chrysaetus L.	Aegipus monachus
Neophron percnopterus	Gupaetus barbatus	Gyps fulvus Hab.
Circaetus gallicus Gm.		

Falconidae:

Falco biarmicus T.	Falco naumanii F.	Falco subbuteo L.
Falco peregrinus	Falco tinnunculus	

Three bird species (Aegipus monachus L., Aquila heliaca Sav. and Falco neumanii Fleis) from those presented above, are on the World Red List (a list of the most endangered birds) and fourteen are on the European Red List (Gupaetus barbatus L., Neophron percnopterus L., Gyps fulvus Hab., Aquila chrysaetus L., Hierateus fasciatus Vil., Hieratus pennatus Gm., Circaetus gllicus Gm., Pandion haliaetus L., Buteo rufinus Gret., Pernis apivoris Gretz., Accipiter brevipes Sev., Milvus migrans L., Falco peregrinus Tunds. and Falco Biarmicus Temn.).
Besides those species mentioned above 111 additional bird species are registerd in the reserve. Twelve species which are on the, International Red Lists of the world's most endangered bird species include mostly migratory water bird species. herefore the reserve consists of the whole region of the ravine of the river Crna Reka, together with its wider surroundings, is added to the International IUCN List and it has been characterised as a world significant birds' living place (Grimet & Jones 1989).
In 1997, the locality of Tikvesh was proclamed as a strict natural reserve by a special Law, and in 1998 the Government of the Republic of Macedonia wrote a decision in which the public company "Water Economy in Macedonia" was declared as the manager of the reserve. This declaration was based on the evaluation of the report for the valorization of the national

values of the orinthological locality of Tikvesh. This valorization was made for the proclaimation of the areas as a strict natural reserve (Grubac & Associates 1993, Republic Institute for Nature Rarities Protection, Skopje). In 1998, the Minister authorized for the Environment of Macedonia, brought the Regulation for enforcing the measures for the protection of the Strict National Reserve Tikvesh.

THE MONUMENTS OF THE NATURE

About the three natural lakes in Macedonia and the problems with their protection

1. Ohrid Lake - It is located at southwest part of the Republic of Macedonia, at an elevation of 695 m a.s.l.. From the total area of 348,8 km2, 229,9 km2 are in the territory of the Republic of Macedonia. The Ohrid valley, where the lake is situated, has been formed by tectonic way during the middle Pliocene.

The deepest part (287 m) is located at Peshtani valley. The Ohrid Lake is known as the deepest lake on Balkan Peninsula. The lake is typical sub-tropic with largest average monthly temperature of 25.7o C. The transparency of the water is high - 21 m, and the color is marine blue.

Another characteristic of the lake is the low productivity of the phytoplancton, limited by the low concentration of phosphates and nitrates in the water.

The macrophytic vegetation of the Ohrid Lake is spread till the depth of 9-11 m, rarely down to 20 m. It is distributed zonally, in three belts: first - reed belt, second - Potamogeton belt and third - Chara belt which is penetrating the deepest. Animal component is connected to all these vegetation belts. On the bare vertical cliffs in the shallow shore small number of snails and planarian are distributed. Colonies of endemic sponge Spongilla stankoviki, larvae of Neuroptera and water moths, shells - Dreissensia, dragonfly larvae and many others are distributed deeper. Among the total number of snail spices, 40 of them are settled in the shallow shore. Excluding the microscopic forms, the number of individuals is about 3000-12.000, rear 30.000 ind. per square m.

In the sub-littoral zone (it is called the zone of dead shells), which is semi-dark, macrophytic vegetation is absent, but the sandy bottom and the layer of dead Dreissensia-shells are covered by algae. The relict species: Ochridospongia rotunda, Archopistomum macedonicus, Neodendrocellum lychnidicum, Peloscolex stankoviki, Ochridocyclops arndti, Asselus arnautoviki and Pyrgula polinskii, fish species - Acantholingua ochridanus and others are distributed in this zone.

Profundal zone is occupying the biggest part of the lake's bottom (4/5) and is characterised by total darkens and absence of plants. Eury-bionts are existing in this part, relict and cave forms among, which more important are: Hyodrilus ochridanus, Fonlicola ochridanus, Pyrgula wagneri, P. Stankovici, P. Vaicaliformis, Horatia brusinae, Archopistomum macedonicum, Ohridia bathybia, Niphargus foreli ochridanus and others.

