

***The Strategy of Bosnia and Herzegovina
and Action Plan for Biodiversity and
Landscape's Protection
(NBSAP BiH 2008-2015)***

DRAFT

Sarajevo, January 2008.

The Strategy of Bosnia and Herzegovina for Biodiversity and Landscape's Protection (2008-2015)

A highly complex document of *Strategy of Bosnia and Herzegovina and Action Plan for Biodiversity and Landscape's Protection (2008-2015)* contains up to date and complete assessment of state and level of biodiversity, geographic distribution of bioresources, as well as the identified both current and potential negative tendencies. The document doesn't insist on strict protection (conservation) of biological and landscapes diversity and genetic resources. This, basically development document, has got primary goal to determine sustainable courses in the domain of modern development based on ecologically oriented social planning.

The document is drafted in the way that it integrates all sectors at local level and enables development of functional connections with international bodies. Hence, in the document are recognizable attributes of national strategy and those of document which is important on regional and global scale.

The Strategy is drafted in the way to sublimate all present issues and problems encountered in the process of young democratic society's development, with an open possibility to fulfil forthcoming needs, as defined by economic sector and the International community, whose competence arises from the belonging of Bosnia and Herzegovina to OUN. The document is prepared in the way that all subjects involved in nature management, as well as all closely related sectors, through planned actions are enabled to achieve their own development, economic and political interests, which is of the high importance under circumstances of very complex state's structure such it is in our country.

The document represents pragmatically reading and guide to all parties involved in the process of planning and decision making. It is an instruction how to, in easier way, gain and understand information in the education system. It is also a component in the process of strengthening and democratization of public and ecologic awarness. The document has been completed with entire diversity of cultures and cultural heritage of Bosnia and Herzegovina and therefore shall make contribution to the promotion of natural and traditional values of this area, as well as to the promotion of Bosnia and Herzegovina and its natural beauties at the international scale.

The Strategy represents some kind of ID of our country.

The Strategy of Bosnia and Herzegovina and Action Plan for Biodiversity and Landscape's Protection (2008-2015) includes the identification of main strategic directions that should be followed in order to achieve an effective and sustainable management of biological and landscape's diversity, and that was elaborated on the base of study *Bosnia and Herzegovina – Land of Diversity*, encompassing following chapters :

- the assessment of state and level of diversity of B&H's flora, fauna and fungia,
- the assessment of diversity of B&H's ecosystems and landscapes,
- the assessment of endemism, relictness and threat's level of gen pool, as well as the actual state of genetic resources in B&H,
- the state and trends in the field of invasive species of both plants and animals in B&H,
- the identification of real and potential threats to entire Bosnia and Herzegovina's biodiversity on local and global scale.

- analysis of the institutional and legal framework's efficiency considering preservation and usage of natural resources and real role they play in the system of ecologically oriented profit gain for the wellbeing of local community.
- other indicators of the achieved implementation level for the international documents.

Having in mind the values of unique and rare forms that have been identified on the bosnia-herzegovina's territory and specific patterns of endemism and threats, geographic and geopolitical position of Bosnia and Herzegovina and its intentions toward integrated European territory, then an adequate implementation of international documents in the domain of nature management intended to harmonize activities regarding entire environment and to reduce local poverty, identified were the main strategic directions.

- 1. DECREASE OF BIODIVERSITY LOSS IN B&H**
- 2. SET UP OF CONSERVATION SYSTEM AND SUSTAINABLE USE OF BIODIVERSITY IN B&H**
- 3. DECREASE OF PRESSURES ON BIODIVERSITY IN B&H**

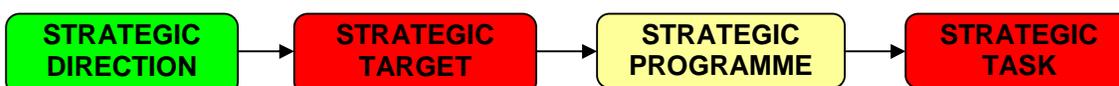
The expected outcomes are to be accomplished through an adequate implementation of the strategic targets in Bosna and Herzegovina, which should restrain negative trends of degradation and biodiversity loss.

- 1.1. CONSERVATION OF SPECIES DIVERSITY IN B&H**
- 1.2. CONSERVATION OF ECOSYSTEM AND LANDSCAPE'S DIVERSITY IN B&H**
- 1.3. CONSERVATION OF DIVERSITY OF GENES IN B&H**

- 2.1. SET OF FINANCIAL MECHANISMS**
- 2.2. SET UP OF EFFICIENT INSTITUTIONAL FRAMEWORK**
- 2.3. INTERSECTORAL APPROACH TO NATURE MANAGEMENT**
- 2.4. EXCHANGE OF SCIENTIFIC AND TECHNOLOGIC INFORMATION**
- 2.5. MAINTAINANCE OF TRADITIONAL KNOWLEDGE AND PRACTICES**

- 3.1. CONTROL OF HABITATS CONVERSION**
- 3.2. MONITORING OF THE GLOBAL CLIMATE CHANGE'S EFFECTS**
- 3.3. CONTROL OF INVASIVE SPECIES IN B&H**
- 3.4. STRENGTHENING OF PUBLIC AWARENESS**

In the document of *Strategy*, particular strategic targets have been elaborated on the level of programmes and tasks, after following scheme :



After strategic directions, targets, programmes and tasks have been identified, the Action Plan and efficiency indicators of the strategic measures were prepared in order to achieve all afore mentioned items.

General facts on Bosnia and Herzegovina

Physical-geographic facts. Bosnia and Herzegovina (B&H) is positioned between coordinates N 42° 26' and 45° 15' and E 15° 45' and 19° 41', in SE Europe and central part of the Balkan Peninsula. Its total surface is 51.129 km², of which 5% is lowland, 24% hills, 42% mountains, and 29% is covered with karst (NEAP, 2003). Most of young mountain chains (its western part) - the Dinaric Alps, is situated on our territory. Chains of the Dinaric Alps descend gradually in the northern direction toward Sava river, while in the southern direction they descend suddenly, directly into the lowland of Herzegovina and Adriatic coastline.

Bosnia and Herzegovina owes its mainly mountainous character to the western part of mediterranean mountain chains.

In terms of hydrology Bosnia and Herzegovina belongs to the Black and Adriatic Sea basins. A watershed of these two confluences runs across mountains Plješevica, Šator, Cincar, Raduša, Bitovnja, Bjelašnica, Treskavica, Zelengora and Volujak. The Black Sea basin takes in 70% of Bosnia and Herzegovina's total, the Adriatic Sea basin takes in 24%, while 6% of overground water dissolves into the karst underground.

There are fresh and salt waterbodies in Bosnia and Herzegovina. Our country has got large quantity of, after world's standard, high quality fresh water. Most of our watercourses emerges under the Dinaric masiffs. Thermal and mineral springs (occurring around indigenous rocks and tectonic cleavages), and mountain lakes (due to its clear blue water called „mountain eyes“) represent the important natural wealth of Bosnia and Herzegovina. In terms of pedology, in Bosnia and Herzegovina prevail soil types from automorphous and hydromorphous division.

Bosnian and Herzegovina is characterized by very complex climate. The Dinaric alpine region strongly modifies mediterranean currents coming from the South, whereas it prevents the penetration of cold air from an inland to the coast. Strong protrusion of mediterranean influences is felt along the Neretva river valley. Between the areas with temperate continental and modified mediterranean (adriatic) climate, there are areas with continental, pre-alpine and alpine climate.

Biogeographic facts. In this respect Bosnia and Herzegovina is being differentiated in three biogeographic regions : mediterranean (with the Adriatic province); eurosibirean-boreoamerican (with provinces as follows : Illyrian in the West, Moesian in the East and relict black pine forests on dolomites and serpentines and alpine-high nordic (with the high Dinaric province and five sectors).

Constitution and population. Bosnia and Herzegovina has been arranged by Dayton Agreement, according to whom it is constituted of Federation of B&H (10 cantons), Republic of Srpska and, after additional decision has been made, Brčko District (DB). According to the assessment made by UNHCR in 1999, total number of inhabitants in Bosnia and Herzegovina was around 3.894.000. Of that 2.381.496 (61%) people lived in Federation of B&H, 1.432.020 (37%) in Republic of Srpska and 80.324 (2%) lived in Brčko District.

Economy. In 1990 GNP in Bosnia and Herzegovina was estimated to be 10,6 billions US dollars, which made over 2.400 US dollars per capita. An income was achieved through many economy branches, while the basic industry was one of the best developed among countries in the region, with highly educated manpower and extremely high export rate to the western market (Environmental Performance Reviews, UNECE, 2004).

In year 2002, GNP has reached almost the half of its pre-war value. A transition process that is currently going through its privatisation phase exercise crucial effects on transformation of the economy's structure.

More than one half of Bosnia and Herzegovina's territory is covered with forest and forest kind of soils, whereby predominant are low forests and shrubs (UNECE, 2004). State owned forests take 2,186.332 ha (81%), while private ones cover 523.437 ha (19%). An average annual increase in large wood of state owned forests amounted 5,48 ,while of private ones it was 4,07 m³/ha.

In 2001, according to records (UNECE, 2004), 12% of GDP was achieved by agricultural production. Domestic dietary products covered barely 35-40% of needs, which is less than it was the case before the war.

The sector of energy in Bosnia and Herzegovina is traditionally of high importance for the country's economy (UNECE, 2004). Production of energy is predominantly based upon inland hydro-energetic and coal resources, whilst the alternative energy sources, as well as the wind power, solar irradiation, geothermal energy and biomass gained energy, play no role in energetic sector today.

Bosnia and Herzegovina posses high potential for development of ecotourism, respectively development of sustainable tourism, which includes : mountain tourism, rafting, thermal and cultural tourism, village and thru kind of tourism. In order to develop ecotourism, it was planned to establish new protected areas on the territory of B&H (UNECE, 2004) (confluence of Una river, Mts. Igman-Bjelašnica near Sarajevo city, centre of endemism Prenj, Cvrsnica, Cabulja Mts. etc.).

Legal framework for the protection of biological and landscapes diversity.

At national level, legal framework for the protection of biological and landscapes diversity make the Constitution of B&H, the Constitution of RS and the Statut of Brcko District.

After Dayton Peace Accord, in the field of environment, in charge is administration of both entities and District, which has adopted, from 2003 to 2004., sets of environmental laws. The adopted laws on nature protection in Federation of B&H, Republic of Srpska and Brcko District are based upon Habitats Directive (EU HABITATS DIRECTIVE (92/43/EEC) and Bird's Directive (Council Directive 79/409/EEC).

Bosnia and Herzegovina has been a signatory of the Convention on Biodiversity since 2002. NFP for the implementation of the Convention is Federal Ministry for Tourism and Environment. As an operative body, this Ministry is responsible for making contacts with international institutions, initialization of actions covered by the Convention and co-ordination with other relevant authorities and interested parties.

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN BOSNIA AND HERZEGOVINA

1.1 CONSERVATION OF ECOSYSTEMS AND LANDSCAPES DIVERSITY IN B&H

The territory of Bosnia and Herzegovina is imprinted by unique, mosaic like distribution of ecosystems : upland landscapes with underlined diversity of glacial biological/ecological forms, ecosystems of canyons and narrow passages comprising high diversity of well preserved tertiary biological/ ecological forms, ecosystems of karst fields and wetlands.

Mountain landscapes of B&H. Despite to ecological resemblances, most of the Dinaric masiffs in Bosnia and Herzegovina are characterized by their own specificities and uniqueness of living world. Each of them, like some kind of isolated island in the sea of red hot lava, had undergone through its own development pattern and morphogenesis, followed by a settlement of specific living world. As a final result, achieved was, on the one hand high level of endemisms and relictness, and on the other, significant level of differences among them. Habitats of mountain landscapes have got highly dynamic relief, which are steep slopes, mountain sinkholes, depressions, screes on silicate and carbonate substratum and shallow humus-accumulating soils.

The climate is typical mountainous, with higher precipitation in snow, strong winds and emphasized temperature extremes. In depressions, where snow is being maintained over entire year, ecoclimate tends to be modified nival.

Mountain landscapes in Bosnia and Herzegovina, from the standpoint of physiognomy, can be differentiated in two major units: sub-alpine belt (encompassing low woodland with mountain pine) and alpine belt above treeline of mountain pine covered with alpine grassland, alpine tundra and fragmented sub-nival vegetation around snowbeds.

In the sub-alpine belt prevail landscapes that can be differentiated in ecosystems as follows:

- Ecosystems of sub-alpine woods with Illyrian beech and greek maple;
- Ecosystems of acidophilous woods with illirian beech and European mountainash;
- Ecosystems of acidophilous woods with moesian beech and melic grass;
- Ecosystems of sub-alpine woods with moesian beech and greek maple;
- Ecosystems of sub-alpine spruce woods;
- Ecosystems of sub-alpine Serbian spruce woods;
- Ecosystems of mountain pine woods with blueberry;
- Ecosystems of mountain pine woods with two-flower violet,
- Ecosystems of mountain pine woods with spruce and European mountainash;
- Ecosystems of mountain pine woods with yellow gentian;
- Ecosystems of *Genista radiata* shrubs;
- Ecosystems of *Genista radiata* shrubs with bearberry;
- Ecosystems of mountain juniper ;
- Ecosystems of mountain pine woods with rhododendron;
- Ecosystems of alpine willow shrubs;
- Ecosystems of green alder shrubs on silicate masiff of Vranica Mt.;
- Ecosystems of sub-alpine white bark pine woods.

