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Introductory Report on Nature Conservation in Montenegro

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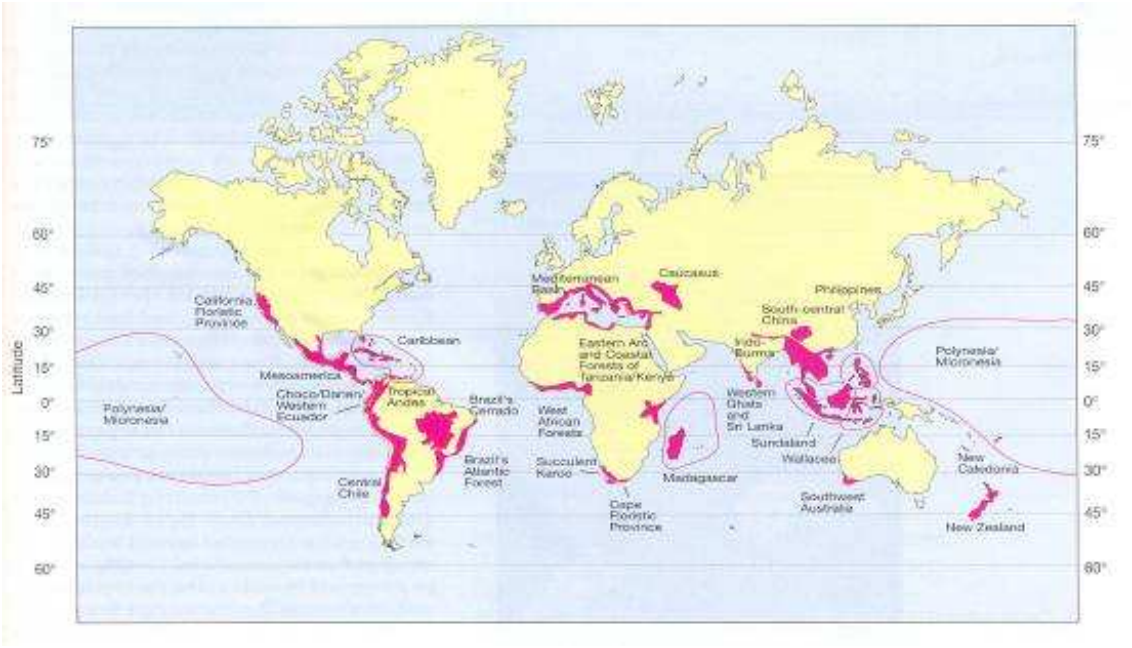
PART I -BACKGROUND INFORMATION

1. Biodiversity

Montenegro's diversity of geology, landscapes, climate types and soils, and its position on the Balkan Peninsula and Adriatic Sea, have created conditions for the development of a highly diverse biodiversity, making Montenegro one of the biodiversity "hot-spots" of Europe and the world (see ECNC map bellow).



Montenegro can be divided into two main bio-geographical regions – Mediterranean and Alpine - and has a very wide range of ecosystems and habitat types for a country of its size. There is a zonation of flora and fauna from the cold mountainous north and south to the warm Mediterranean coast in the west. Additionally, biodiversity is influenced by the presence of elements of Alpine flora and fauna on the tops of coastal mountains and the intrusion of warm air and elements of Mediterranean flora and fauna through river valleys and canyons into the mountains in the continental part of Montenegro. The northern mountain region is bio-geographically connected with other mountain habitats in the Dinaric Alp mountain corridor[1].

During the last Ice Age, a significant part of today flora and fauna in Montenegro survive the glaciations that impacted countries further to the north. In Montenegro biodiversity are present not only remnants of the glacial flora and fauna (the so-called glacial relicts) but also remnants of older Tertiary flora and fauna in the sheltered warm river valleys and canyons. Due to the refugia character of these "sheltered" habitats, there is a considerable endemism[2] in Montenegro with dominant Central European, Iliric, Alpine and Mediterranean elements to the flora and fauna.

1.1 Diversity of ecosystems

Although there is no formal, widely recognized classification of ecosystems in Montenegro, from the point of view of biodiversity conservation the following ecosystems are distinguished in the NBSAP: alpine, forest, dry grasslands, freshwater and marine. Apart from these, there are additional types/systems of habitats considered important for biodiversity protection that are also distinguished from the previous classification of ecosystems because of their distinctiveness, namely coastal habitats, karst, caves and canyons.

[1] South-eastern Dinarides, sometimes called „Dinaric Arc" that is a wider, regional, Dinaric bio-corridor which stretches from the Alps in the north-west to the Šar-Pind area in the south-east that runs parallel with the Adriatic Coast.

[2] For instance, 223 endemic plant species and sub-species are registered for Montenegro.

Alpine ecosystem

This incorporates the peaks of the high mountain regions in the continental part of the country, such as Durmitor (2523m), Komovi (2461m), Prokletije (2536m), Sinjavina (2277m) and Bjelasica (2037m) mountain ranges, and the high coastal mountains of Orijen (1893m), Lovcen (1749m) and Rumija (1586m). Climate conditions are characterized by cool short summers and severe winters with abundant snow. In terms of vertical distribution, this ecosystem is above the upper forest line and includes the following major habitat types: alpine pastures, cliffs, screes and rocky areas with sparse vegetation. Characteristic flora of this are includes: the Alpine flower Edelweiss (*Leontopodium alpinum)*, and the endemic Montenegrin blue-bell (*Edraianthus montenegrinus), Edraianthus glisichi, Edraianthus pulevici, Wulfenia blecicii*, Durmitor mullein (*Verbascum durmitoreum), Potentilla montenegrina, Draba betriscea*, and many relict glacial species. Characteristic fauna include chamois (*Rupicapra rupicapra*) while in the bird fauna are *Pyrhocorax graculus, Antus pratensis, Prunella collaris, Phoenicurus ochruros*, Golden Eagle (*Aquila chrysaetos*), rare Griffon Vulture (*Gyps fulvus)*, Wall Creeper *(Tichodroma muraria).* There are also a number of glacial relicts among the bird fauna, including Snow Finch (*Montifringilla nivalis),* Horned Lark (*Eremophila alpestris)* and Alpine Accentor (*Prunella collaris).*

Forest ecosystem

Mountain forests are the most extensive ecosystem in Montenegro in terms of area, and the forests occupy 54% of the territory (this includes natural forests which cover approximately 45% of the land), making Montenegro one of the most forested countries in Europe (see Map of Forest ecosystems).

Coniferous species, largely Fir *Abies alba,* Spruce *Picea excelsa* and Mugho Pine *Pinus mugo,* dominate in the forests of higher altitude.

Abieto-Picetum forests occupy a wide area of the mountains in northern Montenegro in the zones of Kovač, Ljubišnja, Durmitor, Sinjajevina, Krstac, Smiljevica and Hajla mountains, as well as in enclave forms in Prokletije, Bjelasica, Maglić and other mountains. Important forest is *Picetum abieti montenegrinum,* a Spruce community in Mount Ljubisnja.

Forests with the regionally endemic pine species are also present such as Macedonian Pine and Heldreich (Whitebark) Pine. Macedonian Pine *Pinus peuce* occur in Štitovo, parts of Komovi, in Prokletije and in some other Montenegrin mountains, while Whitebark Pine *Pinus heldreichii* also occurs, largely in the central parts of Montenegro. Another Balkan endemic species which occurs in the high-mountain forests is the Mountain Maple *Acer heldreichii,* which can be found in several locations in the upper forest zone at Durmitor.

Deciduous forests in the higher areas consist mostly of Beech *Fagetum* forests, which are widespread at altitudes of 700 - 1.800m. Chestnut forests *Castanea sativa* form a special type of habitat in the (sub)Mediterranean part of Montenegro but with discontinuous distribution (in several places the Boka Kotot Bay, northern slopes of the Mt. Rumija-Ostros, Livari). Macquis, as a degraded forest in the Mediterranean part of Montenegro, is also shelter for specific tree species such as Evergreen Oak *Quercus ilex.*

Characteristic fauna of forests in Montenegro includes the Wolf *Canis lupus*, Brown Bear *Ursus arctos,* and Wild Boar *Sus scrofa,* along with many species of birds such as Owls (*Strigiformes*), Woodpeckers (*Picidae*) and species of Warbler (*Sylviidae*), with most of the forest avifauna of the Western Palaearctic represented. Despite logging, some forest areas, such as Durmitor, Bjelasica and Prokletije, still retain relatively pristine forests and are under protection.

Dry grasslands ecosystem

Dry grasslands are found on alluvial land but are now very rare. Small remnant areas still exist at Ćemovsko polje, including Karabuško, Tuško and Dinoško polje and the lower part of the canyon of the River Cijevna.