The life of the lake in the pelagic zone is quite heterogeneous; the species from green algae and diatoms being dominant. The biggest part of the algal population is inhabiting the upper, warmer part of the pelagic zone (down to 50 m).

The animal component of the plankton community is characterised by the poor species composition and monotony throughout the whole year. Only two species are endemic among the zoo-plankton (Archodiaptomus steindachneri and Cyclops ochridanus). Among all zoo-plankton species, the most abundant are Copepoda, larvae of Draissensia, Rotatoria and Cladocera.

Due to the geographic isolation and favourable hydrographic conditions, 146 endemic species are preserved and live in Ohrid Lake. Some of them are living fossils and they are remaining unchanged from Tertiary up to now - endemic sponge, relict snail species (more than 27) among which 86% are endemic, several relict species of worms, Ohrid trout (Salmo letnica), belvica (Acantolingua ochridana) and other endemic fish species. There are numerous relict algal species; among which diatoms are the most numerous, as well. Due to these retinas of Ohrid Lake with natural values, it was listed in 1979 in the World Heritage List, and in 1980, due to the important historic-cultural values of the broader territory, this region was nominated as Ohrid natural and historic-cultural region.

According to the data for the last 10 years, the fish catch from Ohrid lake amounts from 165 tones (in 1992) up to 302 tones (in 1988) or average about 225 tones. The biggest part of the catch is composed by Ohrid trout, belvica and plashica.

According to the data of Spirkovski and Talevski (1992) a special change of the age and sex structure of the Ohrid trout population as well as the reduction of its density.

The main reasons for this are the adverse influence of waste water which are causing destroying of natural fish breeding places and decreasing of organisms abundance upon which the autochtonous fish species are feeding, and especially the intensive and unrational fishing - beyond the frame of the biological optimum. The later is especially the case on the Albanian side of the 'lake. Another unfavourable moment is the presence of several introduced allochtonous fish species, such are: gambusia, carassius, rainbow trout and alosa which are demonstrating an adverse effect on the endemic fish fauna of the lake through the competative relations.

The increasing urbanization of the Ohrid coast and unsolved problems with industrial waste waters represent the real danger for the diversity of the Ohrid lake life. A large number of bental life forms from Ohrid lake are living evidences for the originating of the lake as well as for the evolutionary development of fresh-water fauna. Many answers to unsolved questions for the evolution of the life and natural lakes are kept and hidden in these species.

Unsolved question for solid communal waste disposal is big problem as well. lt is disposed presently near the lake, (Studenchishte swamp, river Cherava and close to the coastal

settlements), although the location for depony is existing according to the regional plan for the town of Ohrid. The same holds for town of Struga.

We should mention in this occasion that industrial waste waters are not collected by the existing collector system, but the communal waste and fecal waters solely. Chromic and other acids, cyanides, bases, copper wastes and other toxic materials were registered in the industrial waste waters. Among the biggest polluters are waste waters of the factories "Heroj Toza, Dragovikj" and "Ezerka" from Ohrid.

The influence of the waste water of numerous tourist objects, which are not connected to the existing collector system, is adverse as well. The use of fertilizers and herbicides that are infiltrating in the lake basin cause the pollution and eutrophication of the lake also.

The exploitation of the mineral resources (sand, gravel) from the lake coast is quite often as well. .

The river Sateska, which bed was turned into the lake few decades ago, has a very big influence on the eutrophication of the lake. It is carrying 0.5-1400 tones per day of suspended matters into the lake. The last is contributing to disturbance of some basic ecological conditions for the reproduction of some endemic fish races.

The large number of collective buildings, summer cottages next to the lake coast are the additional load, but the biggest adverse effect on the natural features of this ecosystem will be caused by the realisation of the Detailed Urban Plan on the coastal line from Studenchishta to Kaneo. It is anticipating undertakings that are in the contrast with the decisions of our State in the Nomination File of Ohrid Lake in which is stated that at list 60% of the coastal zone will be protected from the urbanisation.