Above the upper treeline continues the belt of typical mountain landscapes comprising following ecosystems :

- Ecosystems of alpine grassland on basophilous ground with *Elyna* and moorgrass;
- Ecosystems of alpine grassland on acid ground with sedge and mountain woodrush;
- Ecosystems around snowbeds on basophilous ground with alpine willow;
- Ecosystems around snowbeds on acid ground with crenate buttercup;
- Ecosystems of alpine screes on carbonate rocks;
- Ecosystems of alpine screes on silicate rocks;
- Ecosystems of carbonate rock crevices;
- Ecosystems of silicate rock crevices;
- Ecosystems of lichens on both carbonate and silicate bedrock.

Special attributes to the mountain landscapes are provided by the ecosystems developing around sub-alpine springs and rivulets, then ecosystems of mountain lakes and fens. The occurrence of latter ones is attached to dynamics of hydrological network, geological substratum and soil types.

A distinct ecological unit create vegetation of low shrubberies that makes connection between forest and non-forest ecosystem types.

Mountain landscapes with plenty of healthy food have been the areas of intense cattle breeding since ever. Our mountain areas are especially suitable for breeding of very productive sheeps. There are even today numerous herds of sheep called "pramenka" grazing on Mts. Vlašić, Vranica, Cincar, Vitorog, Bjelašnica, Zelengora, Maglic and Volujak, whilst on other mountains graze herds of bosnian cows and horses.

Mountain landscapes in Bosnia and Herzegovina are recognizable in their summer huts, so called „katuni“. Next to this kind of settlements, usually built at higher altitudes (1.640 m Vranica, 1.700 m Maglic), occur special ecosystem types comprising mainly nitrophilous plants (alpine dock, good king Henry, false helleborine, nettle).

More than one third of B&H's flora is comprised within the ecosystems of mountain landscapes, of which many are endemic and relict ones. There are many plants with medicinal, aromatic, edible and honey features. Hence, they have been used in traditional ethnotherapy and as a healthy diet source since ever. The most popular among them are: blueberry, cranberry, bearberry, winter savory, different sorts of thyme, mountain pine, mountain violet, leopard's bane or mountain-tobacco and widely known, today highly threatened, yellow gentian. Although it has been listed in the Red list long time ago, today its remaining populations are main income source for those people, who lost their homes and working places during the war.

Refugial-relict landscapes represent the most unique share in bosnia-herzegovina's environment, which have evolved through stormy history of the Earth reflecting in the evolution of both climate and living world. Those places have suffered least changes in the period before and after glaciation having preserved their natural ecologic values. In these habitats occur many tertiary plant and animal species which have endured drastic climate changes in the last Ice age. From the evolutionary standpoint, these are ancient species known also as relicts.

Habitat types inhabited by glacial-tertiary-relict plants and animals are of highest importance for the biodiversity of Bosnia and Herzegovina, hence for global biodiversity as well. Tertiary relict ecosystems of Bosnia and Herzegovina are attached, first of all, to canyons, cliffs and steep slopes of mountains in the river basins of: Una, Vrbas, Bosna, Drina and Neretva.

Relict-refugial landscapes of Bosnia and Herzegovina include:

- A) Landscapes of relict pine woods
- B) Landscapes of relict-refugial ecosystems in narrow passages and canyons of bosnia-herzegovina's rivers

Landscapes of relict pine woods on vertical and horizontal profile encompass:

- ecosystem of Dalmatian black pine *Pinion dalmaticae*. The ecosystem occurs only fragmented in the Adriatic province of Bosnia and Herzegovina
- ecosystems of white bark pine woods *Pinion heldreichii*. A distribution range of white bark pine in Bosnia and Herzegovina comprises mountains Orjen, Velež, Prenj, Cvrstica, Cabulja and Vran in Herzegovina, and western and southwestern slopes of Hranisava Mt. in southern Bosnia.
- ecosystems of illyrian black pine woods *Pinion austriacae* with different sorts of geologic/pedologic/floristic series :
 - a.) series of black pine woods on peridotite and serpentine *Pinion austriacae „serpentinicum“* . These ecosystems cover large area in the ophiolites zone of Bosnia and Herzegovina, which extends from Kozara Mt., continues along the Vrbanja river's valley where it covers larger area on Uzlomak and Borja Mts.; thereafter it stretches toward Bosna river's basin building a compact complex between Zavidovici and Nemila. Through the valley of Gostovic river, ophiolites zone continues toward Konjuh Mt. where it builds huge complexes, reaching Kladanj and Olovske lake in the South, and Banovici in the North. Especially scenical and dynamic is the valley of Krivaja river built of ultramafic rocks. There are some disjunctions of these rocks on Ozren Mt., right bank of Spreca river, around Maglaj and Lukavac. Towards eastern and southeastern Bosnia and Herzegovina these rocks occur more seldom. They emerge again around Višegrad city (slopes of Sjemeč Mt., Varda and Banja) extending along Lim river's valley toward western and southwestern Serbia.
 - b.) series of black pine woods on dolomite *Pinion austriacae „dolomiticum“* . Dolomite bedrock is being inhabited by specific flora and fauna of which many species occur only on this type of substratum. These are dolomitobionts, among whom prevail dolomitophytes. On dolomite bedrock live also many alpine plants, such as : alpine buttercup, buckler mustard, dinaric gentian climbing here down to 800 m a.s.l. On the other hand, warmth of habitat caused the arrival of mediterranean and supra-mediterranean species, such as broom (*Genista dalmatica*), herzegovina's spurge (*Euphorbia hercegovina*), sage (*Salvia officinalis*), (*Moltkaea petraea*) and others.
 - c.) series of black pine woods on limestone *Pinion austriacae „calcicolum“*. Black pine woods occur also on carbonate rocks, on shallow humus-accumulative kind of soil (black earth), or even on sirozem and regosol. These woods have got the intermittent areal with specific ecosystems of underlined landscapes value in it, in the belt of broadleaved-deciduous thermophilous forests. Especially valuable habitats of black pine woods on limestone are to be found in the canyons of : Sutjeska, Neretva and Drina rivers, with several endemic and relict communities of black pine in rock fissures.

Landscapes of refugio-relict ecosystems in narrow passages and canyons of Bosnia-Herzegovina's rivers evolved under specific orographic, geomorphologic, hydrologic, respectively ecologic conditions. The slopes of canyon sides are steep, built mainly of carbonate rocks (limestone and dolomite). Some of them are between few dozens and several hundred meters deep. The canyon of Neretva river, squeezed between Prenj and Cvrstica Mts., is up to 1.700 m deep. Amongst the most popular canyons are those of Sutjeska and Una rivers. In the past, specific ecoclimate was created in these habitats. That kind of habitats are well protected, safe and hard to reach which enables the survival of populations of numerous species from Tertiary till today. The ecoclimate of canyons and narrow passages is characterized by high both nocturnal and seasonal oscillation in all factors, especially temperature.

The uniqueness and singularity of biodiversity in these habitats is reflected in the occurrence of polydominant communities and ecosystems with highest level of floristic and faunistic diversity.

As a result of specific ecological factors in canyons and narrow passages created were such biocoenoses, in which physiognomy is being determined by great number (up to few dozens) of tree species that play edaphic role. That kind of communities, occurring only in refugial habitats like canyons and narrow passages, sometimes are composed of over 50 tree species hence are called polydominant. One of the best known in Bosnia and Herzegovina is considered to be *Aceri-Tiliaetum mixtum*, occurring in the canyons of Una, Vrbas, Drina and Neretva river.

Apart from polydominant communities the singularity of these landscapes is provided by communities of rock crevices and scree, mainly of endemic and relict character. Those are habitats of most endemic species and communities on the territory of Bosnia and Herzegovina. Refugio-relict ecosystems possess highest biodiversity values in Bosnia and Herzegovina from the standpoint of unique gene pool preservation at national scale, being at the same time of global importance for Europe and entire world.

There isn't so many examples of climate diversity as there is in the watershed of Neretva river, where are being exchanged Mediterranean, supra-Mediterranean, temperate continental and, in the upper area, typical mountain climate.

Depth of canyons, carbonate geological foundation and specificities of ecoclimate have led to the occurrence of several development centres of endemic flora, fauna and vegetation in the watershed of Neretva river. After its biodiversity level this area is considered to be one of the most important and best preserved endemic development centres on global scale in terms of flora and fauna.

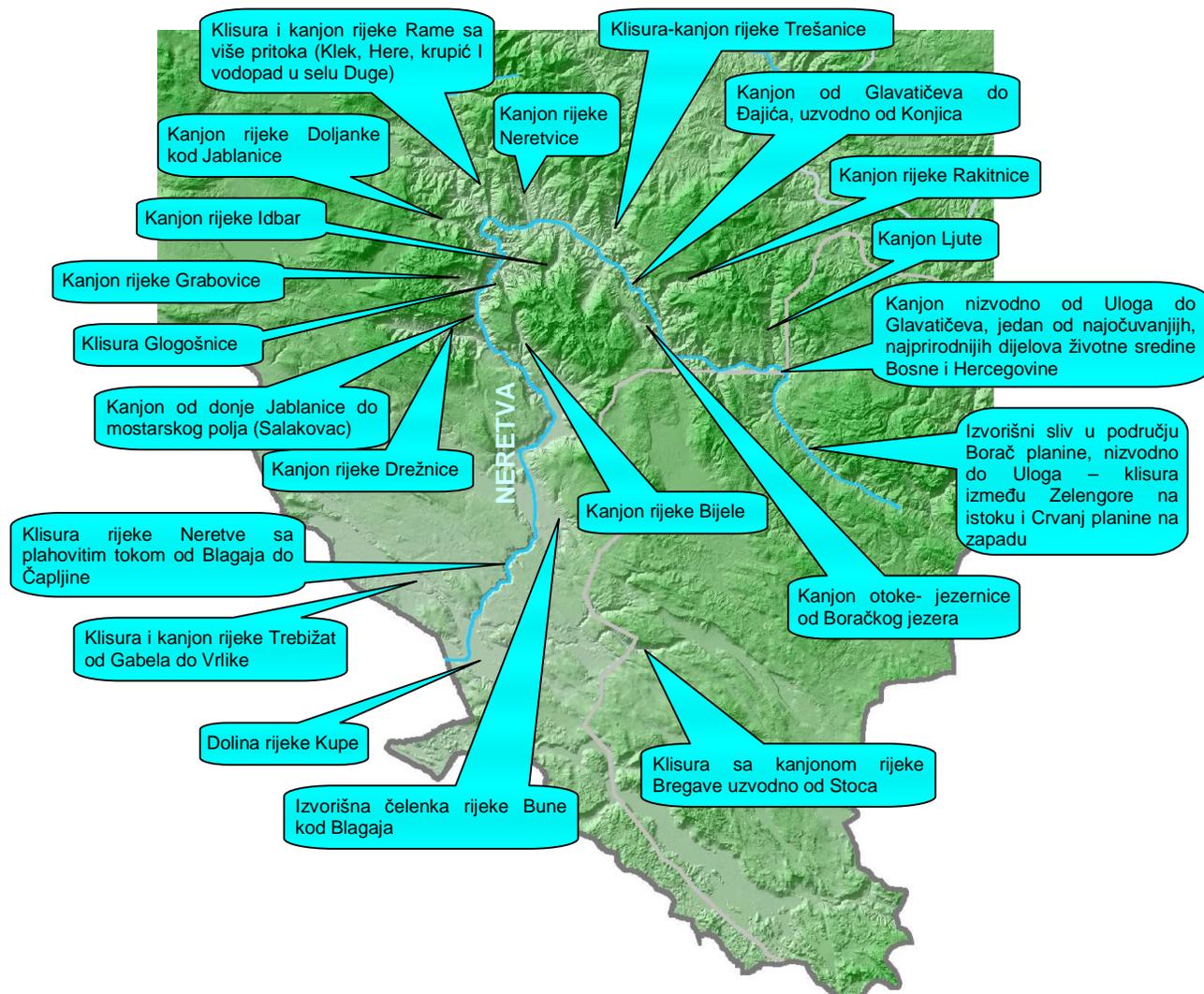


Figure 1. – Refugio-relict habitats in the watershed of Neretva river

Refugia of the watershed of Neretva river are characterized by unique geomorphological shapes, diversity of soil types, hydrological network and ecoclimate which have helped to evolve the highest diversity of species and ecologic conditions not only in Bosnia and Herzegovina, but also in the Dinaric Alps. In the canyons of upper flow of Neretva river contained are aboriginal forms of both living and non-living nature. Extreme richness in stenoendemic and relict plant and animal species nominates this area for important position within global biodiversity. Among unique canyons in this area is the one of Rakitnica river, whereby massifs of Prenj, Cvrsnica and Cabulja Mts. are considered to be endemic development centres. This refugial habitats owe their landscapes value to the endemic communities of broadleaved deciduous woodland and thickets, light coniferous forests, and shrubberies, hygrophilous woods and galleries with willow, alder, poplar and plane, and especially singular vegetation of rock crevices and screes on limestone. In the watershed of Neretva river occur numerous refugia with karst relief features. There is a direct relationship between preservation of these habitats and state in the entire watershed area, especially in one of the largest river delta in Europe in which is situated Hutovo Blato, the wetland of international importance.