Concerning typical birds, in these areas are present Stone Curlew *Burchinus oedicnemus* and Tawny Pipit *Anthis campestris*

Freshwater ecosystems

These comprise lakes, rivers, streams, marshes, and man-made reservoirs, flooded meadows and riverine forests. Wetland habitats occur in the lowlands and along the coast. Skadar Lake that is shared with Albania is the largest[3], with a surface area that varies between 354 and 505 km^2, depending on the water level. According to the new research, Skadar Lake is estimated as a refuge for many species survived the glaciations. Consequently Skadar Lake and its vicinity are rich in relict and endemic animal and plant species. This is relatively shallow lake (6m average depth) with dominant Reedbed *Phragmites communis*, Water Lilies *Nymphea alba* and *Nuphar luteum*, Water Calltrop *Trapa natans*, but also includes flooded meadows, and flooded forests. In some areas near to northern Lake shore are still present forest fragments of Skadar oak *Quercus robur scutariensis*. The southern coast and islets are steep, rocky, with sparse sub-Mediterranean pseudo-macquis (*Carpinus orientals*, Pomegranate *Punica granatum, Paliurus spina-christi*, Fig *Ficus carica, Phillyrea sp.*). The Lake hosts some rather unusual flora such as algae from the families of *Chara* and *Nitelopsis*, the carnivorous Bladderwort *Utricularia* spp. and various species of Orchids. The Lake supports over 40 species of fish (economically the most valuable ones are Carp *Cyprinus carpio* and Bleak *Alburnus alburnus).*

*O*ver 270 species of birds have been recorded from the site, which supports large populations of breeding and wintering waterbirds, including the largest population of Pygmy cormorant *Phalacrocorax pygmeus* in Montenegro as well as the globally threatened Dalmatian Pelican *Pelecanus crispus*. It is also an important 'stop-over' for migrating birds traveling along the Adriatic Flyway from breeding areas in Central Europe to their wintering station further south and east in the Mediterranean and Africa. The biodiversity of Lake Skadar is among the most investigated in Montenegro. Other important lowland wetlands include Šasko Lake, which is another relatively small shallow lake with well-developed macrophyte vegetation situated above the Ulcinj plain.

There are also a number of important cold, high-mountain glacial lakes, particularly in Durmitor, Biogradska gora and Prokletije mountains[4] - national parks, which are poor in nutrients (particularly nitrogen and phosphorus) and often surrounded by peat bogs, which have their own specialized flora and fauna, including a neotenic form of the crested newt *Triturus alpestris*. Barno Lake at Durmitor is specific because of its mountain mire (peat) vegetation.

Marine ecosystems

Montenegro's maritime zone extends out to 12 nautical miles from the shore, covers 2,500 km^2, and reaches a maximum depth of 1,233m. The width of the continental shelf (up to 200m deep) varies along the coast of Montenegro, extending to 9.5 nautical miles at the entrance of the Bay of Kotor, and 34 nautical miles at the River Bojana estuary.

Algae, both planctonic and seaweeds are the characteristic vegetation of Montenegrin coast, which supports extensive Seagrass *Posidonia oceanica* and *Cymodocea nodosa* beds. These plants serve as nursery shelter areas for many larvae and juvenile forms of marine fauna.

[3] Largest in MNE and in the Balkans

[4] Durmitor mountain lakes - Crno jezero, Vražje, Zmijsko; the Bjelasica mountain lakes- Šiško and Pešića lake; Prokletije mountain and the Visitor mountain lakes - Visitorsko, Ridsko and Plavsko; Lukavica mountain - Kapetanovo lake; in Volujak / Bioc: Stabanjska lakes and Trnovacko lake

The fauna of the Adriatic Sea has not been fully investigated yet, but according to recent data[5] there are over 300 species of algae, 40 species of sponges, 150 species of crustaceans, 340 species of mollusks, and almost 400 species of fish, with 3 species of marine turtles and 4 species of dolphins in the Adriatic. Several species of whales are also occasional visitors. Most of the known species are distributed along the littoral zone (up to 200m deep), but some of them are found in transition zone to the bathyal zone (200-300m deep), such as the economically important Norway lobster *Nephrops norvegicus* and petrified sponge (*Thenea muricata).*

Major areas for biodiversity include the area around Boka Kotorska Bay, which is an important spawning site and probably the best-studied area biologically, and has a number of rare species such as the mollusks *Tijsira orahoviciana* and *Mitra zonata*. Bojana estuary is important nutrition place for migratory birds.

Coastal/littoral ecosystems

The Montenegrin coast is 313km in length and characterized by rocky cliffs with 117 natural sandy and rocky beaches situated in between, and has 8 small islands. The longest beach is at Ulcinj, which is over 12 km long, and in places fringed with sand and gravel dunes with halophyte vegetation. The hinterland is covered with typical Mediterranean *macquis, garrigue* and degraded evergreen woodland that extends up the southern slopes of some coastal mountains, but also has Salinas and saltpans and agricultural areas of largely olive groves and citrus fruit orchards. Characteristic vegetation includes typical Mediterranean species such as Evergreen Oak *Quercus ilex*, Kermes Oak *Quercus coccifera*, Viburnum *Viburnum tinus*, Holly *Phillyrea media*, Coastal Juniper *Juniperus oxycedrus*, Big Heath *Erica arborea*, Evergreen Pistachio *Pistacia lentiscus*, Strawberry tree *Arbutus unedo*, Rockrose *Cistus villosus* and *Cistus salviaefolius*, Spanish Broom *Spartium junceum*, Myrtle *Myrtus communis*, Olive *Olea europea*, Smilace *Smilax aspera*, Blackberry *Rubus ulmifolius*, Flowering Ash *Fraxinus ornus*, Fig *Ficus* spp, and Hornbeam *Carpinus* spp., and range of medicinal plants such as Sage *Salvia officinalis* and Laurel *Laurus nobilis*. Some rare and endemic species with limited range of distribution are also present here, including Skadar Oak *Quercus robur* spp. *scutariensis*, as well as some unusual associations, e.g. *Andropogoni – Nerietum* above the well Sopot near Risan. The commercial salt works at Ulcinj together with the neighboring salinas and lagoons comprise an important over-wintering area for waterbirds.

Karst

Montenegro's karst region lies generally at elevations of 1000 meters above sea level, although some areas rise to 1,900m such as Mount Orjen (1,894m), the highest massif among the coastal limestone ranges. The vegetation, characterized by thicket/shrubs of White Hornbeam (*Carpinus betulus*), Black Hornbeam (*Ostrya carpinifolia*), Macedonian Oak tree (*Quercus trojana*), Downy Oak (Quercus pubescens), and herbaceous vegetation with large areas dominated Sage, is generally poor but has numerous endemic forms. Typical bird fauna include Rock Partridge (*Alectoris graeca),* Rock Thrush (*Monticola saxatilis),* Blue Rock Thrush *(Monticola solitarius),* Rock Nuthatch *(Sitta neumayer),* Mediterranean Wheatear *(Oenanthe hispanica),* Whitethroat (*Sylvia communis)* and Orphean Warbler *Sylvia hortensis.* However, the most characteristic animals of the Mediterranean karst region are the reptiles, which show extensive endemism, especially among lizards and snakes.

Caves

Due to its geology, Montenegro has numerous caves and sinkholes, some of which are particularly beautiful (e.g. Lipska cave, Đalovica cave), while others are among the deepest in the Balkans (e.g. sink holes at Vjetrena brda in Durmitor, Duboki do in Lovćen).

[5] In: Regner, S., Vukanic, D., Vuksanovic, N., Jerkovic, L., Kljajic, Z., Mandic, S., Macic, V., Milojevic, S., Radovic, I. & Regner, D., 2003: Geneticki resursi morskih organizama. Jugoslovenska inzenjerska akademija, Bulletin no. 1., Belgrade

In many cases, they have an exceptionally complex and rich fauna, with many endemic and relict (particularly Tertiary) forms, especially in the south of the country and especially among invertebrate groups.

Canyons

Canyons also occur throughout Montenegro, and can have a Mediterranean (canyons of Morača and Cijevna rivers) or continental (Tara river canyon, remains of Piva and Komarnica canyons, gorges like Ibarska, Tifranska and Đalovića) climate, and have very different, very often endemic, species assemblages to their neighboring mountain areas.

The Tara River canyon – maximum depth of 1,300m is the deepest canyon in Europe and second deepest in the world (after the Colorado River Grand Canyon in the USA).

1.2 Diversity of species

Montenegro has a high biological diversity for such a small European country, due to its geographic position, heterogenic distribution of habitats, topographic variations, geological history and climate conditions.

Basic knowledge about the diversity of many plant and animal taxa is very limited, including disagreements about taxonomic status of some taxa – whether they are species or subspecies.

Algae - Freshwater algae

Freshwater algae of Montenegro exhibit high diversity – 1,200 species and varieties have been described so far with silicate algae (*Bacillariophyta*) and green algae being the predominant groups. The freshwater systems they inhabit differ in conditions, with the northern lakes and rivers being oligotrophic and supporting relatively few species (silicate algae dominate, particularly *Asterionella formosa* and species of the families *Cyclotella*, *Fragillaria* and *Synedra*), while those in the south are generally mesotrophic to eutrophic and are richer in species of algae.