Absence of care for the lake is obvious in the case of establishing of the road in the close vicinity of the St. Naum springs, as well as the direct releasing of waste water from the neighboring tourist objects.

Considering the importance of these natural archives, taking into consideration the adverse influence of human activities, their special protection is emerging as an imperative. It can be realised through previous investigations that would be the base for establishing of a proper strategy for their protection. .

Since establishing of Hydro-biological Institute in Ohrid in 1934, the Ohrid Lake is stocked with fish by the nursed progeny of Ohrid trout. Up to know the lake is stocked with 430 millions fish young's. This is enabled by the breeding installations in the Institute, which capacity is 22 millions grains of roe per year. The spawning is organised in the way that enables natural reproduction of Ohrid trout during the fishing closed season.

In 1965 by construction of dam on the river Crni Drim (the Ohrid Lake effluent), the natural rout of eel (Angr~lla angrcilla) was interrupted, by which the natural migration in and out of the lake was disabled. Presently Ohrid lake is artificially stocked by the eel.

2. Prespa Lake **-** The Lake is situated at the outermost southwest part of The Republic of Macedonia, on the junction of three borders between Macedonia, Greece and Albania. It is lying in the tectonic valley between the mountains Baba on the east, Galichica and Petrina Planina on the west and northwest and Suva Gora on the south. The lake occupies an area of

274 km2, 176,8 km2 of what belongs to Macedonia. The level of the lake is at au elevation of 853 m a.s.l. The Prespa Lake, same as Ohrid Lake, was created in Pliocene by tectonic activities. The deepest part of the lake is 54 m deep.

From the phytocoenological point of view, the presence of endemic plant community Lemneto-Spirodeletum polyrrhize aldrovandetosum is the most important.

Considering the fauna, the most important is fish fauna which is composed of 80% endemic species.

The level of the lake has dropped considerably during the last 10 years, which is due to the same reasons noted for Dojran lake - unfavourable hydrological regime and overexploitation of the water by the bordering countries.

The problems of Prespa lake are identical with those of Ohrid lake, but in less extent with the exception of the mineral resources exploitation which is more intensive. Establishing a complete collector systems is a priority for the protection of Prespa lake because the existing one cannot meet the needs of the region.

Since 1994 the strict natural ornithological reserve EZERANI has been promoted with its inclusion on the world Ramsar list and thus, obligating Macedonia, as a full member of this Convention, for undertaking of all measures for protection of the region and through that, of the whole lake.

3. Dojran lake - It is the smallest tectonic lake in Macedonia. The lake is situated in the south-west part of the country and occupies an area of 43,1 km2. The western, larger part (27,3 km2) belongs to The Republic of Macedonia, while the eastern, smaller, part (15,8 km2) belongs to Greece. The lake level is at an elevation of 148 m a.s.l.. It is a shallow lake, the deepest part is only several meters.

The Dojran lake basin was created during the young Pliocene, while the lake in Pleistocene. Actually, the Dojran lake is relict reminder of former Pleistocene Peon lake which was occupying an area of about 127 km2.

The Dojran lake is eutrophic lake, rich on phyto- and zoo-plankton. The blue-green algae (Cyanophyta) are the most abundant in the phyto-plankton. During August and September their biomass is so big, that the whole lake surface is covered by water bloom. Zoo-plankton is represented by 23 Crustacean and several shell species. Due to the high plankton production, Dojran lake is rich with fish species (about 15). Annual catch is about 500.000 kg i.e. I50 kg per ha. This lake is very famous because of the specific way of fishing in "mandri" with the aid of birds. The fish fauna iu Dojran lake is represented with 15 species, four of them being endemic. The presence of freshwater crab (Potamon ibericum) is very significant.

The level of Dojran lake has dropped considerably during the last 10 years. Individual lake zones and groups of species are endangered. Birds were threatened first due to drying up of the reed belt which was the most important nesting place for birds. The littoral zone has undergone the large changes and many algal species, endemic for the lake have vanished. The main reason for these disappearances was extraordinary dry years and over-exploitation of the water for irrigation from both the Macedonian and Greek sides.

Owing to its dimensions, Dojran lake is more susceptible to any ecological changes. Unfortunately, all adverse influences which were mentioned for the Ohrid lake are present in this lake as well, thus, undertaking the same measures for protection is priority, including extension of the collector system and care for its maintenance and regular functioning.