Landscapes of karst fields.

Karst artifacts, along with its hydrological network and both biological and ecological diversity, represent unique phenomenon that reflects specific patterns of Earth's crust formation on the territory of B&H (B&H's Dinaric Alps). Karst (kras) in wider sense, represents rocky desert or crag. In narrower sense, it is a specific relief with special, mainly underground, water circulation ongoing within soluble rocks (limestone, dolomite, tuff). The karst is being created by calcite's dissolution in water that contains CO_2 , whereby CaCO_3 is being transformed into, in water soluble, $\text{Ca}(\text{CO}_3)_2$. Limestone fissures are being increased by a corrosion and joined together to form a network of underground cavities and tunnels, which then extend deep into the ground, even under a sea level.

Within the karst region karst fields are the most interesting phenomena. They make bosnia-herzegovina's biological and ecological diversity recognizable at the European and global scale.

Karst fields are mostly elongated following the extension direction of Dinaric Alps. Field's bottom is usually covered by quarternary deposits, while its sides are encircled by karstified carbonate masses. Along field's margin are sources and wells, and at the deepest places are abysses, through which water dissolves into the karst underground. Between sources and abysses, across the field, extend permanent or periodical overground water network. In quarternary depositions are to be found some hydrographic objects through which water in wet season comes to the surface, and in dry season vanishes again. The lowest positions in the field, especially around abysal zone, are flooded after heavy rain. The survival of both stationary and migratory birds depends upon the wetlands that are being component of karst landscapes (Ždralovac and Buško Blato).

Diversity of climate, as well as of other ecological conditions, have resulted in differentiation of karst fields as follows : karst fields in western Bosnia; in western Herzegovina, in lower part of western Herzegovina, lower karst fields in eastern Herzegovina, mid karst fields in eastern Herzegovina and upper karst fields in eastern Herzegovina. Diversity of climate, then of geomorphological phenomena and soil types were ecological factors that helped creation of rich and diverse plant and animal world in karst fields of Bosnia and Herzegovina. There are many endemic and relict species that are being structural component of specific ecosystems whose habitats are to be found in these karst fields. Here is presented just a piece of it.

Wetland landscapes. Moorland and standing water, which in Bosnia and Herzegovina have got often local character, are induced by specific orographic and edaphic conditions. Today these are the most endangered ecosystem types in Bosnia and Herzegovina. Due to valuable genpool contained within them (different plant and animal species, birds, reptiles, amphibians and fishes) they enjoy the highest priority in the systems of sustainable conservation.

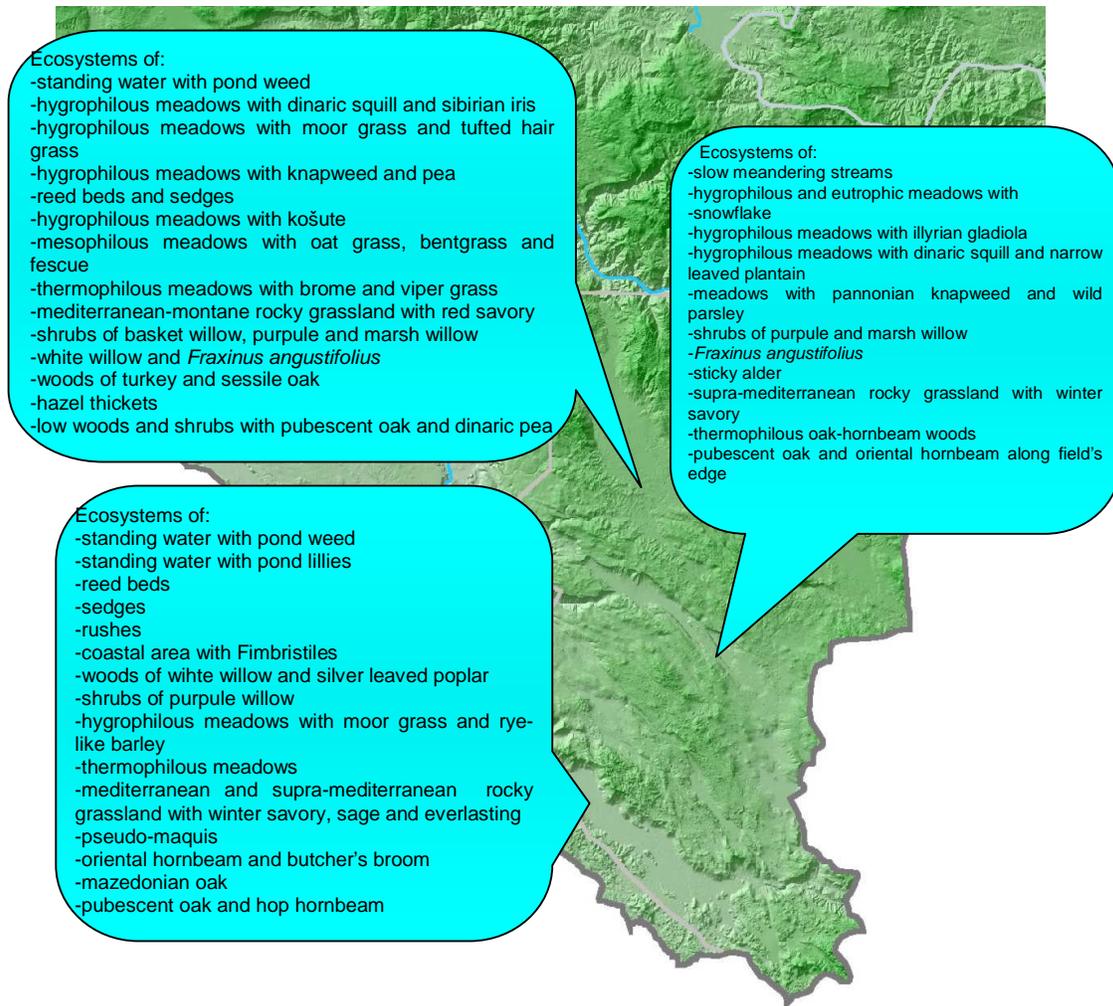


Figure 2. Ecosystems of karst fields eastern from Neretva river

Due to limited distribution of hydromorphous soils in Bosnia and Herzegovina (only 15% of its territory) and continuous melioration and drainage practice, wetlands including entire ecosystems tend to cover small area.

In Bosnia and Herzegovina wetlands emerge over watertight geologic foundation, frequently these are different kind of lake or river depositions, on plain ground and naturally formed depressions.

These ecosystem types in B&H today include areas along main watercourses (Una, Vrbas, Bosna, Drina, Neretva) with hygrophilous both forest and brush communities of willow, alder, purpule and marsh willow.

On the vertical profile of bosnia-herzegovina's Dinaric Alps occur special kind of moist habitats around mountain wells and brooks, in some places develop even turfs. At lower altitude are being formed alkaline blanket bogs, whilst in the belt of dark coniferous woods (at altitude over 1000 m) formed are raised bogs with clear dominance of bogmosses. In the subalpine belt, in small depressions and around springs, develop special kind of boreo-relict blanket bogs.

Wetlands occur in many karst fields, too (Ždralovac area in Livanjsko polje, Buško blato, Duvanjsko, Kupreško, Popovo, Dabarsko, Fatnicko, Gatacko, Nevesinjsko and Podrašnicko polje).

The most important wetland areas with macrophyte vegetation made of reed beds and pond weed in Bosnia and Herzegovina are:

- o Hutovo blato in the Neretva delta area, not far from Capljina;
- o Ždralovac (northwestern part of Livanjsko polje toward Bosansko Grahovo);
- o Plivska jezera by Jajce town;
- o Bardaca near Srbac at Vrbas river estuary;
- o Ponds Velika and Mala Tišina near Bosanski Šamac at Bosna river estuary;
- o Han Kram at Han Pijesak;
- o Some regions around Modrac lake near Tuzla city;
- o Mountain lakes on bosnia-herzegovina's Dinaric Alps (Šatorsko, Kukavicko, Rasticevsko and Turjaca on plateau of Kupres, Prokoško jezero on Vranica Mt., Blatacko jezero on Bjelašnica Mt., Idovacko jezero on Raduša Mt., Blidinje jezero in Dugo Polje between Cvrsnica and Vran Mts., Uloško jezero on Crvanj Mt., Boracko jezero beneath Prenj Mt., Veliko, Blatno, Crno and Bijelo jezero on Treskavica Mt., Kotlanicko, Orlovacko, Crno, Bijelo, Štirinsko, Kladopoljsko, Donje Bare and Gornje Bare on Zelengora Mt..

Apart from these localities, there is a significant number of wetland ecosystems which provide habitats for stationary and migratory birds and are situated at lowland river effluents, in the small depressions and along riverbanks.

Wetland landscapes include large number of ecosystems with high landscape values which ensure special ecologic and biogeographic attributes for entire flat land area.

These ecosystems have been possessing the outstanding economic value since ever. This is habitat of many noble kind of fishes and game species that are considered to be a base for successful fishing and hunt. Wetland ecosystems that are actually forests, beside their ecologic importance, are important for their profit gain based on wood production. Wetland ecosystems comprise significant resource of medicinal, edible and vitaminous plants. Considering whole ecologic picture of Bosnia and Herzegovina, dominated by diverse terrestrial kind of soils and vegetation, marsh ecosystems have got special importance in terms of being rare.

Specific landscapes of Bosnia and Herzegovina are:

- o high-mountain landscapes;
- o refugio-relict landscapes;
- o karst landscapes;
- o wetland landscapes.

These landscapes are composed of highly sensitive ecosystem types, which are directly affected by wide spectrum of anthropogenic activities.

The intensity of pressures is specific for some areas in Bosnia and Herzegovina. Extremely high pressures are identified in following areas.

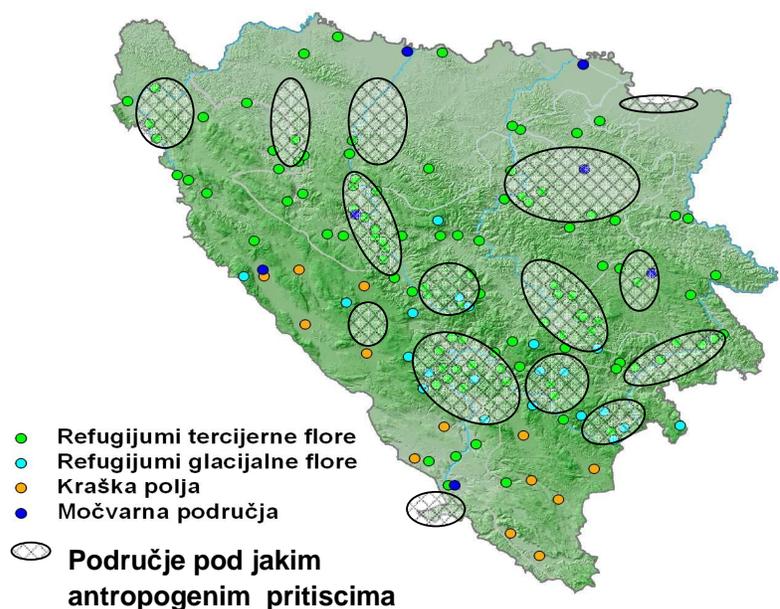


Figure 3. – Specific ecosystem types and areas under anthropogenic pressures in Bosnia and Herzegovina
 On the territory which is considered to be under intense anthropogenic pressures identified were hotspots.