Most significant site for algae in Montenegro is Skadar Lake, the largest freshwater basin in the Balkans, whose meso- to eutrophic waters supports a very high biomass of planctonic, benthic and epiphytic algae. Some 1,093 taxa are known from the Lake, of which more than 700 have not been recorded elsewhere in Montenegro. One algal species - *Cyclotella skadariensis* – is believed to be endemic to Skadar Lake. Other lakes in Montenegro are known to support significant diversity of algae, including Crno (195 species), Bukumirsko (190), Ridsko (183), Plavsko (182), Zminje (180), Šasko (138), and Veliko i Malo Stabanjsko (138). The man-made reservoir Krupačko also supports a good diversity of algae (130 species). The algae flora of rivers in Montenegro is less well studied and taxonomic lists exist only for the Tara River (221 taxa) and the Morača River (214 taxa) systems.

Algae - Marine algae

Over 300 species of macro algae have been recorded in Montenegrin waters (although there are likely to be many more), the majority of which are red algae (*Rhodophyta),* comprising 202 (66.5%) of recorded species in spring and summer surveys, followed by *Phaeophyceae* (60 taxa, 19.7%) and *Chlorophyceae* (42 taxa, 13.8%). Most of these species are widespread in the Atlantic and Mediterranean seas (Atlantic-Mediterranean 57.5%, Mediterranean endemic 26.1%), and only 4.3% are endemic to the Adriatic Sea

Mosses and Liverworts (Bryophytes) and Lichens

Currently, 589 species of Bryophytes are recorded for Montenegro, comprising 483 species of Mosses and 106 of Liverworts. This is less than most of the surrounding countries, but is probably a reflection of limited research on these groups and many more species are likely to be recorded from Montenegro. The largest numbers of species are associated with forests of Beech *Fagus* spp., Hornbeam *Carpinus* spp., Oak *Quercus* spp. and Plane Tree *Acer monspessulanum.* With an increase in altitude and change of forest type the diversity of mosses decreases. Mosses are also associated with watercourses and are particularly diverse in peat bogs in Montenegro (e.g. at Barno lake, Prokletije

mts) where 13 species of *Sphagnum* mosses have been recorded. Lichens are also poorly known from Montenegro with 693 species recorded[6].

Vascular plants (higher plants)

The Balkan Peninsula, which includes Montenegro, is the most diverse part of Europe in terms of vascular plants, with 7,000-8,000 species recorded. Montenegro, with 3,250 species, is floristically one of the most diverse areas. As part of Balkan, country[7] is one of 153 bio-centers that are globally important for floristic diversity. The number of endemics is also high - there are as many as 392 Balkan (regional) Endemic species, which accounts for over 7% of the Montenegrin flora. Apart from these, even local Endemic species have significant importance - there are 46 of these in Montenegro, mostly Tertiary Relicts. Families of vascular plants with the largest number of species in Montenegro are the *Asteraceae* (307 taxa), *Poaceae* (263), *Fabaceae* (233), and *Caryophyllaceae* (151).

Fungi

Around 2,000 species of fungi (over 1,000 Micromycete species and approximately 920 Macromycete species) have been recorded for Montenegro, although it has been estimated that between 15,000 and 21,000 species could occur, of which around 4,500 would be Macromycetes. If so this number of species would represent about half of the number of species recorded for Europe[8]. The key macromycete groups are: *Agaricales* (321 known species), *Aphyllophorales* (221), *Ascomycota* (141), *Boletales* (69), *Gasteromycetes* (47), and *Russulales* (91).

Invertebrates- terrestrial and freshwater aquatic invertebrates

Terrestrial invertebrates are a very large group of animals with many phyla, most of which have been poorly studied in Montenegro. As a result, comprehensive species check-lists and even widely accepted approximations of species numbers are lacking (although species lists exist for some sites, principally Skadar Lake). This holds even for those phyla whose members are important from the point of view of human health (e.g. Protozoans, Nematodes, Flukes, Flatworms, Leeches). To date, the best-studied phyla include Mollusks *Mollusca* with 323 recorded species and 136 Land Snail species considered of international importance, mostly Endemic species), Segmented Worms (*Oligochaeta* - with 27 recorded species) and Arthropods (*Arthropoda* – with an estimated 16,000-20,000 species, although some estimations put the number of >25,000 Insects only). Reseraches of these groups suggest that they are of high levels of endemism as well as high species diversity.

Many are relict species, particularly from the Tertiary period, and include the 'living fossil' *Congeria kusceri* - the only known subterranean Bivalve Mollusk - from a genus thought to be extinct since the Miocene (23 to 5.3 million years before the present). Particularly significant cave sites for endemic invertebrates include: Lipska cave (endemic genera of Amphipod *Typhlogammarus*, endemic species of Snails and Copepod), Bobotuša cave near Trnovo (endemic species of Copepod, Harvestman (*Opiliones*), and Beetle), Obodska cave (endemic species of Beetle, Amphipod and Snails) and Megara cave near to Podgorica (endemic species of Beetle and Harvestman).

Invertebrates - marine invertebrates

The existing data suggest a relatively high diversity, although low endemism (in common with the rest of Adriatic Sea). For instance, some 50% (50/101 species) of all the Echinoderms (*Echinodermata*) occurring in the Adriatic Sea are recorded for Montenegro, 127 species of bivalves have been reported from the inner part of Boka Bay (Kotor-Risan Bay) with an estimated 250-300 species in Montenegrin waters, and 17 species of cephalopod (*Sepia officinalis, Sepia elegans, Sepia*

[6] According to: Knežević & Mayrhofer (2009): Catalogue of the Lichenized and Lichenicolous fungi of Montenegro. Phyton, Wienn

[7] With 3 sub-centers of mountain flora: I. Sub-center of Coastal – Adriatic Dinarides: Orjen mt, Njeguške mts, Lovćen mt., Rumija mt, II. Sub-Center of Durmitor mt group: Bioč mt, Durmitor mt, Sinjavina mt, Vojnik mt, Ljubišnja mt and III. Sub-Center of Prokletije mt group: Bjelasica mt, Komovi mt, Prokletije mt

[8] According to asom, G., 2008: *Prilog o gljivama za Studiju o biološkom diverzitetu*, (Country Study 2008, NBSAP 2010).

orbignyana, Sepietta oweniana, Sepiola rondeleti, Illex coindetii, Loligo vulgaris, Octopus vulgaris, Octopus salutii, Eledone moschata, Eledone cirros, Alloteuthis media, Rossia macrosoma, Scaeurgus uncirrhus, Pteroctopus tetracirrhus and *Todarodes sagitatus)* have been recorded on the open part of the Montenegrin coast.

Commercially exploited species include Squid (*Loligo vulgaris*) and Cuttlefish (*Sepia officinalis*), which comprise the majority of the Cephalopod catch in Montenegrin waters, as well as species of crab and shrimp (*Crustacea*), e.g. the Shrimp *Parapenaeus longirostris*, and several Bivalve species (*Mollusca*). However, despite their commercial importance, the ecology of these groups is still rather poorly known.

Fish - Freshwater fish

The freshwater systems of Montenegro belong to two basins – the Black Sea, in which some 30 fish species have been recorded, and the Adriatic Sea, with 60 fish species. This disparity is because the southern regions draining into the Adriatic coast survived the last Glaciation and provided a Refugium for many freshwater species. Consequently, the number of endemic species and the overall levels of genetic diversity in the region, particularly in Adriatic watershed, are high.

Typical species of fast mountain rivers waters include salmonids (*Salmo trutta / faroides, Salmo dentex, Thymallus thymallus),* as well as cyprinids such as Barbell (*Gobio gobio, Barbus meridionalis,* and *Barbus barbus).* Fish of the middle river stretches (moderately fast courses) are mostly all cyprinids (*Rutilus, Leuciscus, Phoxinus, Chondrostoma, etc*) but some salmonid species, including rare endemic trout *Salmothymus obtusirostris zetensis,* are present as well. Still water (lake, ponds) fishes are also cyprinids along with fish from the orders *Cyprinus, Carpio, Leuciscus, Alburnus etc.* Characteristic estuarine and brackish water species include, apart from several cyprinid species, species from orders *Mugil, Dicentrarchus, Blennius, Platichthis, Anguilla, Alossa* etc.

Among the country's most important sites for freshwater fishes is Skadar Lake, which supports more than 40 fish species, including species that migrate between marine and freshwater systems, such as the Eel (*Anguilla anguilla),* Twaite Shad *(Alossa falax nilotica)* etc.

Fish - Marine fish

The marine fish fauna of the Adriatic Sea is considered diverse with 117 recorded families, but has a low level of endemism. To date, 407[9] species have been recorded for Montenegro, which represents around 70% of that recorded for the Mediterranean. However, this is not likely to be a full list, as some species have been recorded only once and their status in Montenegrin waters is unknown (e.g. whether they are migratory or resident), and not all of the marine territory of Montenegro has been explored (the eastern Adriatic is the deepest part of the Sea and largely unexplored, so records of new species are expected).