Measures for protection of the three natural lakes in Macedonia

In order to protect the three natural lakes in Macedonia, the following steps should be undertaken:

1. Respecting the existing Laws for protection of these lakes (considering the urbanization, communal waste, coastal zone, exploitation of mineral resources etc.).
2. Respecting the obligations toward UNESCO considering Ohrid Lake.
3. Respecting the obligations of the Ramsar Convention considering Prespa Lake or the EZERANI reserve.
4. Establishing of the special bodies (Council for Protection of the Lakes) for carrying out our country's obligations toward corresponding international organizations as well as the country's own legislation.
5. Improvement of the existing collector systems and care for their correct functioning.
6. Elaborating the feasibility study for re-establishing the natural migration route of the eel (Anguilla anguilla) back to Ohrid lake.

4. The Krushje cave - It is located near the village Zashle, Demir Hisar county.

5. The Slatina cave- It is located at the left bank of the river Slatinska Reka (Makedonski Brod county) at an elevation of 625 m a.s.l.

6. Kalnica - Paleonthological locality rich in vertebrate fossil bones belonging to Pikermian fauna. It is located in Kavadarci county and occupies an area of about 17 ha.

7. Prevalec - This paleonthological locality with the area of about 50 ha is located 4 km on southwest of Titov Veles. The locality represents the first discovery of mammal fossil bones - "pikermian fauna" in Macedonia. The paleonthological find was discovered accidentally by the German researcher Jugman in 1917 during the World War One. The age of the fauna was determined as old Pliocene and numerous mammal genera and species were determined, included are: monkeys, hipparions, giraffes, antelopes, gazelles, deer, mastodons, rhinoceroses wild boars, hyenas etc. Among other species, Mesopithecus pentelici, Hipparion gracile, Tragoceras amaltheus etc. were discovered.

8. Demir Kapija - This is the longest gorge of the river Vardar (19 km). It is passing through limestone and eruptive rocks that are dividing Tikvesh valley on the northwest and Gevgelija-Valandovo valley on the southeast. The entrance in the gorge is especially impressive canyon, 0,9 km in length, with different carstic shapes on its slopes - caves (9): the longest is Bela Voda cave (955 m) crevices, cuttings with steep cliffs etc.

The Demir Kapija gorge is among the richest ornithological reserves in Europe. The rare birds of pray include: griffin vulture (Gyps fulvus), Egyptian vulture (Neophron percnopterus), golden eagle (Aquila chrysaetos), shot-toed eagle (Circaetus gallicus), long-legged buzzard (Buteo rufinus), and different falcons (Falco peregrinus, Falco naumanni). Other rare and

scientifically important bird species are also present in this area. In the Demir Kapija gorge, important mammal, reptile, and insect species are present as well as rare and endemic plant species (Caladonia macedonica, Lilium: heldreichii, Lilium martagon, Kitaibelia vitifolia etc.).

9. Manastir - It is located in the locality "Pulikj" near village Manastir - Mariovo region. It represents an important paleonthological find of vertebrate fossils and macro-flora (Castana ataria, Quercus pseudocactanea, Fagus, Populus, Acer etc.) in volcanogenic- sediment series together with the layer of diatomaceous earth.

10. The cave Mlechnik - It is located on Karaorman mountain, on the slopes faced toward Struga valley, at an elevation of 980 m a.s.l.. It lays under the steep slopes of Mlechnik crest more exactly. The cave is composed of two halls connected by a small hole. In the first hall, at the left side of the entrance, several beautiful columns are present. While on the bottom right side, massive stalagmite are rising next to the entrance to the second hall. Specific types of fauna are living in the cave.

11. Trubarevo - ex situ

12. Karshi Bavchi - It is located on the slopes of Baba hill near Kratovo and represents an interesting formation of volcanic rocks. There are two stems of Pinus silvestris growing at this locality. According to their age and dimensions they are unique in Macedonia.

13. Markovi Kuli - Massive rocks called Markovi Kuli are located in the central part of Macedonia, north of the town of Prilep. They are composed of numerous small denudation shapes dated from the Precambrian age. Their composition is of granite, with shapes representing relief sculptures (peaks, earth pillars, columns, plaques, splieres etc.). The height of separate massifs is over 1000 m.