SPECIFIC LANDSCAPES	HOTSPOTS
MOUNTAIN LANDSCAPES	Pišeševica, <u>Klekovača</u> , Osječenica, Šator, Dinara, Cincar, Vitorog, Vran, Čvrstica, Čabulja, <u>Prenj</u> , Velež, Vranica, <u>Vlašić</u> , <u>Bjelašnica</u> , <u>Jahorina</u> , Crvanj, <u>Zelengora</u> , Volujak, Maglić, Gat. Bjelašnica, <u>Orjen</u> , Veliki Stolac
CANYONS AND NARROW PASSAGES	Upper Neretva, Lover Una, mid Vrbas, mid Bosna i upper Drina, upper Sana
KARST FIELDS	Ždralovac with Livanjskim poljem, Glamočko, Kupreško, Duvanjsko, Mostarsko Blato, Posuško, Ljubuško, Popovo polje, Dabarsko, Fatničko, Nevesinjsko i Gatačko kraško polje
WETLAND AREAS	Mountain lakes, Plivsko jezero, Hutovo blato with delta of Neretva river, swampy parts of karst fields, raised bogs on Mts. Romanija, Ozren, Zvijezda, blanket bogs in high-mountain area, Posavina (Tišina, Bardaca, Brcko, Raca) Valley of Spreca river
FOREST ECOSYSTEMS	Klek Peninsula, surrounding of Stolac, Prenj Mt., Cvrstica Mt., Orjen Mt., gornja Neretva, Velež Mt., Veliki Stolac Mt., Konjuh Mt., Majeвица Mt., Kozara Mt., Pišeševica Mt., Cincar Mt., Bjelašnica Mt., Vlašić Mt., Vrataljica (nearby Konjic town)

In order to preserve diversity of ecosystems and landscapes in B&H, the Strategy determines programme of activities as follows:

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN B&H

Cilj 1.1. CONSERVATION OF DIVERSITY IN ECOSYSTEMS AND LANDSCAPES OF B&H

PROGRAMME OF ACTIVITIES	TASK
1.1.1. Identification and classification type of ecosystems and habitat	1.1.1.1. Analysis and encoding of both ecosystem and habitat types, including preparation of instructions needed for their identification
1.1.2. Conservation of biodiversity in mountain landscapes	1.1.2.1. Estimation of natural values in mountain belt of bosnia-herzegovina's Dinaric Alps
	1.1.2.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and following IUCN principles
1.1.3. Conservation of biodiversity in refugia of canyons and narrow passages	1.1.3.1. Estimation of natural values in endemic development centres of narrow passages and canyons of Neretva, Una, Sana, Vrbas, Bosna and Drina river including their tributaries
	1.1.3.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and DB, following IUCN principles
1.1.4. Conservation of biodiversity in karst fields	1.1.4.1. Estimation of natural values in karst fields of B&H
	1.1.4.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following IUCN principles
1.1.5. Conservation of biodiversity in wetlands	1.1.5.1. Estimation of natural values in wetland landscapes of B&H
	1.1.5.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and DB, following IUCN principles
1.1.6. Conservation of biodiversity of forest ecosystems in B&H	1.1.6.1. Estimation of natural values in specific kind of forest ecosystems
	1.1.6.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and DB, following IUCN principles

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN B&H

Cilj 1.2. CONSERVATION OF SPECIES DIVERSITY IN B&H

The extreme richness of living world that exist on our territory is the result of ecological heterogeneity of Bosnia and Herzegovina, its geomorphological and hydrological diversity, specific geological past and its ecoclimate diversity. Flora, fauna and fungia of Bosnia and Herzegovina are considered to be among the most diverse in Europe, being especially important in terms of global biodiversity due to its high level of endemism and relictiness.

Like in no other place in Europe, here, on such small space, occur countless endemic centres in which, even at present-day, continue to unfold process by which new species evolve.

High species diversity of plants is based on diversity of cyanophytes, algas and vascular plants (mosses, ferns and spermatophytes).

Taking into account the heterogeneity of aquatic and wet habitats, as well as the existence of endemic development centres, it can be considered that at least one third of organisms belonging to the group of cyanophytes and algas in Bosnia and Herzegovina is unknown to the scientific public. This relates especially to algas living in mountain blanket or raised bogs, mountain springs, then springs and upper flows of karst sinking rivers, and streams which are to be found within refugia of tertiary flora.

For the diversity of cyanophytes and algas especially invaluable are forms which characterize thermal and mineral springs, tuff building algas, then those living in caves and half-caves etc.

Table 1. – Diversity of cyanophytes and algas

Taxon	Genus	Species	Subspecies	Variety	Form
<i>Cyanobacteria</i>	36	303	-	1	4
<i>Rhodophyta</i>	7	20	-	1	
<i>Charophyceae</i>	33	319	-	31	5
<i>Chlorophyceae</i>	65	242	-	25	2
<i>Euglenophyta</i>	4	21	-	-	-
<i>Dinophyta</i>	5	20	-	-	2
<i>Bacillariophyceae</i>	57	881	1	222	15
<i>Xanthophyceae</i>	4	21	-	-	-
<i>Chrysophyceae</i>	12	32	-	4	-
Total	217	1859	1	284	28

Mosses are to be found in almost any kind of habitats in Bosnia and Herzegovina. About one hundred of them is attached to springs, brooks, tuff barriers, stony riverbeds. The remaining 460 species live on ground, bark, decomposed lignohumus in forests and meadows, whilst significant number of them lives on bare limestone, ultramafic and silicate rocks.

Ferns are characterized by underlined differentiation in terms of their phylogeny and ecology. Representatives of Equisetophyta are attached to wetlands, in which prevail species belonging to genus horsetail (*Equisetum*). Wetland habitats and standing water are inhabited by extremely rare ferns, such as *Salvinia* and *Marsilea*, which are today considered as highly important diversity components for their role in maintenance of stability of wetland areas that get more threatened from one day to another. Especially valuable elements in our forest ecosystems are clubmosses (species of genera *Lycopodium* and *Hupersia*), which grow on humus ground in dark coniferous woods, whilst species of genera *Selaginella* live in rock crevices of ultramafic rocks.

Table 2. – Taxonomic diversity of vascular plants

	Family	Genus	Species	Subspecies	Hybrids	Total number of species, subspecies and hybrids
Bryophyta	52	187	565	0	0	565
Pteridophyta	14	26	61	8	2	71
Spermatophyta	161	858	3256	1078	164	4498
Ukupno	227	1071	3882	1086	166	5134

In vascular flora of Bosnia and Herzegovina the most numerous and diverse are spermatophytes. These are plants of terrestrial habitats, but there are several of them which are adapted to aquatic environment. This group of organisms makes the framework for living world in Bosnia and Herzegovina, and acts as a main factor for landscapes diversity design. This rich diversity of vascular flora includes the most important biological resources (economically important forest trees, medicinal, edible, aromatic herbs, herbal genetic resources and ornamental flora). Spermatophytes used to be strong driver of ethnogenesis, inhabitation, survival and existence of bosnia-herzegovina's population.

Most unique forming processes that took place in the past, in which were created geologic foundation, soil, relief, ecoclimate, and water balance established, have led to evolution of most unique world of plants on the territory of bosnia-herzegovina's Dinaric Alps. The underlined insulation of certain habitats, such as cliffs, canyons and the highest mountain peaks, has resulted in development of special forms that are specific for smaller or larger area, of which some enlarged their distribution range toward other parts of the Balkan peninsula

The most specific feature of B&H's flora is a great deal in both paleo- and neo-endemic species, then tertiary and glacial relicts, which have been preserved in refugial habitats, such as cliffs, canyons and mountain cirques. There is a small number of palaeoendemic species that have been preserved in B&H's flora. Into this group belong some famous representatives of silicate and carbonate alga, whilst among vascular plants here belong different conifers, and trees like birch, hazel, oaks and beech. Most of endemic forms (genera, species, sub-species and lower taxonomic categories) is comprised by flora of vascular plants, which, after current assessment, counts 450 endemic taxa. But newly undertaken research indicates that this number is much greater, especially within insufficiently explored genera like *Alchemilla*, *Potentilla*, *Rosa*, *Rubus*, *Hieracium*, *Centaurea*, *Carex*, *Festuca*. Special attribute of vascular flora in B&H are countless stenoendemic forms.

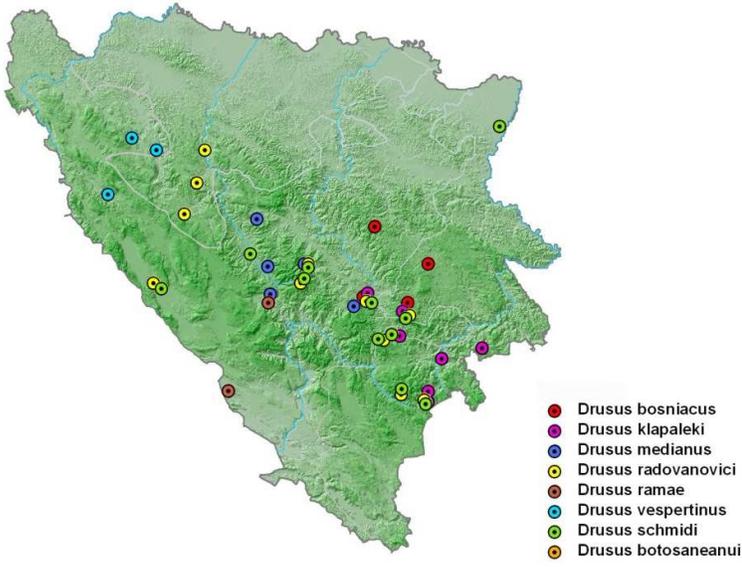
Table 3. – Some stenoendemic plants in B&H

Taxon name	Distribution
<i>Acinos orontius</i> (K. Maly) Šilić	Between Konjic i Glavatičevo, around Glavatičevo, in kanyon Rakitnica, Đepa at Konjica, valley Trešetnice, Vrtaljica, Suhi do, Zlatar, at Vrbljana, Pirića in around Podorašca, at Špiljana, Bigolja
<i>Alyssum moellendorfanum</i> Aschers. ex G. Beck	Dolomite slopes at Prenja: valley Trešanice, between Konjica and Špiljana, Koznik near Konjica, at Vrabca, Borak, Galat, Orlov Kuk near Glavatičevo, at estuary Rakitnica, Boračko jezero – Glavatičevo
<i>Asperula hercegovina</i> Degen	Prenj, Čvrsnica, Čabulja, Velež
<i>Barbarea bosniaca</i> Murb.	Bosnia; endem of mid Dinarida
<i>Campanula hercegovina</i> Degen & Fiala	Čvrsnica, Prenj, Čabulja, Velež, Plasa
<i>Centaurea bosniaca</i> (Murb.) Hayek	Vranica, Vitruša, Zec Mt., Vukuš Mt., Vis at Kalesije, Tatinica, Ravna Mt.
<i>C. murbeckii</i> Hayek	Igman, Plazenica Mt., Kupres, Bjelašnica Mt. at Gacka, Velež, Lukomir, Obalj
<i>Dianthus freynii</i> Vandas	Prenj, Čvrsnica Plasa
<i>Edraianthus hercegovinus</i> K. Maly	Čvrsnica
<i>E. niveus</i> G. Beck	Vranica, Zec Mt., Vitreuš Mt.
<i>Euphorbia gregersenii</i> K. Maly	Valley of Gostović potok (Kamenica) and his tributaries : Kamenica i Suha, Velež, Borik kod Borovnice, na Tajanu
<i>E. hercegovina</i> Beck	Zvekuša, slopes of Zlatara, between Podorašca i Konjica, Suhi do, dolina Ljute kod Bigolja i Pričepe
<i>Melampyrum trichocalicinum</i> Vandas	Glogovo Mt., gorge Risovca – Aleksin Han at Jablanice, Pribilje in valley of Rakitnice, in valley Doljanke at Doljana, Skok at Prenj Mt., Orahovica near Nemila, Brasina Mt., above Bijelog polja, gorge of Risovca, at Jablanice, in valley Rakitnice near Blaca
<i>Minuartia handelii</i> Mattf.	Čvrsnica – Veliki Vilinac
<i>Oxytropis prenja</i> (G. Beck) G. Beck in Reichenb. & Reichenb. Fil.	Prenj, Čvrsnica, Vran, Plasa,
<i>Potentilla heptaphylla</i> L. subsp. <i>velezensis</i> (Beck) Bjelčić	Prenj, Čvrsnica, Čabulja, Velež, Preslica
<i>Seseli hercegovinum</i> K. Maly	Karaula, Aleksin han, Prenj, Čvrsnica, Grabovica, Neretva, estuary Dive Grabovice, above estuary of Drežnice u Neretvu, Glogovo
<i>Symphandra hofmannii</i> Pantocsek	Mid Bosnia: area around mid flow of Bosnia and Vrbas river, Vranica – valley of river Kozice, near Brčkog
<i>Thymus richardii</i> Pers. subsp. <i>Richardii</i>	Surrounding of Konjic : Ljuta, Vrtaljica, Suhi Do, Zlatar i dr.), surrounding of Podorašca, on dolomite bedrock around Boracko lake, Glavatičevo near Dubočana, Visočica above Pribilja, Zvekuša Mt. Živanjska rijeka, Pričepak, Bigolj

<i>Viola beckiana</i> Fiala	Smolin near Žepča, Stolovac between Donjeg Vakufa and Jajce, between Bugojno and Kupres, Han Koprivnica, Stožer Plazenica
<i>V. prenja</i> G. Beck	Prenj

Respecting the approach of modern authors, animal kingdom is divided into numerous phyla. To assess the actual and potential number of animal species in B&H is the most sever problem of all. Any attempts to make systematic overview on available faunistic records in Bosnia and Herzegovina had to deal with uneven knowledge level regarding different animal groups. There is a lack of records on Protozoan realm in Bosnia and Herzegovina by phylla. Metazoan phylla, like Plathelminthes, Nemertina, Nematoda, Rotatoria, Pogonophora are either poorly or not explored at all in Bosnia and Herzegovina.