The habitats richest in fish species (both in terms of diversity and biomass) are the drop offs and reefs of the near-shore coastal zones, which provide high structural diversity and different microhabitats for fish. Sandy bottoms, such as that at the mouth of the River Bojana, are relatively poor in fish species, although shallow-water *Posidonia* Seagrass provide important nursery areas for young fish. Close to the coast e.g. Boka-Kotor Bay, *Spicara flexuosa, Serranus hepatus, Mullus barbatus, Pagellus erythrinus* and other, mostly bento-pelagic species, can be found, while *Merluccius merluccius, Trisopterus minutus capelanus, Trachurus trachurus* are characteristic of the benthic area of open sea areas in the middle and southern Adriatic.

Reptiles and amphibians (herpetophauna)

Montenegro supports a relatively high diversity of both terrestrial and aquatic Amphibians and Reptiles, including Lizards, Snakes, Turtles, Frogs, Toads, Salamanders, and Sea Turtles. There are currently 56 species (18 species of Amphibian and 38 species of Reptiles), and 69 subspecies recorded from 38 genera, and this list is unlikely to be final. This is especially the case for the Green Frog (*Rena esculenta)* species complex and Crested Newt (*Triturus cristatus)* species complex, for which the region is the centre of speciation, and records of more species and sub-species are likely. One notable

Amphibian species is the Blind Olm or 'human fish' (*Proteus anguinus)*, which is endemic to the waters of subterranean caves of the karst Dinaric Mountains of South-East Europe.

The Lovćen and Prokletije mountain regions stand out as particular hotspots of Amphibian and Reptile diversity and endemism in Montenegro. Aquatic habitats in the Lovćen region are especially interesting as they host Amphibian and Reptile communities with many relict and endemic species e.g. Italian Crested Newt *(Triturus carnifex),* Cetinje Yellow-Bellied Toad *(Bombina variegata scabra), Podarcis melisellensis fiumana, Dinarolacerta mosorensis (=Lacerta mosorensis),* Blue Lizard *Dalmatolacerta oxycephala (=Lacerta oxycephala),* and *Vipera ammodytes meridionalis*. The lakes of Mount Prokletije region (Bukumirsko and Ridsko lakes) are notable for their populations of Neotenic[28] Alpine Newt *Triturus alpestris,* and also support a significant number of Balkan endemic species e.g. *Bombina (variegata) scabra, Pelophylax shqipericus,* Greek Stream Frog *Rana graeca, Dinarolacerta montenegrina* (new species), *Dalmatolacerta oxycephala, Podarcis melisellensis, Hierophis gemonensis=Coluber gemonensis.* Also of note are the islands of Skadar Lake, which each support a different lizard community, the Durmitor National Park area where *Triturus alpestris, Triturus vulgaris, Rana temporaria, Vipera berus* and the two endemic reptiles *Dinarolacerta mosorensis* and *Dalmatolacerta oxycephala* occur.

Other important sites for rare amphibians and reptiles include the Pošćenska lakes, the canyon of the Komarnica river from Skakavica to village Duži, Zminičko Lake (important for the survival of the endemic Zminicki Newt *Triturus alpestris serdarus*), part of the River Tara canyon – locality Ćelije-Borovi is important for *Rana graeca*), Kotor-Risan Bay (for *Caretta caretta, Chelonia mydas, Elaphe quatuorlineata, Zamenis situla = Elaphe situla, Bombina variegata*), Platamuni (*Caretta caretta, Chelonia mydas*), Katic island (*Caretta caretta, Chelonia mydas*), Cijevna River canyon (*Elaphe quatuorlineata, Zamenis situla, Testudo hermanni, Triturus carnifex*), Ćemovsko field (*Testudo hermanni*), Buljarica (*Testudo hermanni*), Mrtvica canyon (*Elaphe quatuorlineata, Zamenis situla, Testudo hermanni, Bombina variegata*), Ada Bojana (*Caretta caretta, Chelonia mydas, Emys orbicularis, Testudo hermanni, Triturus carnifex*), Mala Rijeka canyon (*Testudo hermanni*), Rumija mt (*Elaphe quatuorlineata, Zamenis situla, Testudo hermanni, Vipera ursinii*), Tivat Salina (*Caretta caretta, Emys orbicularis, Mauremys caspica, Testudo hermanni, Elaphe quatuorlineata, Zamenis situla*).

Birds

Montenegro's location along a major migratory route (the Adriatic flyway) and diversity of natural habitats result in high avian diversity. Of a total of 526 European bird species, 333 can be found regularly in Montenegro, and several additional species are registered as occasional visitors and the current total for Montenegro is 326 species[10]. Of these, 204 species nest in the country. Montenegro has a wide variety of bird types, including many raptors, forest and wetland species, and provides an important refuge for a number of rare and threatened bird species, including Dalmatian pelican *Pelecanus crispus* and pygmy cormorant *Phalacrocorax pygmeus*. Important bird sites include Buljarica, Velika Plaža, Ada Bojana, Tivat and Ulcinj Solana, Šasko Lake in the Mediterranean region, the pastures and flooded woodlands adjacent to the Bojana River, and, further inland, Durmitor, Bjelasica, Komovi and the canyons of Piva, Tara, Morača and Cijevna Maglic, and Prokletije. Over 281 species of birds have been recorded at Skadar Lake, approximately 250 in the surroundings of Ulcinj, and 172 in Durmitor.

Mammals

Montenegro also has a rich mammal fauna[29] and includes Carnivores (e.g. Wolf *Canis lupus*, Brown Bear *Ursus arctos* , Red Fox *Vulpes vulpes*, Lynx *Lynx lynx*, Otter *Lutra lutra*), Ungulates (e.g. Wild Boar *Sus scrofa*, Red Deer *Cervus elaphus*, Roe Deer *Capreolus capreolus*, Chamois *Rupicapra rupicapra*), Rodents (including *Pitymus thomasi*, found only around Podgorica (Beri, Vranici) and in Vilusi and several species of Bats), then some Marine Mammals (common Dolphin *Delphinus delphis*, Striped Dolphin *Stenella coeruleoalba,* Bottlenose Dolphin *Tursiops truncatus*, The highest mammal

[28] In neotenic forms, sexual maturity is reached while the animal is still in its larval state.

[29] 65 species of mammals are registered

diversity occurs in the mountainous and forested north of the country. Apart from some research on individual species, e.g. Brown Bear *Ursus arctos*, and some groups, e.g. Bats in the Ulcinj and Arsenal areas, and hunting population estimates[11] by hunting societies that are not independently verified, there are no data on the size of mammal populations in Montenegro.

1.3 Centres of biodiversity in Montenegro and their regional importance

Mapping the distribution of plants and animals throughout the Balkan Peninsula has shown that there are hotspots of biodiversity within Montenegro[12]. Almost all the mountainous regions of Montenegro can be treated as centers of diversity for vascular flora, including (i) Durmitor, (ii) Prokletije massif, and (iii) Mediterranean Dinarides (Orjen, Lovćen, Rumija, Njeguš mountains). Sites with 1,200-1,400 taxa (species and subspecies combined) include: (a) Durmitor with Bioč including the canyons of the rivers Tara, Piva and Sušica; (b) Bjelasica, Komovi and Prokletije with Visitor, Žijovo, Hum Orahovski, (c) Canyon of Cijevna river; (d) Mrtvica Canyon, (e) Skadar Lake with northern slopes of the Rumija mountain. The areas of the Prokletije massif[32,] , Moračke mountains, Bjelasica and Komovi are recognized as centers of endemic flora.

The most important biodiversity centers of birds in Montenegro include the region of Skadar Lake and Ulcinj, as well as mountain areas of Durmitor, and Prokletije. Bio-centers of mammal diversity in Montenegro are the mountainous regions of Durmitor, Sinjavina, western side of Prokletije, Komovi and Bjelasica, with smaller concentration of species in eastern side of Prokletije, central parts of Montenegro, northern parts of Boka-Kotor bay and Orjen mt and coastal Dinarides (Lovćen mt, Rumija mt with Skadar Lake).

The coastal region of Montenegro and its hinterland - Skadar Lake, Lovćen and Prokletije are considered as most significant centers of biodiversity of Reptiles and Amphibians on the Balkan Peninsula and in Europe.

Overlapping of the center of diversity of vascular flora (VF), amphibian and reptiles (VG), birds (P) and mammals (S) in Montenegro Circles in red represent overlapping centers of diversity for three groups of organisms, while the circles in light-brown colour represent overlapping areas of diversity for two groups of organisms.

Regional and global importance of Montenegro biodiversity

Montenegro, with more than 3,200 plant species, is floristically one of the most diverse areas in the region, comparable only to Greece and Bulgaria. The "S/A" index[33] of Montenegro for vascular plants is 0.837, which represents the highest recorded of all European countries. Similarly, an index of the density of nesting birds in Montenegro has a value of 0.557, which is higher than the figure for the Balkans as a whole (0.435). At a global level, Montenegro is included within the Mediterranean biodiversity hotspot [34] and the following Global Eco-regions[35]: European-Mediterranean Montane Mixed Forests (no. 77), Mediterranean Forests, Woodlands and Scrub (no.123), and Mediterranean Sea (no. 199) and the Balkan Rivers & Streams (no. 180); and, together with the mountainous area of Bulgaria, comprises one of the 153 centers of globally significant floral diversity.