From the floristic point of view, the presence of endemic plants is important: Asplenium macedonicum Kummerle, Verbascum adenanthum Bornm., Centaurea karamani O. & E. Beher et Wad, Moehringia minutiflora Bornm. and Silene viscariopsis Bornm.. Among the relict plant species, the presence of Isoetes phrygia Boiss. is worth noting.

14. The cave Ubavica (The Beauty) - This cave is the most beautiful, the most attractive, and the richest cave among all caves discovered up to now in Macedonia. It is located on the Bukovikj mountain (Bistra), next to the abandoned road Gostivar-Makedonski Brod. The cave is extremely rich with cave ornaments of various colours, which is a rare phenomenon that takes place during the creation of underground karst shapes. There is an underground water-flow flowing through the cave, sinking into the earth in one of its corridors and appearing out of it as a karst spring. A special beauty of the cave is the "waterfall hall" which is situated at the end of the main corridor (the part of its length, already studied, is 920 m).

The investigation of the cave fauna resulted in the registration of the endemic species Centhophies bukoviki (Karaman 1970).

15. Ostrovo - The locality "Ostrovo" near Trubarevo is a remainder of the former Katlanovo swamp which was meliorated in 1965. This area is protected in order to maintain

this site where a large number of singing birds are staying. It represents the only resting place for migratory birds in the area surrounding Skopje.

16. Duvalo - The object is active post-volcanic appearance, located close to the village Kosel near Ohrid. It is very small crater with diameter of 0,5 m and 30 cm depth, remainder of former volcanic activity. COZ (98,06%) and HZS (0,38%) are fuming out of the crater.

17. Karaslari - That is paleonthological locality located about 3 km on southeast of Titov Veles, near the village Karaslari. The fossil find was discovered in 1973 during the construction of the Titov Veles - Gevgelija highway. According to the discovered fossil mammals (horses, gazelles, giraffes, wild boars, dogs etc.), this locality can be listed among the most known paleonthological finds in the world. The protected area occupies 70 ha.

18. Kale Banjichko - It is paleonthological locality, occupying an area of 100 ha, located near village Banjica, Titov Veles county. The locality represents open geological profile at an elevation of 840 m a.s.l.. It is composed of sediment rock's layers containing characteristic and divers fossil brachiopod, orbitoides, W ell, ammonite etc. fauna.

19. Koleshinski vodopad (Koleshino waterfall) - This waterfall is located on the north slopes of Belasica mountain, in the lower flow of the river Baba, at an elevation of 450 m a.s.l.. It is tectonic by origin, created in the granite rocks. The water is falling from 13,80 m height. Above this waterfall at about 100 m distance, several other waterfalls are presented, distributed in the line, with 2-4 m height.

20. Zvegor - It is located on the northeast of the village Zvegor at the locality called "Ilin Kamen" - Delchevo County. The protected area occupies an area of 75 ha. It represent the characteristic geological profile, an, example for the processes which have been carried out during different geological periods.

21. Konopishte - Near the village Konopishte, 1,5 km on the south of Kavadarci, very interesting geomorphological object is present - natural appearance of earth columns (earth pyramids). They are extraordinary interesting and very rare forms of intensive soil erosion. The locality occupies an area of 75 ha. The object is located in a short dry stream on the right side of the river Boshava, at an elevation of 740 m a.s.l.. It is the witness of the historic-geological processes, characteristic for this region and broader, and especially for the complex volcanic activity of the Kozhuv Mountain (Pliocene and Pleistocene).

22. Murite - It is located at the locality called "Murite" on Maleshevo Mountains, at an elevation of 1200-1400 m a.s.l.. The object represent the mixed forest stand composed of fir (Abies alba), beech (Fagus moesiaca), Pinus silvestris and spruce (Picea sxcelsa). The presence of 4 tree species on the relatively small area was the most important point for recognising of this object as a protected area, as well as the fact that spruce is here at its the most southern and the most eastern border of its areal.

23. Konjska Reka - The stand of "naked man" (Arbutus andrachne) is under protection. It is located along the flow of the river Konjska Reka at an elevation of 300 m a.s.l., about 3 km far on the northwest of the village Gornichet, Gevgelija County.