Invertebrates represent the largest and most diverse group of living world, at global, regional and local scale. The framework of bosnia-herzegovina's faunistic biodiversity is composed of different invertebrate groups. On the other hand, invertebrates



represents least explored group of organisms.

Due to diversity of aquatic habitats, as well as the occurrence of different kind of streams, limnofauna in Bosnia and Herzegovina is extremely diverse. For an illustration, fauna of caddisflies counts so far 215 species from 78 genera. Out of which 50 species are considered to be endemic, and among them are 24 species with dinaric distribution range.

Figure 4. – Distribution of species of genus *Drusus* in B&H

The most interesting genus is *Drusus* which lives in spring water of B&H. Vertebrates fauna in Bosnia and Herzegovina is represented by following groups: fishes (Pisces), amphibians (Amphibia), reptiles (Reptilia), birds (Aves) and mammals (Mammalia). Diversity assessment by animal groups in B&H is shown in Table 4. The highest level of endemism is achieved in the group of fishes. Besides, it was established that most of endemic forms have got distribution range within Adriatic watershed (Table 5).

There are only few groups of organisms on the Earth that occur as frequent as representatives from misterious world of fungi do, yet they are poorly known to the science. It is also the case with lichens.special living form of biological organisation, in which mutualistic symbiosis make fungi and cyanophytes and other algas. Fungi inhabit both terrestrial and aquatic environment. Their role in matter circulation, through the process of decomposition, is immense.

Fungi contain enzymes necessary to decompose even the most complex organic compounds, such as lignin, turning it into humus and, at the end into mineral components.

Table 4. – Assessment of animal biodiversity in B&H

Group	Family	Genus	Species	Endemic species
Fishes	27	69	119	12
Amphibians	7	8	20	6
Reptiles	12	26	38	12
Birds	60	165	326	-
Mammals	19	51 (??)	85 (+2?)	9
Total	125	319 (??)	588 (??)	39

Table 5. – Endemic species and sub-species of fishes and their distribution in B&H

Confluence	Vrbas	Bosna	Drina	Neretva	Una i Sana	Ukrina	Hutovo blato	Buško jezero	Klinje jezero	Sava	Tinja	Trebišnjica	Livno, Duvno
TAXON													
<i>Salmothymus obtusirostris oxyrhynchus</i>				X									
<i>Salmo marmoratus</i>				X			X						
<i>Phoxinellus alepidotus</i>				X				X					
<i>Phoxinellus metohiensis</i>									X			X	
<i>Phoxinellus pstrosi</i>												X	
<i>Phoxinellus ghetaldi</i>								X				X	
<i>Phoxinellus adspersus</i>				X			X						
<i>Leuciscus svallize</i>												X	X
<i>Leuciscus tursky tursky</i>				X			X					X	X
<i>Chondrostoma kneri</i>				X			X						
<i>Chondrostoma phoxinus</i>								X					X
<i>Aulopyge hugeli</i>				X				X					X
TOTAL				7			4	4	1			5	4

Due to diversity of active principles they contain (physiological and pharmacological), fungi had been used. Higher fungi (actual fungi) include species with proven nutritive characteristics being therefore used in human nutrition and for medicinal purposes. Among these the most common are : mushroom (*Agaricus bisporus*), truffle (*Tuber magnum*), morel (*Morchella sp.*), bolete (*Boletus sp.*), milk paper mushroom (*Lactarius sp.*), cantarelle (*Cantarellus sp.*), and others that represent substantial income source for a local community. Among fungi some are lethal, such as: fool's mushroom (*Amanita verna*), destroying angel (*Amanita virosa*), and many other different species with different toxic effect.

Due to heterogeneity of habitats it is being estimated that in Bosnia and Herzegovina live extremely great number of fungi. However, there have been identified 552 species until now.

Table 6. – Diversity of known fungi in B&H

DIVISION	CLASS	ORDO	FAMILY	GENUS	SPECIES
Ascomycota	2	6	12	28	51
Basidiomycota	2	22	56	139	501
TOTAL	4	28	68	167	552

Table 7. – Assessed diversity of fungi in B&H

GROUP FUNGI	ASSESED	PRESUMED NUMBER	KNOWN IN EUROPE
Dyscomycetes	200	1000	1800
Pyrenomycetes	11	?	?
Gasteromycetes	50	150	280
Aphylophorales	400	700	1000
Agaricales	800	2000	3400
TOTAL	1461	3850 ?	6480 ?

Lichens make unique group of organisms. In the course of living systems evolution, lichens have brought together interest of, in respect of phylogeny, distant groups : fungi (Mycota kingdom), cyanophytes (Mychota kingdom) and green algae (Plantae kingdom).

Lichens have played one of the most significant roles in the shaping up of geobiosphere, especially in pedogenesis. Therefore, in the process of syngeneses and pedogenesis lichens have irreplaceable function. In the natural system they represent initial stage of community's development (phytocoenoses) known as *Lichenetea*, being the foundation for further syngeneses - toward more complex communities.

Lichens are highly sensitive biological systems in terms of environmental changes, which makes them excellent bioindicators for the evaluation of ecosystem's state and acceptance capacity, and especially for the assessment of air quality. In Bosnia and Herzegovina identified are over 300 lichens so far, while the expected biodiversity is estimated to be about 1.000 of total 20.000 species as it was identified in the world.

In order to preserve diversity of plants, animals and fungi in Bosnia and Herzegovina, the Strategy has determined following programme of activities:

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN B&H

1.2 CONSERVATION OF SPECIES DIVERSITY IN B&H

PROGRAMME OF ACTIVITIES TASK	TASK
1.2.1. Assessment of species diversity in B&H	1.2.1.1. Flora of Bosnia and Herzegovina
	1.2.1.2. Fauna of Bosnia and Herzegovina
	1.2.1.3. Fungia of Bosnia and Herzegovina
1.2.2. Assessment of conservation status for species diversity in B&H	1.2.2.1. Red list and Red book of plants of Bosnia and Herzegovina
	1.2.2.2. list and Red book of animals of Bosnia and Herzegovina
	1.2.2.3. Red list and Red book of fungi and lichens of Bosnia and Herzegovina
1.2.3. Setting up of <i>in situ</i> conservation measures for species diversity in B&H	1.2.3.1. Identification of areas important for protection of species diversity in B&H
	1.2.3.2. Setting up of areas designed to protect species diversity in B&H
	1.2.3.3. Setting up of monitoring mechanisms
1.2.4. Setting up of <i>ex situ</i> protection measures	1.2.4.1. Reviving of existing capacities (Botanical garden, Arboretum, Mediterranetum, natural scientific collections of Land's Museum)
	1.2.4.2. Setting up of gen bank for endemic and threatened gen pool
	1.2.4.3. Setting up of national Botanical garden

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN B&H

1.3 CONSERVATION OF GENETIC RESOURCES IN B&H

Genetic diversity means richness of gen pool comprised within different plant and animal forms both cultivated and domesticated ones through a long process of ethnogenesis in Bosnia and Herzegovina.

Factors that determine genetic diversity on national scale are :

- High heterogeneity of ecosystems and landscapes in Bosnia and Herzegovina,
- Unique processes and levels of cultural diversity,
- Hystorical process of inhabitation,
- Other civilization's influences coming from the East and West,

Biodiversity of indigenous gen pool as whole has resulted in high diversity of genetic resources in Bosnia and Herzegovina that are contained in great number of original (especially genotypes and ecotypes) animal breeds and plant sorts.

As it is the case in any other biodiversity aspect, genetic biodiversity of B&H represents a big mistery. There are only sporadic scientific and expert data on identified sorts and breeds.

Now, it is common belief that basic data on rich genetic diversity of plants and animals were lost over time. Legislative that would consider the issues of inventory and protection hasn't been inforced yet. Special importance comes to a fact that the scientific inventory of genetic diversity hasn't been completed yet, meaning that bank of gens which should obey the international rules hasn't been established neither.

What once used to be the richness in indigenous (either deeply rooted or domesticated) sorts of apples, pears, plums and other fruits, and sorts of wheat such as „bjelica“ and other cereals, now are only traces in volk's songs and tales illustrating former cultural richness and ethnologic diversity.

Nevertheless, speaking of herbal genetic resources nowadays is stressed diversity of vegetables, fruits and cereals in Bosnia and Herzegovina.

Among cereals, as a genetic resource valuable are sorts of maize (*Zea mays*), wheat (*Triticum sp.*), barley (*Hordeum sp.*), oat (*Avena sativa*), rye (*Secale cereale*), broomcorn millet (*Panicum miliaceum*).

Among gardening genetic resources diversity of forms and special ecotypes characterizes : pumpkins from genus *Cucurbita*, bean (*Phaseolus vulgaris*: čučo, bubnjo, trešnjo, kućičar, mesni), cabbage from genus *Brassica*, paprika (*Capsicum annuum*), widely known okra (*Hibiscus esculentum*), watermelon called semberka (*Cytrullus colocynthus*), melon (*Cucumis melo*), and spectrum of potato's sorts (*Solanum tuberosum*: romanijski, kupreški, fojnički, glamočki etc.).

Genetic diversity of fruits is reflected in great number of cherry sorts (*Prunus avium*: alice, ašlame, hašlamuše, hruščovi, crnice, bjelice); plums (*Prunus domestica*: bijele, prskulje, mrkulje, savke); pears (*Pyrus sp.*: ječmenke, krivočke, mednjače, takiše, bijeli karamut, crni karamut, krupnjače, jeribasme); apples (*Malus sp.*: petrovače, golubače, šarenike, zelenike, senabije, šahmanuše, krompiruše, crvenike etc.), as well as sour cherries, apricots, peaches, almonds, raspberries, blackberries, strawberries and currants.

Ornamental flora that still decorates many gardens and backyards takes significant place in the diversity of herbal genetic resources of our country, too. Highly significant gen pool is contained within different forms of roses (*Rosa sp.*), such as đulbešećerka (*Rosa poliantha*); đulhatma or hollyhock (*Althaea rosea*); common rue (*Ruta graveolens*); rejhan or basil (*Ocimum basilicum*); miloduh or lovage (*Levisticum officinale*); šekaik or peony (*Paeonia sp.*); wenlock beauty (*Erysimum sp.*) and many others whose last traces were lost long time ago.

Through the longlasting existance of human civilizations on the territory of Bosnia and Herzegovina, domesticated were many animal breeds. Some of them evolved in time as distinct ecotypes representing today clearly separated, even insulated, forms in the general gen pool of domestic animals. High diversity is achieved among various breeds of horses, cattle, sheeps, goats, pigs, dogs and pigeons.

Special value of Bosnia and Herzegovina is represented by thousand-year old roots of various biotechnological procedures in food production and preservation, from traditional refreshing drinks and sour salad, over "sour" food supplies for winter season to mild and strong alcohol drinks. In the beginning those products were ment for personal needs, getting later more comercial dimension. Based on rich experiences from the "home-made" biotechnological practice, in Bosnia and Herzegovina has been developing very successful industrial biotechnological production of livegoods and alcohol drinks.

As a special expression of ethnogenesis, nutritional culture and traditional biotechnological skills and solutions considered is high richness in indigenous sorts of chees, made by "secret" biotechnological procedures from high quality milk of bosnian cows, sheeps and goats. In the uniqueness of herbal diversity comprised by pastures in Bosnia and Herzegovina, where domestic animals graze, lies a secret on the quality and composition of chees. Apart from so far identified and recognized 15 sorts of indigenous chees, there are most certainly many other unknown biotechnological formulas, which are hidden in mountain cottages of the Dinaric Alps in B&H.