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[11] Disputable compatibility of data about number of hunting game presented by the hunting organizations since their professional verification is missing

[12] Stevanovic, V. & Vasic, V. (1995): Biodiversity of Yugoslavia with the overview of species of international importance, Faculty of Biology and Ecolibri, Belgrade

[32] In the central and estern Prokletije more than 110 endemic taxa are present.

[33] It is expressed as logarithm of number species (log S) /logarithm area (km^2) (log A). See Stevanovic, V. Vasic, V.Regner, S. (eds) (2000). Biological diversity of SRYugoslavia. Ecolibri, Belgrade.

[34] Conservation International - Mediterranean biodiversity hotspot. See http://www.biodiversityhotspots.org/xp/hotspots/mediterranean/Pages/default.aspx

[35] Global Ecoregions are scientifically defined as the most expressed land, freshwater and marine habitats in the world. See http://www.panda.org/about_wwf/where_we_work/ecoregions/ecoregion_list/index.cfm

Areas that are internationaly important for rare, endemic and endangered species

In Montenegro are identified following Important Bird Areas (IBA)[13] područja značajna za ptice: Skadar lake, Ulcinj Saltwork, Šasko lake, Durmitor and Biogradska gora[14]. In the integral list of identified and potential (marked with*) IBA are: Delta Bojana, Rumija mt, Buljarica bay, Skadar lake, Plavsko lake with flooded meadows, Tivat Salina, Ćemovsko polje, Prokletije mt, Nikšić water accumulations, Hajla mt, Biogradska gora, Durmitor mt, Cijevna river canyon, Zeta river valley*, Kučke mts*, Visitor mt*, Komovi mts*, Golija mt*, Pivska highland*, Ljubišnja mt*.

Concerning Important Plant Araes (IPA) in Montenegro are identified 22 sites[15] as folows:

Jerinja glava mt, Lukavica mt, Trebjesa mt, Starac mt, Bogićevica mt, Visitor mt, Hajla mt, Skadar lake, Orjen mt, Lovćen mt, Rumija mt, Velika Ulcinjska beach, Babji zub mt, Piva river canyon, Tara River canyon, Komarnica River Canyon, Mrtvica Canyon, Cijevna River canyon, Lim River canyon, Komovi mt, Durmitor mt and Biogradska gora.

Identification of Important Fungi Areas (IFA) is not provided so far, but could provide additional reasons for protection of existing and new / potential Protected Areas.

2. Status and trends of the biodiversity

The **monitoring** of biodiversity in Montenegro has been carried out[16] in a limited manner, within the framework of the National Environmental Monitoring Programme, since 2000. Due to the limited financing for this Program, data gathered so far do not offer the possibility for complex analyses of trends in the condition of indicator species populations, or changes in selected habitats and the overall living environment.

However, summary results of the reports generated from the Program (presented in the National State on Environment Reports that are annually adopted by the Government)[17] have confirmed previous evaluations from professional / scientific literature on the threats to many of the components of biological diversity in Montenegro. Results obtained through the Program indicate that water ecosystems and forests[18], then urban and agricultural areas are under the greatest negative impacts. Different ecosystems are endangered to different extents depending on the intensity of anthropogenic factors. In this regard, the greatest pressure has been on the forest vegetation due to constant exploitation over a long period of time. Coastal ecosystems are also endangered while natural coastal habitats have been occupied by tourism facilities and urban development. Aquatic ecosystems are under the pressure from various forms of pollution, which decreases their productivity.

It could be concluded that the threats to biodiversity need to be analysed in the following period with due attention in order to be able to suggest effective measures for biodiversity improvements, through their integration into sectoral plans and strategies. The existing Biodiversity Monitoring Programme have to be expanded, more complex and with particular emphases to the Protected Area

[13] IBA are localities important for protection of birds because these localities regularly accept important populations of one or more globaly or regionaly endangered bird species, endemic birds or certain higly representative bird agregates . IBAs are selected according to international criteria and standards. See http://www.birdlife.org/action/science/sites/european_ibas/index.html.

[14] Seei http://www.birdlife.org/datazone/sites/index.html and then click on link for Montenegro: Biogradska gora (YU037) – fulfil criteria B2, B3; Durmitor (YU036) fulfil criteria B2, B3; Šasko lake (YU039) fulfil criteria B1i, B2, B3; Skadar lake (YU038) fulfil criteria A1, A3, A4i, A4iii, B1i, B2; Ulcinj saltworks (YU040) fulfil criteria A1, A4i, B1i, B2

[15] See - http://www.ipa-montenegro.cg.yu/

[16] Institute for the Protection of Nature of MNE

[17] Due to restructuring Government departments over the time, electronic versions of the State on Environment Report are provided at different web-sites, so for years 2005, 2006 and 2007 these reports are at http://www.mturizma.gov.me/vijesti.php?akcija=rubrika&rubrika=258, for years 2002, 2003, and 2004 are at http://www.mepp.cg.yu/vijesti.php?akcija=rubrika&rubrika=28 while for 2008 and 2009 are at http://www.epa.org.me/index.php/me/sektor-za-monitoring-analizu-i-izvjetavanje

[18] This conclusion was obtained also during the prioritisation of ecosystems for protection (anketa with 15 specialist from various sectors)

network and forthcoming Network NATURA 2000. In 2005, it was also noted that the ecosystems of dry grassland (Zetsko-Bjelopavlićka plain) and ecosystems of salt pans (hinterland of Velika plaza in Ulcinj) are threatened.

Results from the Biodiversity Monitoring Programme also gave significant inputs for the revision of the conservation status of many species, so new List of the Protected Species has been adopted in December 2006 (Decree on the protection of certain flora and fauna species (Official Gazette, MNE, No. 76/06). In a time scale number of protected species increased so in 1968, only 6 plant species[19] were placed under protection, but in 1982, 52 plant species and 314 animal species were under protection[20]. After its last revision, List of the Protected Species include 415 plant species and 430 animal species,

3. Main threats to the Biodiversity

3.1 Threatened habitats and ecosystems

While comprehensive data on population and distributional changes are lacking for most species and habitats[21], there are many examples of threatened and declining biodiversity in Montenegro reported in professional literature and official documents.

a. Coastal and marine areas –

The flora and fauna of the coastal zone is considered the most threatened in Montenegro. This region is threatened by uncontrolled tourism and urban development which due to increased discharge of polluted and untreated waste waters into the sea endangers the marine ecosystem, particularly in tourist areas such as the Boka Bay. The most threatened habitats on the coast are the dunes at Velika Plaža at Ulcinj (which has unique halophyte vegetation[22]) and the remaining fragments of Skadar Oak (*Quercus robur scutariensis)* forest at Štoj at the rear of the Velika Plaža and Ulcinj. Bird fauna at these localities is endangered by hunting.

b. Forest habitats/forest ecosystems –

Forest biodiversity has also suffered heavily in Montenegro. After World War II there was a period of 'industrialization' of forestry when the highest-quality timber was logged and almost all of the most valuable forest complexes were destroyed. Unfortunately, there are no reliable data on changes in the distribution or coverage of different forest types in Montenegro over the last 50 years, but some data do exist on timber volumes extracted. In the period 1947 - 1951, around 1,200,000 m^3/year of timber was logged in Montenegro; in the 1970s this fell around 900.000m^3/annually and by the end of the 1980s approximately 800.000m^3/annually were harvested. The amount logged in the 1990s fell due to the regional conflicts, but illegal logging (1998-2000) was pronounced in the border regions with Kosovo. Logging in Montenegro is currently estimated at about 700,000-815,000 m^3/year.

c. Water and wetlands habitats –

Wetland habitats suffer from eutrophication, particularly from pollution from human settlements. Plans for the direct use of biological resources from freshwater ecosystems, plans for their drainage[75]

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[19] *Daphne malyana* Blecic, *Dioscorea balcanica* Kosanin, *Ilex aquifolium* L., *Leontopodium alpinum* Kass, *Ramondia serbica* Panc and *Taxus baccata* L.

[20] Decree on protection, rare, thinned and endangered plant and animal species ("Official Gazette or RMNE", no. 36/82)

[21] The result of insufficient research and lack of a more complex system of monitoirng of biodiversity. See previous chapter

[22] Rare and endangered species at this location are: *Cakile maritima, Xantium italicu, Salsola kali, Euphorbia peplis*, *Euphorbia paralias*, *Polygonum maritimum*, *Atriplex hastate*, *Echinophora spinosa*, sea holly *Eryngium maritimum*, *Agropyrum junceum*, *Medicago marina*, *Inula crithmoides*, *Lagurus ovatus*, *Cuscuta* sp.