24. Skopska tvrdina (Skopje fortress) - At the west side of the Skopje fortress, the paleontological locality is located with the find of preserved invertebrate and vertebrate fossil fauna with the special geological-paleonthological characteristics. It occupies an area of 6750 m2.

25. Vevchanski izvori (Vevchani springs) - They represent pseudoperiodic siphon springs which are rare in Macedonia. They are located on the east slopes of Jablanica mountain near the village Vevchani, at an elevation of 900 m a.s.l. The main spring is situated in the hole of a cave and during the summer months it is dried up. Located about 10 m lower are several constant springs which interact with the main spring by an underground connection. The quantity of water coming forth during the humid period of the year is about 1500 ls-1.

26. Mokrino - The object is located on the north slopes of Belasica mountain, near the village Mokrino. It represents a well preserved stand of very old plane (Platanus orientalis) stems with the special habitues characteristics concerning the dimensions.

27. Mokrievo - It is located on the Belasica mountain at the locality called "Volovarnik" on the south-east of the village Mokrievo. This area is valuable because of the beech stand at this locality which bares marks of a real virgin forest.

28. Katlanovska Banja (Katianovo Spa) - This area is located 27 km to the south of Skopje, at the place where the river Pchinja is passing through Katlanovo hill and creating a short but very beautiful gorge. The visible tectonic fissure which is about 350 m long, makes this monument of nature particularly important. Mineral water springs containing water rich in gasses are present at many places. The water is coming forth in periodical pulsing (fumaroles) and is of juvenile (volcanic) origin. The preserved connection between thermal water and tectonic fissure is of special importance in respect to the Katlanovo Spa; a rarity not only in the Balkan Peninsula, but also in the whole of Europe.

29. Matka canyon - The locality, 15 km south-west of Skopje, represents a gorge break-through along the lower flow of the river Treska. Owing to the fact that the gorge is one of the biggest refugium centres from the glaciation period, a large number of relict and endemic plant and animal species are present there.

Twenty percent of 1000 plant species are endemic or relict.

Among the tertiary relicts, some of the more important are: Viola kosanini and Ramonda nathaliae. At locality of Matka two new spider species (Macedoniella karamani Drenski and Mesiotelus cypris skopjensis Drenski) and five pseudoscorpions (Chithorzius tenuickelatus, Ch. troglobius, Ephipiosthonius tulierculatus, E. microtuberculatus, Neochtthonius karamanianus and Artemnus balcanicus) have been discovered. One hundred and nineteen day-butterfly species and 140 night-butterfly species have been registered in the canyon. In the Matka canyon 77 Microlepidoptera species, Balkan endemites are present and 18 more have been described as new for the science.

INDIVIDUAL PLANT AND ANIMAL SPECIES OUTSIDE OF NATURAL RESERVES

1. Garska Reka **- wild chestnut *(Aesculus hypocastanum)* reserve with the area around 2 ha. It is located along the river Garska Reka flow, south-west of the Crn Vrv peak (1501 m a.s.l.), close to the village Lazaropole. Individual autochthonous stems as well as stems in smaller or larger groups are protected.**

2. Drenachka Reka **- wild chestnut *(Aesculus hypocastanum)* reserve with the area around 2 ha. It is located along the river Drenachka Reka flow, east of the village Drenak (Debar County).**

3. Suvi Dol **- wild chestnut *(Aesculus hypocastanum)* reserve with the area around 287 ha. It is located near village Klenoec. The Aesculus stand alone is represented by 4000-5000 stems occupying area of about 25-30 ha.**

4. Iberliska Reka **- plane *(Platanus orientalis L.)* reserve. It is located along the river Iberliska Reka flow, between the villages Iberlija and Chelevec (Demir Kapija region). The reserve occupies 25 ha area. The forest is of a native origin and is well preserved.**

5. Menkova Livada **- Black pine *(Pinus nigra Arm.)* reserve. It is located in the "Menkova Livada" locality - Mariovo, in the 59-tli section of Rozhden forests. It occupies the area of 3,5 ha.**

6. Tumba **- beech and fir *(Fagus moesiaca Maly and Abies alba Miller)* reserve. It is located at the locality called "Tumba" in Mariovo forests - section 45, next to the Greek and Macedonian border. It occupies the area of 5 ha.**