In order to preserve indigenous gen pool and genetic resources in B&H, the Strategy has determined following programme of activities:

1. STRATEGIC DIRECTION: DECREASE IN BIODIVERSITY LOSS IN B&H

1.3. CONSERVATION OF GENETIC RESOURCES IN BOSNIA AND HERZEGOVINA

PROGRAMME OF ACTIVITIES	TASK
1.3.1. Assessment and conservation of indigenous genetic resources in B&H under <i>in situ</i> conditions	1.3.1.1. Identification and estimation of significance for indigenous genetic resources in B&H
	1.3.1.2. Creation of Action Plan for conservation of herbal genetic resources in B&H under <i>in situ</i> conditions
	1.3.1.3. Creation of Action Plan for conservation of herbal genetic resources in B&H under <i>in situ</i> conditions
1.3.2. Conservation of indigenous genetic resources in Bosnia and Herzegovina under <i>ex situ</i> conditions	1.3.2.1. Identification of priorities for conservation purposes under <i>ex situ</i> conditions
	1.3.2.2. Founding of bank of gens, polens, seeds, setting up of tissue cultures etc.
	1.3.2.3. Setting up of gen bank by manipulating and keeping DNA molecules <i>in vitro</i>
	1.3.2.4. Setting up of network of centres for reproduction under <i>in vitro</i> conditions
1.3.3. Monitoring and conservation <i>in situ</i> by analysis of genetic variability	1.3.3.1. Monitoring and regular research on variation within informative genetic markers
1.3.4. Protection of biological diversity against potential risk arising from GMOs introduction	1.3.4.1. Development of system for controlling the quality and biosafety of imported food and raw material
	1.3.4.2. Setting up of GMOs monitoring system in animal and herbal production, as well as monitoring of possible outburst of transgens within local ecosystems

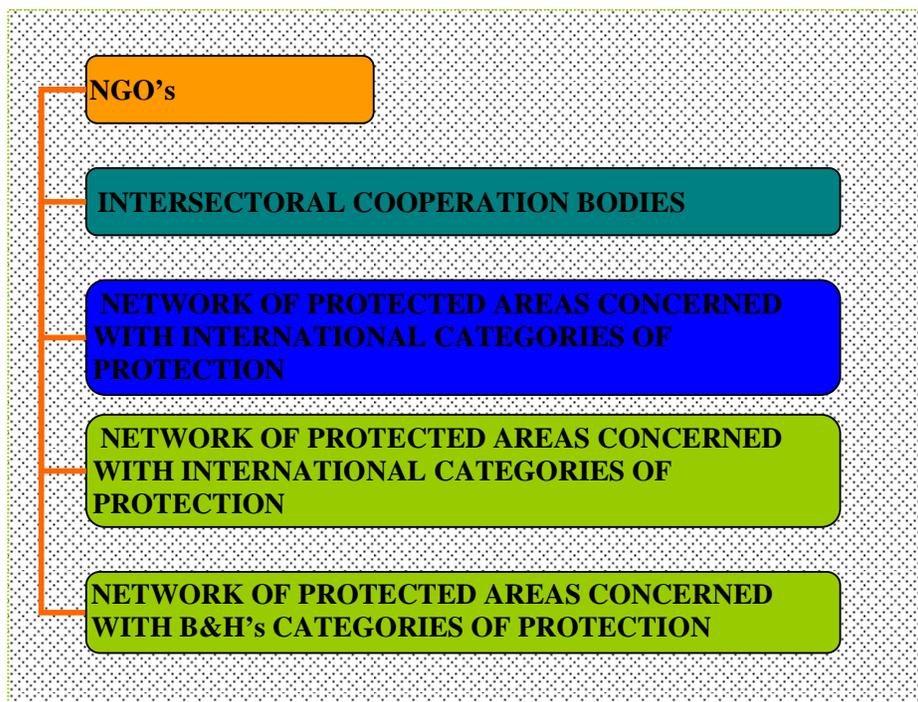
2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

The maintenance of biodiversity of Bosnia and Herzegovina in current state is impossible to achieve if there is no efficient system with developed mechanisms in place, which include:

1. financial support for the realization of activities
2. strong and efficient institutional framework which shall encompass legal, human and technical capacities
3. development of mechanisms for carrying out activities of biodiversity protection through relevant economic sector
4. exchange of scientific and technological information
5. preservation and promotion of traditional knowledge and practice.

The system of biodiversity conservation in Bosnia and Herzegovina shall be composed of following components:

1. network of protected areas with corridors concerned with:
 - a. BH protection categories
 - b. International protection categories
2. network of administrative, scientific and expert institutions with information flow in place
3. intersectoral bodies for cooperation in the field of biodiversity protection
4. network of non-governmental organizations



Graph 1. – Components of biodiversity conservation system in B&H

DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

SETTING UP OF FINANCIAL CURRENT AS A SUPPORT TO THE SYSTEM FOR CONSERVATION OF BIODIVERSITY IN B&H

Having respect on one hand for the richness and biodiversity potentials in terms of sustainable development of Bosnia and Herzegovina, and rising political willingness for recognition of biodiversity's importance as a property and resource on the other, in the contemporary moment of our society emerges a need for steady financial current to be established in order to enable continuous activities regarding nature protection.

Present economic situation, including all associated social effects, shows that Bosnia and Herzegovina is not able to ensure full and steady financial support by its own means for the biodiversity protection on its territory. Moreover, there must not be omitted the fact that financial mechanisms, though poorly inter-connected, have already been in place.

The analysis of B&H's biodiversity state, as well as the identification of clear conservation targets and system which enables it, made obvious that means invested until now haven't been enough.

At the same time, it became clear following: a critical items are to ensure stable internal financial basis which shall supply means for the system, to set up and maintain functions of the system and to ensure its sustainability.

In wider sense of words, set up of biodiversity conservation system requires mechanisms for nature management to be developed. This includes, among others, economic functions and connections between adjacent sectors, and extremely important economic potentials for the development of natural management sector as a new economy branch of sustainable development in Bosnia and Herzegovina.

Among working mechanisms in natural management sector there is a creation of space for private entrepreneurs and foreign investments which hasn't been entirely used until now, when it comes to activities of nature protection in B&H.

It is necessary to adjust current economic patterns through the introduction of incentive measures in programmes of natural management. Public enterprises, for instance, as a way to manage rare protected areas, with taxation burden and poorly developed strategy of fund raising, don't represent a sustainable way of natural management.

Due to possibility of fast fund raising through the exploitation of hydro-potentials, forest and other natural resources, there is a lack of interest for the establishment of new protected areas. Hence, creation of mechanisms for benefit gain in natural management sector becomes priority in terms of biodiversity preservation.

It is not a question at all if this process requires much stronger political willingness and social efforts in general, but it is also a sole method for maintenance of natural resources of Bosnia and Herzegovina, as a base for the subsistence of entire society.

It is necessary to stress following: concept of environmental foundations in terms of leading idea for their purpose is not satisfactory base for the development of process for natural management. After given concept, there is a number of environmental segments which shall use this foundation and leave no enough space to initiate strong process of natural management.

The Strategy affirms following programme of activities:

2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H	
2.1. SETTING UP OF FINANCIAL CURRENT AS A SUPPORT TO THE SYSTEM FOR CONSERVATION OF BIODIVERSITY IN B&H	
PROGRAMME OF ACTIVITIES	TASK
2.1.1. Setting up of financial base for the system of conservation and sustainable use of biodiversity in Bosnia and Herzegovina	2.1.1.1. Cost-benefit analysis for setting up of nature management sector including economic mechanisms and programmes
	2.1.1.2. Setting up of continuous allocation originating in budget means as a support for biodiversity conservation system
2.1.2. Setting up of strong mechanisms for creation of economic obligations in sector of use of natural resources	2.1.2.1. Review of ongoing currents for fund rising by sectors based on use of resources, with proposal for adequate measures
	2.1.2.2. Monitoring of ongoing means current coming from allocation by sectors on the base of resources use
2.1.3. Setting up and strengthening of economic incentive measures for nature preservation	2.1.3.1. Analysis of effective management modes in the field of nature preservation including proposal for economic discounts
	2.1.3.2. Introducing programme for private sector regarding protected areas management
2.1.4. Utilisation of foreign means	2.1.4.1. Identification of investors and corresponding programmes
	2.1.4.2. Strengthening of capacities required for application, adequate claim and use of foreign means

2. STRATEGIC DIRECTION: SETTING UP OF CONSERVATION SYSTEM AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

2.2. SETTING UP OF EFFICIENT INSTITUTIONAL FRAMEWORK

The institutional framework supporting biodiversity conservation system which is in accordance with identified biodiversity state should be highly efficient in terms of legal, administrative, expert and human capacities.

The institutional framework for management of biological and landscapes diversity in Bosnia and Herzegovina is composed of:

- ❖ International regulations and legal framework of Bosnia and Herzegovina for maintenance and protection of biological and landscapes diversity;
- ❖ Institutions of governmental sector;
- ❖ Institutions for study, inventory and conservation of biodiversity;
- ❖ Organisations of non-governmental sector.

In the field of interest direct legal base for actions make Law on nature protection of FB&H, Law on nature protection of RS and Framework law on nature protection of Brcko District. The base for entity laws make Habitat (92/43/EEC) and Bird Directives (79/409/EEC) which are still unapplicable within the general social context on our territory. The implementation level for afore stated laws is considered to be low due to lack of both financial and organisation capacities. The mechanisms for implementation of laws are poorly developed which utterly results in highly complex and difficult procedure for practical protection of natural areas of high value. Lack of both horizontal and vertical interconnections between this and adjacent laws, as well as between all relevant administration structures, cause the activities to get fragmented and issue of biodiversity protection to get detached from all adjacent sectors and domains.

The institutions of governmental sector in competence of nature management don't dispose of adequate expert and technical capacities for entire and highly complex, but at the same time undeveloped, process of nature management. Competent institutions aimed to carry out targets and actions of the Convention on biological Diversity haven't been established (FB&H, DB) yet or require far greater capacities than those already in place (RS).

Political, organisational and financial aspects of establishment of the national agency can not be considered as institutional obstacle for the implementation of targets of the Convention on biological Diversity. Bosnia and Herzegovina as a state is liable signatories of the Convention hence development of mechanism required for its targets to get implemented is necessary and it shall be in common for Federation B&H, Republic of Srpska and Brcko District.

In order to establish the efficient framework, the Strategy identifies programme of activities as follows:

2. STRATEGIC DIRECTION: SETTING UP OF CONSERVATION SYSTEM AND SUSTAINABLE USE OF BIODIVERSITY IN B&H	
2.2. SETTING UP OF EFFICIENT INSTITUTIONAL FRAMEWORK	
PROGRAMME OF ACTIVITIES	TASK
2.2.1. Strengthening of legislative basis for nature protection	2.2.1.1. Review of the Law on nature protection in FB&H, RS and DB according to NBSAP targets
	2.2.1.2. Development of sub-legislative acts and mechanisms for their implementation
2.2.2. Increased implementation of laws on nature protection in FB&H, RS and DB	2.2.2.1. Strengthening/founding of expert institutions for the implementation of Law on nature protection in RS, DB and FB&H
	2.2.2.2. Education of trained personnel
	2.2.2.3. Setting up of adequate technical capacities
2.2.3. Strengthening of cooperation between entity institutions and laws	2.2.3.1. Establishment of uniform nature management process based on decisions from Ministry departments
	2.2.3.2. Founding of the Direction for implementation of the Strategy and setting up of Natura 2000 Network
	2.2.3.3. Co-operation by setting up of the network of Natura 2000 sites
2.2.4. Strengthening of cooperation between scientific institutions in the field of nature protection	2.2.4.1. Preparation of symposiums, conferences and seminars for identification of Natura 2000 sites
2.2.5. Strengthening of cooperation within NGO's sector	2.2.5.1. Setting up of common projects for biodiversity monitoring

2. STRATEGIC DIRECTION: SETTING UP OF A SYSTEM OF CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

2.3 INTER-SECTORAL APPROACH IN NATURE MANAGEMENT

Among in the First national Report referred characteristics of nature management in Bosnia and Herzegovina stressed was also “lack of intersectoral connections in the process of decision making relating to exploitation of biological and landscapes diversity”. As the most obvious difficulties in this process emphasized were:

- lack of connectivity in both horizontal and vertical sense, as well as lack of cooperation and information flow between socio-political and other organisation systems of Bosnia and Herzegovina,
- discrepancy and lack of connectivity between strategic and corresponding development documents in economic sectors relating to management of biological and landscapes diversity in B&H.

By implying the intersectoral steering of natural resources as a base for sustainable development, the Strategy aims to incorporate the preservation of biological and landscapes diversity into decision making process of relevant economic sectors in Bosnia and Herzegovina. In that sense, especially important are sectors of forestry, water management, energetic, physical planning and tourism.

In the world today, commonly recognized principle in natural resources management is considered to be the ecosystem approach which is the base for integrated management of space and values contained within.

The Strategy, tending to govern nature management in Bosnia and Herzegovina in the sustainable way, endeavours to create activities which shall enable optimising of natural resources management in B&H, which is to be achieved by connectivity of:

- identification of sustainable aim and efficiency for some areas in Bosnia and Herzegovina including all available resources,
- decision making which will ensure long-termed wellbeing for the community,
- development of programmes which are profitable for number of sectors within the community,
- identification and promotion of biological and landscapes diversity in B&H as a common value at national scale with potential to gain profit.

For there is no independent and self-sustained nature management system in Bosnia and Herzegovina at the moment, if there should be setup one which would be linked to relevant sectors, then it would be a chance for optimal systems of integrated management of bigger or smaller ecological units to get developed within geographically defined framework, such as watersheds, mountain regions, karst region etc.

In respect to administrative organisation in B&H, integrated management of physic-ecological units increase possibility to develop secondary and tertiary actions, and at the same time to develop programmes which should be adjusted to preserve and revive ecological environmental values that already exist.