[75] Plans for deepening of the bed of the river Bojana and regulation of the water level of the Skadar Lake

represent important threat to the flora and fauna, particularly fish population. Hunting has also been a threat to many waterbirds in Montenegro.

d. Dry grassland habitats –

Dry grasslands in Montenegro are now very rare and considered the most threatened habitat in Montenegro, most having been overgrazed or converted for arable and fruit farming or viniculture, for example a large part of the grasslands at Ćemovsko has been converted into vineyards and orchards.

Threatened agro-biodiversity

Development and economic and market pressures in Montenegro have led to the erosion of agrobiodiversity, including the decline in populations and disappearance of all local breeds and a reduction in genetic diversity which has been further eroded by cross-breeding with other varieties and imported breeds.

3.2 Major threats to biodiversity in Montenegro

On the basis of the available information, the following 6 main categories of anthropogenic threats can be identified:

1. *Uncontrolled urbanization and tourism development* of natural habitats with associated infrastructure development;
2. *Changes in land use practices*, particularly in relation to agriculture and forestry;
3. *Unsustainable and illegal use of natural resources* (including illegal hunting, overharvesting etc);
4. *Water, soil and air pollution* from industrial and agricultural pollutants and municipal wastes;
5. *Introduction of alien, invasive species* [23] is poorly investigated threat, so far, but its higher importance among threats to biodiversity could be expected soon.
6. *Impact of climate change*, especially the effects of hot and dry periods on forest habitats [24] which need to be the focus of more attention[25].

The cumulative effect of the above threats to biological diversity is the loss of rare or endangered habitats and their associated (often endemic) species, particularly on the coast and a reduction in the functionality and stability of natural ecosystems, particularly of forest and water ecosystems.

3.3 Major reasons which lead to loss of biodiversity

There are a number of root causes of the threats to biological diversity stated above, the most significant being:

Low political priority that has the protection of the environment –

Although environmental protection and conservation of biodiversity and natural resources are formally declared as priority in numerous official documents (The Declaration of the Ecological State, Spatial Plan of Montenegro, National Strategy for Sustainable Development, etc.). In practice they are positioned low in the political agenda since the economic sectors (tourism, energy, agriculture etc) considered as profitable are priorities. Interests of "development without barriers" are generally substantiated with strong financial and investment arguments that are stronger than environmental arguments including legal procedures and administrative measures that are considered as barriers to that kind of development.

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[23] The most common species are *Robinia pseudoacacia, Ailanthus altissima* and in urban areas *Broussonetia papyrifera*. In the sea *Caulerpe racemose.*

[24] Expected climate changes in Montenegro according to IPCC AR 4 and other sources in the period to 2050: increase of temperature *by* 1.8 – 2.2 ^{0}C; (ii) reduced precipitation – between -6 % i – 14%, part. in summer (iii) increased extreme climate phenomena *and* (iv) increase of sea level by 18 – 22 cm.

[25] Predicted climate changes are presented in the document of the MTLE and UNEP RAC / SPA: *Vulnerability and impacts of Climate Change on Marine and Coastal Biodiversity in Montenegro,* National Overview prepared bz V. Buskovic (2008)

olicies which are not aimed to the environmental sustainability in these sectors could be clearly distinct. Thus, for example, policy in the tourism sector is not yet enough focused on more environmentally sustainable and expensive forms of tourism with smaller number of guests.

Low level of limitations and incentives relating to protection of biodiversity protection for nature –

The current system of prohibition and punishment for violation in the laws/regulations concerning nature protection (ranging from pollution to the direct use of biological resources) is poorly efficient and does not provide full control and / or limiting harmful activities. When applied those penalties are often considered more like "extra taxes" that complicate economic activities. In addition, there is a lack of incentives for investment regarding improvement of natural resources in economic sectors (agriculture, industry, tourism…) as well as for individuals that have to change their awareness and behavior.

Demographic, social and economic changes which influence biodiversity –

Significant demographic changes affected the region in past two decades (the break of Yugoslavia, the migration of refugees and displaced persons etc) consequently changed previous resident population (ethnic, social, economic and etc.) of Montenegro. On the other hand, internal migrations of the population (from village to city and from the north to Podgorica and to Coastal Area) have changed the demographic profile of rural settlements. here are significant changes in the age structure of the population, which further affects the labor capacities and economic potentials of Montenegro. These changes affected traditional forms of the utilization of natural resources as well as traditional life style, especially in the mountains areas. Unfavorable economic conditions caused increase of the volume of direct exploitation of biological resources. Volume of direct exploitation of biological resources is depending on their accessibility while unequal distribution of the benefits arisen from their exploitation is causing local population feel dissatisfied.

istorically, there is no continuity in organizing participation of key stakeholders in decisions making process regarding use and management of natural resources. Also, existing mechanism for the management of protected natural assets do not meet rights and needs of local population linked to the use of natural resources. Even not properly organized, this interest group is changing their estimation of natural resources in public use which are considered as "nonentity" property that should be exploited “as much as possible”. On the other hand, general public declaratively claim environmental protection / biodiversity conservation is obligation o "someone other who is in charge for taking action" and unwillingly accept participation in the actions undertaken by organized forms of civil society.

There are a number of significant obstacles or "barriers" to effective conservation of biodiversity and its sustainable use in Montenegro, the most important of which are:

ost of taxonomic groups are poorly investigated (see previous sections) that is influence quality and efficiency of the measures undertaken for biodiversity protection. A lot of information remain unpublished, or if published they usually do come to the public (publicly not available information, such as internal reports within the institution, the results of research projects, master and doctoral theses, specialist articles / works in professional publications or other publications that are not for general public distribution). There are no publicly available databases for whole biodiversity or specific taxonomic groups, and there is no "red book" of rare and endangered species. Existing Biodiversity Monitoring Program does not provide sufficient information about the state, causes and threats to biodiversity. On the other hand, country experienced a period of isolation during the 90's that also affected scientific community causing breaks in the cooperation with similar institutions abroad, exclusion from wider (global, regional) initiatives related to biodiversity conservation.

elatively small number of personnel is engaged in the field of nature / biodiversity conservation, so far. Usually, only one or two specialists or researchers possess knowledge about a particular plant or animal group, while for some taxonomic groups are not covered by adequate specialists. In combination with insufficient financial allocations from state budget and with no financial participation of private sector, this is causing biodiversity conservation activities (monitoring,

scientific inventories and databases, management plans for protected areas of nature, etc.) are not implemented with required efficiency, or not implemented at all. Apart from the lack of capacity, very small number of education and research institutions is providing specialized training relevant for implementation biodiversity protection / conservation measures or management practices regarding certain components of biodiversity.

Poor harmonization of legal and inter-institutional responsibilities –

Fragmented distribution of responsibilities and low level of inter-institutional coordination is causing both, overlapping of the institutional responsibilities relevant for biodiversity / natural resources, and lack of efficiency in the execution of obligations regarding biodiversity protection / conservation and sustainable use. In addition to that, there is a gap between the reforms in the legislative framework for biodiversity / nature protection, on one side and socio-economic transition / reforms all required by EU. For example, foundation of the management plans for protected areas is still in traditional management models that exclude participatory process in their preparation, adoption and implementation.

Lack of public and political awareness of biodiversity and lack of public participation in its protection –

A low level of awareness on wide broad of issues regarding biodiversity / nature protection is reflected in various aspects, such as inadequate solid waste disposal, lack of knowledge about the protected areas, etc. Public awareness campaigns on these issues are rare, usually timely limited and focused on the specific issue (for example, campaign against the construction of hydropower plants on Tara River). Generally speaking, there is low public support to the initiatives for the nature protection (for example, lack of public support for establishing National park "Prokletije"), which leads to discouragement of general public and lack of political interest and support, as well. Putting under protection new protected areas is considered as "a barrier" for local economic development of rural areas that additionally amplifying deviation of general public opinion.

The weaknesses in the system of management and designation of protected areas of nature –

The weaknesses in the existing management system and designation of protected areas are obstacles that affect the efficiency of direct in-situ protection of biodiversity. The low level of professional, operational / managerial capacities in existing protected areas and lack of managers / management authorities for all protected areas are important impact to key natural values of these areas. Negative trends in the designation of new protected areas, particularly those of larger size require more efficient models for their designation and management that could be provided in the process of revision of the status of existing protected areas.

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Considering the existing intensity of threats and reasons for protection of biological and landscape diversity in Montenegro, and the progress achieved in preparing the National Strategy and Action Plan for the Protection of Biodiversity (2010 – 2015), it has been found that Montenegro has a great wealth of biological and landscape diversity, in a very high degree of conservation, especially in the framework of Central and Eastern Europe, Balkan and Mediterranean.