7. Golem Kozjak **- *Pinus silvestris L.* reserve. It is located at the spring's area of the river Bistrichka Reka, bellow the Golem Kozjak peak, section 45 - Mariovo. Concerning the area and the wood quality this forest is rare case in our country. It occupies the area of 4 ha.**

8. Katlanovski Blato (Katlanovo swamp) **- ichtio-ornithological reserve close to Skopje occupying the area of 70 ha. This swamp is the remainder of the former Skopje Neogene Lake. Until 1968 it was representing the only natural spawning place of carp and other fresh water fish species from the river Vardar. It was the most important resting place for large number of migratory birds, from and to Europe, along the Morava-Vardar migration direction.**

9. Popova Shapka **- spruce *(Picea excelsa L.)* reserve. The reserve is located at the tourist centre "Popova Shapka on Shara Mountain. It occupies the area of 5,2 ha.**

10. Rupa **- fir *(Abies alba Mill.)* reserve. It is located on the Baba Mountain, at the locality called "Rupa". The reserve is in the frame of economic unit Brajchino I. It occupies the area of 7,6 ha.**

11. Neprtka **- birch *(Betula verrucosa Erhr.)* reserve. The reserve is composed of two stands located on the Baba Mountain at the localities "Neprtka" and "Kalojzana". These stands are representing the southernmost part of birch areal in Macedonia.**

12. Kalojzana **- beech *(Fagus moesiaca Ozeczott)* reserve. It is located on Baba Mountain, at the locality called "Kalojzana" - Resen county. The reserve is in the Frame of economic unit Brajchino I. It occupies the area of 5 ha.**

13. Cham Chiflik **- Crimean pine *(Pinus pallasiana Lamb.)* reserve. It is located at 2,5 km on the south of Strumica, toward village Popchevo and the lake Vodocha, at the Cham Chiflik locality. It occupies the area of 428 ha.**

14. Ruchica **- *Pinus mugo Turr.* reserve. It is located on Jakupica Mountain, on the north of Solunska Glava peak at the locality "Ruchica", at au elevation of 1500-2000 m a.s.l. This reserve was proposed for protection because of the only one preserved compact stand of this pine in Macedonia. It represents tie south border of its areal on Balkan Peninsula. The surface of the protected area is 1000 ha.**

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State Institutions

Special Institutions

Macedonian Institute for Water Economy, Skopje
State Hydrometeorological Institute, Skopje

Inspectorates

State Inspectorate for Environment, Skopje

Institutions for Protected Areas Protection

Main Office for National Parks and Hunting Reserves in the Republic of Macedonia, Skopje
Administration Office of the NP "Mavrovo", Gostivar
Administration Office of the NP "Pelister", Bitola
Administration Office of the NP "Galichica", Ohrid

Non-govermental Organizations

Other Organizations

ZOO "Skopje", Skopje
Botanic Garden, Faculty of Science, Skopje

Basic laws

The Law for Protection of Natural Rarities
The Law for Protection of Ohrid, Prespa and Dojran Lakes
The Law for Protection of National Parks

The laws for close fields

The Law for Regional and Urban Planing
The Law for Forests
The Law for Waters
The Law for Fishing
The Law for Hunting
The Law for Management and Use of Pastures and Abandoned Fields and Meadows
The Law for Geological Investigations and Exploitation of Mineral Resources
The Law for Construction of Investment Objects