In order to establish inter-sectoral approach in nature management, the Strategy has determined following programme of activities:

2. STRATEGIC DIRECTION: SETTING UP OF A SYSTEM OF CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H	
2.3. INTER-SECTORAL APPROACH IN NATURE MANAGEMENT	
PROGRAMME OF ACTIVITIES	TASK
2.3.1. Harmonization of sectoral strategies with strategic targets related to biodiversity management	2.3.1.1. Analysis of sectoral strategies
	2.3.1.2. Identification of divergent targets
	2.3.1.3. Identification of targets for optimizing of sustainable development
	2.3.1.4. Modifying of sectoral targets in accordance with the Strategy for biodiversity protection
2.3.2. Incorporation of biodiversity issue in sectoral policies and targets	2.3.2.1. Preparation of instructions for identification and preservation of biological/ecological specific forest areas
	2.3.2.2. Preparation of instructions for identification and management of biological/ecological specific areas/agroecosystems
	2.3.2.3. Preparation of instructions for identification and management of biological/ecological specific hidroecosystems areas
2.3.3. Development of integrated environmental management process	2.3.3.1. Preparation of instructions for identification of ecological values within B&H's regions
	2.3.3.2. Capacity building relevant for defining optimal space usage
	2.3.3.3. Building of capacities needed for implementation of ecosystem approach in nature management

2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

EXCHANGE OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION IN THE FIELD OF BIODIVERSITY

Exchange of information related to biodiversity issues in Bosnia and Herzegovina has not been established yet, which is the result of inadequately developed institutionally framework. There is a structure missing in vertical sense that should be a backbone for management in the field. This has led to fragmentation and retention of information at either administrative or some scientific levels.

Lack of centrally positioned expert institution, and/or firmly established expert and administrative bodies by entities, have disabled exchange of information in this field.

When it comes to how the competencies and responsibilities in B&H are split, the Federal Ministry of Environment and Tourism plays a key role in implementation of the Convention on biological Diversity, being hence also a host for the CHM in Bosnia and Herzegovina.

The Clearing House Mechanism, which is the portal for exchange of information on biodiversity, has been established in the course of this project. Development of this mechanism, its use in practice and rising of usage value shall become one of the main indicators for the efficiency of Strategy on biological and landscapes diversity in Bosnia and Herzegovina.

2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H	
2.4. EXCHANGE OF SCIENTIFIC AND TECHNOLOGICAL INFORMATION IN THE FIELD OF BIODIVERSITY	
PROGRAMME OF ACTIVITIES	TASK
2.4.1 Strengthening of BH-CHM network for exchange of information on biodiversity	2.4.1.1. Opening of CHM office
	2.4.1.2. Development of IT CHM service
	2.4.1.3. Establishment of data base
2.4.2. Promotion of practice on exchange of information	2.4.2.1. Setting up of local reporting network considering biodiversity monitoring
	2.4.2.2. Preparing of publications considering the biodiversity in B&H

2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

2.5. MAINTENANCE OF TRADITIONAL KNOWLEDGE AND PRACTICE

The sustainable use of biodiversity components in Bosnia and Herzegovina has got its solid fundamentals in traditional knowledge and practice, which is missing in a modern society.

The longlasting ethnogenesis with underlined diversity of cultures has left enough time and space for development of number of practices, which has ment high level of natural resources usage, as well as its sustainability for ensuring the life.

Food production in Bosnia and Herzegovina, which gained and transmitted great deal of experiences on best practice in time, has been built upon ecogeographic belonging of distinct regions and ran under proper climate conditions that govern there. That kind of production associated with sufficient amount of labour was able to ensure enough food for local population.

In modern bosnia-herzegovina's society there has been daily growing interest in easy and fast way of satisfying life needs hence the traditional approach has been neglected completely. Old knowledge and practices are being lost forever with dissapearance of older generations which is the lost that B&H's society is not aware of. Under current economic conditions, traditional knowledge along with indigenous gen pool and high potential of the area represent base for intensive production of healthy food.

2. STRATEGIC DIRECTION: SETTING UP OF SYSTEM FOR CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY IN B&H

2.5. MAINTENANCE OF TRADITIONAL KNOWLEDGE AND PRACTICE

PROGRAMME OF ACTIVITIES

TASK

2.5.1. Setting up of centres for maintenance of old knowledge and practice

2.5.1.1. Maintenance of indigenous practices and knowledges through ecotouristic activities

2.5.1.2. Administration of traditional knowledges and practices

2.5.2. Promotion of traditional knowledges and practices

2.5.2.1. Programme of promotion of traditional practice through healthy food production

2.5.2.2. Programme of promotion of traditional values through publications and media

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H

CONTROLLING OF HABITATS CONVERSION

According to the results of Millenium Ecosystem Assessment one of the five major drivers leading to biodiversity loss is habitat conversion.

Transformation of habitats at present, mainly from primary into secondary or tertiary ones, including all of their structure and functions, represents in our society frequently occurring, yet less noticed and monitored phenomenon.

In our country primary kind of habitats that are most often stroke by anthropogenic activities are: forests, rock crevices which prevail in refugio-relict ecosystems of canyons and narrow passages, as well as wetlands that are attached to high-mountainous bogs, alluviums or estuaries, but also to karst fields in Herzegovina.

These habitats are subjected to diverse and very intense pressures.

Construction of roads within forest ecosystems changes not only that particular share in forest habitat, but also through fragmentation of woodland comes to tremendous changes in the structure and function of entire biocoenoses.

Rising of hydro-accumulation dams, opening of quarries and development of traffic infrastructure within most valuable refugio-relict ecosystems of Bosnia and Herzegovina, all that leads to irreversible loss of environment in which have managed to endure populations of certain species over thousand of years. Today, these species are considered to be true rarities in respect to global biodiversity. By drainage, burning, melioration and conversion into arable land what once used to be a wetland area, is being lost large proportion in B&H's biodiversity both in terms of quality and quantity. Many animals, especially birds, amphibians and reptiles, which are adapted to wetland environment lose their living medium through the outlined anthropogenic activities.

However, primary ecosystem types are not the only ones to be affected today. Fertile arable land including its agrobiodiversity are being often converted into construction sites in which

comes to irreversible changes that lead to emerging of anthropogenous deserts.

Through the construction of housing and economy infrastructure on arable land degraded are not only habitat for number of species attached to agrobiocoenoses, but also the possibility itself to either restore or improve these ecosystems eventually.

Along with above mentioned facts, it should be stressed that urbanisation process, followed by all of its side effect, frequently gets out of control. There is a delay either in decision making or implementation of expert physical planning documents, hence piece after piece of most valuable parts of B&H's nature are being lost day after day.

In its original idea, the ecosystem approach has been present in this territory for over 50 years.

However, social happenings that took place in B&H in last 15 years, have brought high dosis of negligence toward possible consequences which affect the environment, and that happens with one purpose only - to gain swift profit. However, positive streamlining in the society could be promoted in the way that ecosystem approach principles and practices get re-established again.

In order to get control over habitats conversion, the Strategy has determined following programme of activities:

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H	
CONTROLLING OF HABITATS CONVERSION	
PROGRAMME OF ACTIVITIES	TASK
3.1.1. Identification of sensitive areas and ecosystems in Bosnia and Herzegovina	3.1.1.1. Mapping of sensitive areas in B&H
	3.1.1.2. Mapping of habitats and ecosystems in B&H
	3.1.1.3. Review of conservation status for areas protected by laws of SRB&H
3.1.2. Co-operation with physical planning sector	3.1.2.1. Identification of sensitive habitats in B&H through physical-planning documents of FB&H, RS and DB
	3.1.2.2. Enlargement of capacities for physical-planning documentation through intensified work of court's services
	3.1.2.3. Enlargement of capacities for physical-planning documentation through intensified work of inspection services
3.1.3. Strengthening of environmental licence tools	3.1.3.1. Strengthening of mechanisms for expert assessment on state in biological and landscapes diversity as a segment in environmental licence approval
	3.1.3.2. Valorizacija stručne procjene stanja biološke i pejzažne raznolikosti u procesu sticanja okolinske dozvole
	3.1.3.3. Monitoring of biodiversity protection measures assigned by environmental licence

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H

3.2. MONITORING OF THE EFFECTS OF GLOBAL CLIMATE CHANGES

Global climate changes have become our reality today. They were emphasized in the Millennium Ecosystem Assessment as one of the strongest drivers for changes in biodiversity and its loss in general. Since the Summit on Earth (Rio de Janeiro, 1992), when the Framework Convention on Climate Changes has been created, there has been growing civilization awareness on almost inevitable effects of global changes, which are the result of high pollution and uncontrolled exploitation of resources on one, and changes in vegetation cover on the other side.

Since that moment, it has become clear that direct causal relationship between changes in biodiversity and those in climate, considering the implementation of these two Conventions, should be a matter of co-operation.

Daily increasing amount of pollutants released in the atmosphere builds up the "impermeable wall" around the Earth, which prevents it from cooling off. On the other side, chemical interactions between particles cause damage to ozone layer, which becomes permeable for ions and non-ionic radiation from space, especially of those wave lengths that living world on the planet is not adapted to. Consequences of this two-way process are most obvious in changes of weather pattern and global climate circumstances resulting in ice melting on polar caps and high mountains, as well as frequent floodings followed by catastrophic weather conditions.

One of the main greenhouse gases is CO₂, which is also necessary starting component in the process of photosynthesis. A climate changes model predicts that increase in CO₂ concentration should lead to increased biomass yield.

However, at the same time, the most intense usage of forest resources recorded during civilization era and reduction in phytoplankton productivity due to UV rays and polluted water, act as factors for diminished, not increased absorption of the gas. The nature use feedback effects and systems to send a warning sign to human population on planet.

World actions undertaken on global scale designed to decline effects of climate changes are intense and widely accepted. But, the realization of them both at regional and local level has to cope with many difficulties reflected in their low efficiency rate.

Being far from widely known global effects of climate changes, within ecosystems live populations of such species for whom the environmental conditions, measured on human timescale, are being either rapidly or moderately fast altered. No matter how fast these changes in environmental conditions evolve, the process of adaptation on level of species can not be accelerated, hence many species become either extinct, or their abundance decreases as a result of complex biological interactions.

Changes in temperature, moisture, soil acidity, yield, species extinction within a food web, act as new factors in the environment, which loosen the synergism between biological events which is so typical for ecological balance.

If there is any chance to "follow up" the effects of climate changes, first step would be to monitor changes on living world around us. Lack of knowledge here could have severe consequences on both sides.

In order to secure co-operation in the field of biomonitoring on global climate changes, the Strategy has determined following programme of activities:

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H	
3.2. MONITORING OF THE EFFECTS OF GLOBAL CLIMATE CHANGES	
PROGRAMME ACTIVITES	TASK
3.2.1. Monitoring of the effects that climate changes have got on state in species diversity in B&H	3.2.1.1. Setting up of efficient legal framework for monitoring on state of species
	3.2.1.2. Development of human and technical capacities for species monitoring
	3.2.1.3. Setting up of reporting system for species monitoring
3.2.2. Monitoring of the effects that climate changes have got on state in ecosystem's diversity in B&H	3.2.2.1. Setting up efficient legal framework for monitoring of ecosystem's state
	3.2.2.2. Development of human and technical capacities for ecosystem's monitoring
	3.2.2.3. Setting up of reporting system for ecosystem's monitoring
3.2.3. Co-operation by the implementation of Convention on biological Diversity and Framework Convention on climate changes at local level	3.2.3.1. Co-operation at level of focal points and referring centres
	3.2.3.2. Setting up of reporting system on CBD targets implementation
	3.2.3.3. Setting up inter-conventional body at local level

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H

3.3. CONTROLLING OF INVASIVE SPECIES IN BOSNIA AND HERZEGOVINA

Such species of plants, animals and fungi that have their origin in other floristic, respectively zoogeographic regions are considered to be alien species. In competitive interactions they suppress indigenous gen pool by taking all available ecological niches. Dispersal of alien species is mostly associated with diverse human activities. These species take first either urban or rural habitats, and later on they invade free nature.

The territory of B&H hasn't been spared before the arrival of adventives species, which include apart from alien species different sorts of herbal genetic resources (vegetables, fruits, cereals, ornamental and cultivated plants), as well as the entire line of animals and fungi.

Many alochthonous species are allied to different herbal genetic resources, such is the case with weeds that sustain within crops, leaving agroecosystems hardly ever and taking ecological niches of autochthonous flora. Yet, there are some alochthonous species that are completely adapted to local habitat conditions and have fled to human control long time ago.

Some alien species are spread along with cultivated plants being quite common weed today, such as:

- o *Ambrosia artemisifolia*, thoroughly invading habitats within moist and flooded forests, then ruderal and urban places, as well as the artificial meadows;
- o *Bidens bipinata*, *B. frondosus*, *B. subalaternus* and *Echinocystis lobata* invade habitats of all kind of communities in the belt of riverbanks of lowland and mountainous streams.

Alochthonous animals have been reaching the B&H territory through direct human actions aimed either to breed them or spontaneously.

Among invasive aquatic species the most common are fishes that have come into free water from fish farm or spontaneously from adjacent both rivers and lakes.