4. Legislation & Policy

4.1. National Legislation in the Field of Nature Conservation

A. CONSTITUTIONAL PROVISIONS AND DECLARATION

- Constitution of Montenegro
- Declaration on Ecological State of Montenegro ("Off. Gazette of RoM", no.39/91)

B. REGULATIONS RELATED TO ENVIRONMENTAL PROTECTION

i. General regulations

- Law on Environment ("Off. Gazette of RoM", no. 48/08)
- Law on Strategic Environmental Impact Assessment (Official Gazette of the RoM, no 80/05)
- Law on Environmental Impact Assessment (Official Gazette of the RoM, no 80/05)
- Law on Waste Management (Official Gazette of the RoM, no 78/08)
- The Law on Chemicals (Official Gazette of the M, no 11/07),
- Decree on assessment of impact of interventions affecting environment ("Off. Gazette of RoM", no. 14/97)
- Instruction on the contents of the elaborate of assessment of the impact of interventions affecting environment ("Off. Gazette of RoM", no. 21/97)
- Decree on protection from noise ("Off. Gazette of RoM", no.24/95)
- Law on inspection control ("Off. Gazette of RoM", no.50/1992)

ii. Protection of nature

- Law on Protection of Nature ("Off. Gazette of MNE", no. 51/08)
- Law on National Parks ("Off. Gazette of RoM", no. 56/09)
- Decree on protection of rare, thinned, endemic and endangered plant and animal species ("Off. Gazette of SRoM", no. 56/06)
- Ministry ordinance on the types and criteria for determining the types habitat, manner of making maps of habitat, way of monitoring and the threat of habitat content of annual reports, measures of protection and preservation habitat types ("Off. Gazette of MNE", no. 80/08.).
- Regulations on closer the content and manner of keeping the register of protected areas ("("Off. Gazette of MNE, no. 79/09 of 12/04/2009)
- Regulation on detailed conditions to be met by control of the protected area ("Off. Gazette of MNE no. 35/10)
- Regulation on the contents of near-annual program of monitoring the state of conservation of nature and the conditions to be met by a legal entity that monitors ("("Off. Gazette of MNE, no. 35/10)
- Regulation on the manner of making and risk assessment for the introduction of foreign species of wild plants, animals and fungi ("Off. Gazette of MNE no. 46/10 of 06/08/2010)
- Regulation on detailed conditions to be met by legal or physical person to store the seized protected wild species of plants, animals and fungi ("Fig. MNE, no. 46/10 of 06/08/2010).

iii. Strategical documents:

- National strategy of sustainable development (2007.)
- National strategy of biodiversity with action plan for 2010-2015.

iv. Spatial development and construction

- Law of Spatial planning and construction of facilities ("Off. Gazette of RoM", no. 51/08)
- Spatial plan of special purpose areas for National Park "Durmitor" ("Off. Gazette of RoM", no. 20/97)
- Spatial plan of special purpose areas for National Park "Lovćen" ("Off. Gazette of RoM", no. 19/97)
- Decision on commencement of the development of the Spatial plan of special purpose areas for National Park "Biogradska gora" ("Off. Gazette of RoM", no. 47/92)
- Decision on commencement of the development of the Spatial plan of special purpose areas for National Park "Skadar Lake" ("Off. Gazette of RoM", no. 47/92)

5. International Treaties and Activities:

No	Name of the multilateral agreement in English	Status:	Published in the Official Gazette
1.	Convention on Biological Diversity	ratified/assumed by succession	Official Gazette of FRY- International agreements, 11/01-28
2.	Cartagena Protocol on Convention on Biological Safety	ratified/assumed by succession	Official Gazette of Serbia and Montenegro – international agreements 16/05-40
3.	Convention on Migratory Species – CMS	ratified/assumed by succession	Official Gazette of Montenegro – international agreements 06/08-147
4.	Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)	ratified/ ratification instruments currently being deposited	Official Gazette Montenegro no 7, of 08 December 2008
5.	Ramsar Convention on Wetlands	ratified/ assumed by succession	Official Gazette of SFRY 09/77-675
6.	Convention Concerning the Protection of the World Cultural Heritage	ratified/assumed by succession	Official Gazette of SFRY 56/74-1771
7.	European Landscape Convention	Ratified	Official Gazette 006/08-135
8.	Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES Convention)	ratified/assumed by succession	Official Gazette of FRY- International agreements 11/01-3
9.	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa	Ratified	Official Gazette of the Republic of Montenegro 17/07-12
10.	UN Framework Convention on Climate Change	ratified/assumed by succession	Official Gazette of FRY 02/97-71
11.	The Kyoto Protocol UN Framework Convention on Climate Change	Ratified	Official Gazette of the Republic of Montenegro 17/07 as of 27 March 2007

6. Linked Activities (other international and national initiatives):

- *Projects related to the planning and management of PA system*

UNDP is working (2009 – 2012) on 2 GEF projects regarding planning and management of PA system, as follows: (i) *Strengthening the Financial Sustainability of Protected Areas in Montenegro* (PAF) with the aim to enable legal framework for improving financial sustainability of PAs and ensure their revenues and (ii) *Strengthening the sustainability of the protected area system of Montenegro* (PAS) that is aimed to expand and rationalize the PA system to ensure better habitat representation and their more secure conservation status and strengthen the capacity of PA institutions to effectively manage a more representative protected area system. UNDP is also working on the GEF project *Securing biodiversity conservation and sustainable use in the Dinaric Mountain ecoregion of Montenegro* (GEF, OP 12) and contribute to the regional initiative Dinaric Arc Initiative (DAI) i.e. *Dinaric Arc Ecoregion - 2012 PAs project* with a objective to draw a picture of the "state of the game" for status and progress towards the completion of the targets of the CBD Programme of Work on Protected Areas (PoWPA), and identifying actions and needs, constraints and opportunities towards the full implementation of the PoWPA in the region as a basis for the development of the present project proposal. Project implementing WWF in the cooperation with the partners in following countries: Slovenia, Croatia, Bosnia and Hercegovina, Montenegro and Albania. One of main project outcomes shall be PoWPA methodologies (gap assessment, financial sustainability, management effectiveness...) applied to certain level in the Ecoregion countries.

From previous, *National Country Self Assessment* (NCSA) GEF project has been implemented (2006-2007) by UNDP and MoTE. Assessment of conditions for implementation biodiversity conventions was one of three thematic areas in the frame of this project

ENVSEC initiative (UNEP, UNDP, OSCE and NATO) is aimed to provide a framework for dealing with environmental issues across borders and promoting peace and stability through environmental co-operation and sustainable development. The Initiative focuses on the four pilot regions: Central Asia, the Caucasus, South Eastern Europe (SEE) and Eastern Europe. In the SEE region, which UNEP Vienna office is covering within the Initiative, biodiversity loss was recognized as posing a security risk. Based on this priority, ENVSEC designed a programme "Enhancing Transboundary Biodiversity Management in South Eastern Europe", which is currently being implemented with the funding of the Austrian Development Agency (ADA). As a first step, the rapid assessment of management problems experienced by the administrative bodies responsible for protected areas in a transboundary context was carried out with a focus on mountain ecosystems situated in border areas. Workshop on the "Enhancing Transboundary Biodiversity Management in South Eastern Europe" has been hold in Podgorica 13-14 June 2006).

IUCN Green Belt – this initiative of 22 countries is aimed at the first trans-boundary habitat network through Europe, at a death zone ("Iron Curtain") separated "East" and "West" from the Barents Sea to the Adriatic Sea. The core areas of this belt will be big crossborder National Parks and conservation areas of international interest. It is a retreat for numerous endangered species like lynx, wolf, bear and river otter. One of the visions is, that one day these species could use the Green Belt as a route for migration. In Montenegro, this initiative came out through WWF MedPO project "Conserving the Biological Diversity of South-Western Balkans: Transboundary Nature Conservation in the Landscape of the Durmitor Massif/Tara River/Prokletije Mountains (Montenegro and Albania)". In cooperation with its local partner NGO Green Home (2006) Assessment Study on biodiversity and socio-economic features of the Durmitor / Tara / Prokletije region and its surrounding area, as a basis for development of the Conservation Action Plan (CAP) and for sustainable development

Montenegro is continuously cooperating with the United Nations Educational, Scientific and Cultural Organization – UNESCO, precisely with relevant bodies of this international institution: the World Heritage Center in Paris and UNESCO BRESCE Office in Venice. Montenegro has received financing for the Project "*Recovery and Rehabilitation of Areas Engulfed by Fire in the National Park Durmitor*" through the UNESCO's urgent Participation Programme Projects.

SNV is implementing in the cooperation with MoT and PENPMNE project *Management and valorisation of sensitive eco systems in rural areas* that contribute to tourism - economic development of the rural communities in the Montenegro by improving management and valorisation of sensitive eco systems in rural areas[26].

As a first step towards implementation 2010 biodiversity targets, as well as the integration of the economic and environmental policies, several important international projects have been started and are in progress in this field.

1. National Strategy on Sustainable Development

2. National Forestry Policy Resources and Goods

3. National Strategy of Biodiversity with Action Plan, financed by GEF/UNDP;

7. The Law on Nature Protection – harmonization with EU and other international regulations

8. The Law on GMO

9. Creating terms for accessing to Natura 2000/Emerald Network etc

[26] Project include following group of activities: 1. Cooperation and capacities in management of protected areas improved. 2Local natural values assessment and monitoring programme for the sensitive areas/species developed, 3. Prepare education and voluntary programmes on the basis of monitoring (flagship species) and 4. Carry out and promote database of local natural values

-Important areas of bird species diversity have been identified for the purpose of implementing Council Directive 79/409/EEC, the Convention on Wetlands, Bern and Bonn Conventions.