International legislative

A. International dokuments ratificed from the Republic of Macedonia

Agreement on the conservation of African-Euroasian migratory waterrbirds Concluded at Haque on 16 June 1995. Adopted the Law on ratification, "The Official Gazette of R. M." 32/1999.
Agreement on the conservation of bats in Europe, (EUROBATS) Concluded at London on 4 December 1991. Adopted the Law on ratification, "The Official Gazette of R. M." 38/1999.
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer Adopted at the Second Meeting of the Parties at London on 29 June 1990.
Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer Adopted at the Fourth Meeting of the Parties at Copenhagen on 25 November 1992.
Basel Convention on the Control of Transboundary Movements of Hazard Waste and their Disposal Concluded at Basel on 22 March 1989 Adopted the Law on ratification, "The Official Gazette of The R. M." 49/1997. **Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Waste sand Their Disposal** Concluded at Basel on 22 March 1989. Adopted at the Third Meeting of the Conference of the Contracting Parties at Genova on 22 September 1995. Non ratification.
Convention for the protection of the world cultural and natural heritage Concluded at Paris on 23 November 1972 Adopted the Regulation on ratification, "The Official Gazette of SFRJ" 56/74. R. M. to come to these Convention with succetion act on 9 September 1991, wich diplomatic note of FA of R. M. at 1997.
Convention on Biological Diversity. Opened for signature at Rio de Janeiro on 5 June 1992 Adopted the Law on ratification, "The Official Gazette of R. M. " 54/1997.
Convention on Environment Impact Assessment in a Transboundary Context (ESPO) Concluded at Helsinki at Espo (Finland) on 25 February 1991.

Adopted the Law on ratification, "The Official Gazette of the R. M." 44/1999.
Convention on international trade in endangered species of wild fauna and flora (CITES) Concluded at Washington on 3 March 1973.
Convention on the Conservation of European wildlife and Natural Hebitats Concluded at Bern on 19 September 1979 Adopted the Law on ratification, "The Official Gazette of R. M. " 49/1997.
Convention on the conservation of migratory species of wild animals Concluded at Bonn on 23 June 1979. Adopted the Law on ratification, "The Official Gazette of R. M." 38 /1999.
Convention on Wetlands of international importance, especially as waterfowl habitat Concluded at Ramsar on 2 February 1971 Adopted the Regulation on ratification, "The Official Gazette of SFRJ" 9/1977. R. M. to come to these Convention with succetion act and with nomination the Prespa Lake in Ramsar-Side on 3 May 1995. These Convention is actually for R.M. on 9 September 1991.
Conventuon on Long-range Transboundary Air Pollution Concluded at Geneva on 13 November 1979 Adopted the Law on ratification, "The Official Gazette of SFRJ" 11/86.
Montreal Protocol on Substances that Deplete the Ozone Layer Concluded at Montreal on 16 September 1987
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Long-Ter Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-Rang Transmission of Air Pollutants in Europe Concluded at Geneva on 28 September 1984. Adopted the Law on ratification, "The Official Gazette of SFRJ" 2/87.
United Nations Framework Convention on Climate Change Concluded at New York on 9 May 1992 Adopted the Law on ratification, "The Official Gazette of R. Macedonia " 6/97.
Vienna Convention for the Protection of the Ozone Layer Concluded at Vienna on 22 March 1985 Adopted the Law on ratification, "The Official Gazette of SFRJ" 1/1990.

B. International documents for ratification

Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas. Opened for signature at New York on 17 March 1992. Non ratification.
Convention on the Law of the Non-Navigational Uses of International Watercourses Adopted by the General Assembly of the United Nations on 21 May 1997 Non ratification.
Convention on the Protection and Use of Transboundary Watercourses an International Lakes Concluded at Helsinki on 17 March 1992. Non ratification.
Convention on the Transboundary Effects of Industrial Accidents Concluded at Helsinki on 17 March 1992. Non ratification.
European Convention for the protection of pet animals

Concluded at Strazbourg on 13 November 1987. Non ratification.
European Convention for the protection of Vertebrate animals used for experimental and other scientific purposes Concluded at Strazbourg on 18 March 1986. Non ratification.
Lusaka Agreement on Co-operative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora Adopted at the Ministerial Meeting at Lusaka on 08.09.1994. Non ratification.
Protocol of Amendment to the European Convention for the protection of Vertebrate Animals used for Experimental and other Scientific Purposes Adoptet at Strasbourg on 26 June 1998. Non ratification.
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 % Concluded at Helsinki on 8 July 1985. No ratification.
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Nitogen Oxides or their Transboundary Fluxes Concluded at Sofia on 31 October 1988. No ratification.
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes Concluded at Geneva on 18 November 1991. No ratification.
Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Furthe Reduction of Sulphur Emissions Concluded at Oslo on 14 June 1994. No ratification.
United Nations Convention to Combat Desertification in those Countries Experiencin Serious Drought and/or Desertification, Particularly in Africa Opened for signature at Paris on 14 October 1994. Non ratification.