-Important areas of plants

7. Instruments of the Management of the Protected Areas and Biodiversity in Montenegro

- Protection regimes
- Management, protection and utilization plans of the areas and natural resources
- Protection and development programmes of the protected areas and natural values
- Strategic Environmental Assessment and Environmental Impact Assessment
- Multilateral Agreements
- Institutions in charge of management and control of the protected natural value
- Monitoring

7.1. Institutional Framework

The Government of the Montenegro defines politics/strategy for protection of nature and natural values and in that context managing those values and action plans in order to conduct established politic/strategy

The Ministry for Spatial Planning and Environment and suggests politics/strategy and action plans, their implementation and co-ordination with activities of other ministries and other competent institutions, supervision of managing, appropriate system of observation and financial support, to the Government of Montenegro.

Institute of Nature Protection of Montenegro performs specialist activities geared toward protecting natural resources, and conducts research with an objective to protect the nature, implement natural protection regime, prepare reports which emphasize priorities in evaluating and protecting natural resources, monitor the state of natural resources and suggest nature protection measures, determine protection conditions and provide information about protected natural resources for the purpose of developing spatial and other planning documents, and perform all other relevant duties determined by the legislature.

Environmental Protection Agency (data collection and reporting on the status of biodiversity)

Public Enterprise “National Parks of Montenegro” with four management units are responsible for management of the national parks in Montenegro.

Institute for marine biology is responsible for specialist activities geared toward protecting of marine natural resources

Public Enterprise “Morsko dobro” is responsible for management of coastal zone in Montenegro.

NGO’s and private enterprises and organizations, and local communities, manage the protected areas by the municipality and support and contribute to the co-operation in the field of managing of protected areas of high national importance.

Close cooperation with the Ministry of Agriculture, Forestry and Water Management, the Ministry of Economy, the Ministry of Education and Science, Ministry of Tourism, Ministry of Transportation, Marine and Telecomunication.

Such inter-ministerial cooperation is further supplemented by complementary consultation with the Institute for Nature Protection, municipalities and private land owners and public, which defined by the Law on the Government of Montenegro and su-law regulations.

PART II - BERN CONVENTION AND MONTENEGRO

8. Bern Convention and Montenegro

8.1. Background Information

Montenegro took part in Council of Europe activities in the field of nature conservation already in eighties, mostly on expert level, within the State of Serbia and Montenegro.

Bern Convention was *ratified* by the Parliament of Montenegro on November 2008.

(Official Gazette of Montenegro – International Treaties No. 07/08), instruments of ratification were handed to the General Secretar of the Council of Europe on June 2009.

8.2. Implementation of the Bern Convention in Montenegro

Bern Convention obligations will be implemented by national legislation. That will be a basis for selection of ASCI Emerald areas as well as SPA and pSCI of Natura 2000 network. Both processes will be fully co-ordinated.

All activities are planned in accordance to other international obligations, especially CBD and Ramsar Convention, Bonn Convention and Bern Convention.

8.3. Action Plans for threatened species

Montenegro has the Action Plan for Pelecanus crispus, endemic species on Skadar Lake.

8.4. Emerald Network

Emerald habitat types in Montenegro by bio-geographic regions

There are 3 bio-geographic regions in Montenegro (alpine, continental and Mediterranean). Some of these habitat types are found in Montenegro over large areas, such as beach forest, oak forest, Mediterranean salt steppe and sea-grass meadows.

Filling in the database proposed Emerald sites

The database was filled for the planned 32 sites (total number of Emerald sites in Montenegro).

Basic information on chosen Emerald sites in Montenegro were collected and filled into the Emerald database module, using the programme "Emerald Sites Network Software Version 2.0", which is based upon the Access database.

Evaluation of the project implementation and gained experiences

Building up Emerald Network in Montenegro and creation of a database on its ASCIs was an important for following reasons:

- Emerald Network is an important contribution to the newly undertaken steps towards European trends in the field of nature conservation;
- the database represents a basic tool for the development of future ecological networks;
- it is an opportunity to get acquainted with commonly applied methodology;
- capacity building of skilled experts;
- training for personnel that would be involved with nature conservation in future;
- an excellent and useful preparation and directions for Natura 2000.

In the course of the project the following problems were encountered:

- Lack of recently obtained ecological data on some areas, population and species;
- Lack of centralized system containing any kind of data;
- Lack of digitized maps and GIS system in Montenegro;
- Incompatibility of Palaeractic classification with regionally applied syntaxonomy;

- Lack of regionally important endemic plant and fauna species and marine species in the resolution No. 6.

8.5. Climate Change and Biodiversity

8.5.1. National Climate Change Observation and Research Activities as Fundamental Base of Impact Climate

Change on Biodiversity

In cooperation with the UNDP office in Montenegro, the Ministry for Environment implemented the project "*Enabling Activities for the Preparation of Montenegro's Initial National Communication to the UN Framework Convention on Climate Change*". First (Initial) National Communication on Climate change of Montenegro to the UN Framework Convention on Climate Change (UNFCCC), as key result of the project, has been prepared in May 2010 and consequently submitted to the Secretariat of UNFCCC. Most of the analyses concerning climate change issue from the Communication to UNFCCC have been consulted and used for preparing this report to CBD.

It is very difficult to evaluate the impacts of climate change on biodiversity because the changes occur slowly and the effects of these changes are always in interaction with other influences that have already caused certain consequences and reactions.

In line with the expected climate change (increased temperature and reduced humidity), a reduction in and loss of species is expected, primarily those related to freshwater ecosystems, as well as species vulnerable to significant fluctuations in temperature and humidity environments (amphibians). It is estimated that this may reduce and fully endanger the populations of amphibians and reptiles in karst areas of old Montenegro and karst regions of Kuča-Žijovo, as well as in the coastal mountains of Rumija, Lovćen and Orjen. A temperature increase in the continental part of Montenegro would eventually lead to acceleration of eutrophication of mountain lakes, and then to their withdrawal and complete disappearance.

Data on the phenology of woody species already indirectly indicate the presence of the consequences of climate change on the productivity of some ecosystems in Montenegro. Available data show that the listing of some species (black locust, linden, oak, maple, ash, beech, poplar, alder, pine, and maritime pine) begins a few days earlier than usual. Listing of given species begins around 12 days earlier than on average.

In relation to the marine ecosystem, the foreseen climate change would lead to faster eutrophication of shallow and confined parts of the sea waters, as well as the introduction of new thermophilic (invasive) species from southern marine biogeographic zones. Also, one of the main problems may be migration of marine species through the Suez canal, mainly from the Red Sea, the Pacific and Indo-Pacific areas into the Mediterranean.

Significant measures to mitigate the consequences of climate change on biodiversity would cover the establishment of scientific infrastructure for the purpose of investigation of the impact of climate change on biodiversity, terrestrial ecosystems and the sea, training of experts; establishment of an intersectoral group which will deal with issues of water resources management and protection of biodiversity, etc.

9. Responsible bodies and useful addresses

9.1. Diplomatic level

Ministry of Foreign Affairs
Stanka Dragojevića 2
Montenegro-81000 Podgorica
Tel.: 00 382 (0)20 224 670, fax: + 382 (0)20 246 357;+ 382 (0)20 201 530
http://www.mip.gov.me

Permanent Mission of Montenegro to the Council of Europe
18 ALLÉE SPACH
67000, Strasbourg
France
Zoran Janković, Ambassador
the head of the mission chief
tel: +33 (0) 3 88 36 85 65
fax: +33 (0) 3 88 35 07 24
e-mail: rp_montenegro@yahoo.fr

9.2. Implementing Authorities

Decision making level and legal service:

Ministry for Spatial Planning and Environment
Rimski trg 46
Montenegro-81000 Podgorica
Tel.: 00 382 (0) 20/ 482-176, fax: 00 382 (0) 20/234-131
Minister: Mr Branimir Gvozdenović
Secretary of the Ministry: Mr Zoran Tomić
Focal point for Bern Convention: Ms Milena Kapa
www.mse.gov.me
e-mail: mse@gov.me
milena.kapa@gov.me

9.3. Technical and administrative level

Institute for Nature Protection
Kralja Nikole 7
Montenegro-81000 Podgorica
Tel.: 00 382 (0) 20/622 848
Director: Mr Zlatko Bulić, ph. d
e-mail: zastitaprirode@t-com.me

Environmental Protection Agency - EPA
IV Proleterske 19, 81000 Podgorica
Tel: 00 382 (0) 20/ 618 255
Fax: 00 382 (0) 20/618 246
http://www.epa.org.me

10. References

Fourth national report of Montenegro to the Convention on biological diversity (4th NR of MNE to CBD), Published by Ministry for Spatial Planning and Environment

Information about the state of the environment

Implementation report for ‘’Establishing an Emerald network in Montenegro’’ project

First national communication for climate change in Montenegro.