Natural and artificial lakes are habitats that get easily invaded by alien species. Alien fishes occur in the artificially impounded accumulations Salakovac, Grabovica, Svitavsko jezero, Gorica, Bilecko jezero on Trebišnjica river, Buško jezero, hydro-accumulation lakes on Vrbas river, then Višegradsko jezero, Perucac and Zvornicko jezero on Drina river. In the natural lakes (Prokoško; Kotlanicko, Orlovacko, Crno, Bijelo, Donje Bare, Gornje Bare, Štirinsko and Kladopoljsko on Zelengora Mt.; Veliko and Blatno jezero, Crno and Bijelo jezero on Treskavica Mt.; Blatacko jezero on Bjelašnica Mt.; Uloško jezero beneath Crvanj Mt.; Boracko jezero beneath Prenj Mt.; Blidinje jezero in the Dugo Polje between Mts. Cvrstica and Vran; Idovacko on Raduša Mt.; Šatorsko on Šator Mt.; Kukavicko, Rasticevsko and Turjaca on the plateau of Kupres; thereafter Veliko and Malo Plivsko jezero) invasive species came by fish introduction, after which the image of herbal and animal world has been changed severely.

In order to ensure control of invasive species in B&H, the Strategy has determined following programme of activities:

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H	
3.3. CONTROLLING OF INVASIVE SPECIES IN BOSNIA AND HERZEGOVINA	
PROGRAMME ACTIVITIS	TASK
3.3.1. Identification of invasive species on the territory of B&H	3.3.1.1. Identification of species and populations of invasive plants and fungi in B&H
	3.3.1.2. Identification of species and populations of invasive fauna in B&H
	3.3.1.3. Establishment of data base on invasive species in B&H
3.3.2. Monitoring of invasive species in B&H	3.3.2.1. Uspostava sistema praćenja i djelovanja na invazivne vrste Setting up of system for monitoring and actions related to invasive species
	3.3.2.2. Setting up of monitoring posts
	3.3.2.3. Setting up of monitoring services
3.3.3. Restrain of dispersal of invasive species on the territory of B&H	3.3.3.1. Identification of modes and ways of dispersal of invasive species in B&H
	3.3.3.2. Setting up and conduction of restrain methods against dispersal of invasive plants and fungi in B&H
	3.3.3.3. Setting up and conduction of restrain methods against dispersal of invasive animals in B&H

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H

3.4. PUBLIC AWARENESS RAISING

The environmental awareness level in citizens of Bosnia and Herzegovina is in general low. The reasons for this kind of state are, among others: achieved level of environmental education, presence of environmental issues in media, information on citizen rights, information on duties of governmental structures in charge, legal basis for environmental protection.

A permanent environmental education, as integral part of continuous education does not exist as such. Besides, written and electronic media in B&H does not show enough interest and knowledge in local environmental issues and problems. However, local entity and national radio and television programmes encompass often aimed documentaries (Eco lexicon, Eco-show, Ecologica, Ecovision, Living with nature, Natural inheritance of B&H).

Although the Law on free information access was adopted in Bosnia and Herzegovina in 2002, it has been poorly used in terms of free access to environmental information. After data base made by the Regional environmental Centre (Office in Bosnia and Herzegovina) there are over 120 NGOs in B&H gathering over 85.000 members. These NGOs have got environmental issues included in their programmes, with accent placed on environmental awareness raising and education.

Although NGOs have realized large number of environmental projects and programmes in B&H since the war ended, the state of environment indicates the fact that by all those activities has not been reached appropriate level of environmental awareness.

3. STRATEGIC DIRECTION: DECREASE OF PRESSURES ON BIODIVERSITY IN B&H

3.4. PUBLIC AWARENESS RAISING

PROGRAMME ACTIVITIES

TASK

3.4.1. Public awareness raising on importance and values of biodiversity in B&H

3.4.1.1. Setting up of the system for environmental education

3.4.1.2. Strengthening of NGO's activities

3.4.1.3. Connecting of NGO's sector and the system for monitoring and reporting

3.4.1.4. Programme for persistent biodiversity presence in media

Monitoring of efficiency of the Strategy for protection of biological and landscapes diversity in Bosnia and Herzegovina (2008-2015)

All provisions and streamlines of the Strategy, which were addressed through targets defined by the Action Plan, as well as the efficiency and dynamics of their implementation, are to be conducted under continuous surveillance by relevant institutions which are designed according to the general socio-political structure in Bosnia and Herzegovina.

In order to ensure that measurement of both general and specific efficiency for strategic directions happens right on time and in the appropriate way, as well as its influence on economic and social development, it is required to identify, which is to set up, indicators of efficiency that should provide all necessary answers and assessment on achieved realization level by strategic directions in the most simple way.

Taking into account the complexity and significance of strategic priorities that were established, as well as the socio-economic and political trends on the territory of Bosnia and Herzegovina and its international orientation on one, and biological diversity related specificity on the other side, determined are following indicators for monitoring of the Strategy's efficiency:

1. Implementation and completion level for strategic tasks within planned time scale. The core of this indicator's significance is reflected in the implementation level for each strategic task, within concrete time dimension (% of task completeness 3 and 5 years after the Strategy's implementation has started)
2. Total area of B&H's territory concerned by any kind of protection. This indicator enables a transparent measurement expressed in increased percentage of protected area within given time dimension (3 and 5 years after the Strategy's implementation has started).
3. Financial support. This indicator relates to the extraction rate of financial means out of the budget sources (annual rate including the precise identification of source)
4. Financial support arising from non-budget means. The indicator is to be established based on the relationship between applications and provided means (means from the international foundations: GEF, World Bank etc.)
5. Level of adjustment of national legislative with international documents. Given indicator relates to the level of adjustment of national legislative with international documents in the field of biodiversity management.
6. Development of legislative. The indicator is to be assessed based on the number of brought laws and under-legal documents which regulate the issue of management of biological and landscapes diversity.
7. Setting up of the ecological network Natura 2000. Given indicator is to be monitored over entire Strategy's implementation period by increasing of the area which is designated to be encompassed by the future network.

Akcioni plan Strategije za zaštitu biološke i pejzažne raznolikosti Bosne i Hercegovine (2008-2015)

PROGRAM	ZADATAK	VREM. RASPORED	REALIZACIJA	NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i DB
1.1.1. Identification and classification of both ecosystem and habitat types	1.1.1.1. Analysis and encoding of both ecosystem and habitat types, including preparation of instructions needed for their identification	2008	Expert team	
	1.1.2. Conservation of biodiversity in mountain landscapes	1.1.2.1. Estimation of natural values in mountain belt of bosnia-herzegovina's Dinaric Alps	2008-2011	
1.1.2.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and following IUCN principles		Od 2009	entitetska resorna ministarstva	
1.1.3. Conservation of biodiversity in refugia of canyons and narrow passages	1.1.3.1. Estimation of natural values in endemic development centres of narrow passages and canyons of Neretva, Una, Sana, Vrbas, Bosna and Drina river including their tributaries	2008-2011	Expert team	
	1.1.3.2. Setting up of protected areas according to the Law on nature protection in FB&iH, RS, following DB and IUCN principles	Od 2009	entitetska resorna ministarstva	
1.1.4. Conservation of biodiversity in karst fields	1.1.4.1. Estimation of natural values in karst fields of B&H	2009-2012	Expert team	
	1.1.4.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following IUCN principles	Od 2010	entitetska resorna ministarstva	
1.1.5. Conservation of biodiversity in wetlands	1.1.5.1. Estimation of natural values in wetland landscapes of B&H	2009-2012	Expert team	
	1.1.5.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following DB and IUCN principles RS i DB i IUCN standardima	Od 2010	entitetska resorna ministrsva	

1.1.6. Conservation of biodiversity in woodland of B&H	1.1.6.1. Estimation of natural values in specific kind of forest ecosystems	2008-2013	Expert team
	1.1.6.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following DB and IUCN principles	Od 2009	entitetska resorna ministarstva
1.2.1. Assessment of species diversity in B&H	1.2.1.1. Flora of Bosnia and Herzegovina	2008-2012	Expert team
	1.2.1.2. Fauna of Bosnia and Herzegovina	2008-2012	Expert team
	1.2.1.3. Fungia of Bosnia and Herzegovina	2008-2012	Expert team
1.2.2. Assessment of conservation status for species diversity in B&H	1.2.2.1. Red list and Book of plants of Bosnia and Herzegovina	2008-2012	Expert team
	1.2.2.2. Red list and Book of animals of Bosnia and Herzegovina	2008-2012	Expert team
	1.2.2.3. Red list and Book of fungi and lichens of Bosnia and Herzegovina	2008-2012	Expert team
1.2.3. Setting up of <i>in situ</i> conservation measures for species diversity in B&H	1.2.3.1. Identification of areas important for protection of species diversity in B&H	2008-2012	Expert team
	1.2.3.2. Setting up of areas designed to protect species diversity in B&H	2009-2012	entitetska resorna ministarstva
	1.2.3.3. Setting up of monitoring mechanisms	Od 2009	entitetska resorna ministarstva
1.2.4. Setting up of <i>ex situ</i> protection measures	1.2.4.1. Reviving of existing capacities for ex-situ protection	2009	vlada BiH, vlade entiteta
	1.2.4.2. Setting up of gen bank for endemic and threatened gen pool	Od 2009	Expert team
	1.2.4.3. Setting up of national Botanical	Od 2010	Expert team

NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i

	garden			NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i
1.3.1. Conservation of indigenous genetic resources in B&H under <i>in situ</i> conditions	1.3.1.1. Identification and estimation of significance for indigenous genetic resources in B&H	2008-2011	Expert team	
	1.3.1.2. Creation of Action Plan for conservation of herbal genetic resources in B&H under <i>in situ</i> conditions	2008	Expert team	
	1.3.1.3. Creation of Action Plan for conservation of animal genetic resources in B&H under <i>in situ</i> conditions	2008	Expert team	
1.3.2. Conservation of indigenous genetic resources in Bosnia and Herzegovina under <i>ex situ</i> conditions	1.3.2.1. Identification of priorities for conservation purposes under <i>ex situ</i> conditions	2008	Expert team	
	1.3.2.2. Funding of bank of gens, polens, seeds, setting up of tissue cultures etc.	Od 2008	stručne institucije	
	1.3.2.3. Setting up of gen bank by manipulating and keeping DNA molecules <i>in vitro</i>	Od 2008	stručne institucije	
	1.3.2.4. Setting up of network of reproduction centres under <i>in vitro</i> conditions	Od 2009	stručne institucije	
1.3.3. Monitoring and conservation <i>in situ</i> by analysis of genetic variability	1.3.3.1. Monitoring and regular research on variation within informative genetic markers	Od 2009	Expert team	
1.3.4. Protection of biological diversity against potential risk arising from GMOs introduction	1.3.4.1. Development of system for controlling the quality and biosafety of imported food and raw material	Od 2009	stručne institucije	
	1.3.4.2. Setting up of GMOs monitoring system in animal and herbal production, as well as monitoring of possible outburst of transgens within local ecosystems	Od 2010	ekspertni tim i stručne institucije	

2.1.1. Setting up of financial base for the system of conservation and sustainable use of biodiversity in Bosnia and Herzegovina	2.1.1.1. Cost-benefit analysis for setting up of nature management sector including economic mechanisms and programmes	2008	stručne institucije	NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i DB
	2.1.1.2. . Setting up of continuous budget allocation as a support for biodiversity conservation system	Od 2009	vlada BiH, vlade entiteta i DB	
2.1.2. Setting up of strong mechanisms for creation of economic obligations in sector of use of natural resources	2.1.2.1. Review of ongoing currents for fund rising by sectors based on use of resources, with proposal for adequate measures	2008	vlade entiteta i DB	
	2.1.2.2. Monitoring of ongoing means current coming from allocation by sectors on the base of resources use	2008	entitetska resorna ministarstva	
2.1.3 Setting up and strengthening of economic incentive measures for nature preservation	2.1.3.1. Analysis of effective management modes in the field of nature preservation including proposal for economic discounts	2008	stručne institucije	
	2.1.3.2. Introduction programme for private sector regarding protected areas management	2009	entitetska resorna ministarstva	
2.1.4. Utilisation of foreign means	2.1.4.1. Identification of investors and corresponding programmes	2008	entitetska resorna ministarstva	
	2.1.4.2. Strengthening of capacities required for application, adequate claim and use of foreign means	2008	entitetska resorna ministarstva	
2.2.1. Strengthening of legislative basis for nature protection	2.2.1.1. Review of the Law on nature protection in FB&H, RS and DB according to NBSAP targets	2009	entitetska resorna ministarstva	
	2.2.1.2. Development of sub-legislative acts and mechanisms for their implementation	2008	entitetska resorna ministarstva	
2.2.2. Increased	2.2.2.1. Strengthening/founding of expert	Od 2008	entitetska resorna	

implementation level of laws on nature protection in FB&H, RS and DB	institutions for the implementation of Law on nature protection in RS, DB and FB&H		ministarstva	NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i DB
	2.2.2.2. Education of trained personnel	Od 2008	entitetska resorna ministarstva	
	2.2.2.3. Setting up of adequate technical capacities	Od 2008	entitetska resorna ministarstva	
2.2.3. Strengthening of cooperation between entity institutions and laws	2.2.3.1. Establishment of uniform nature management process based on decisions of Ministry departments	Od 2008	entitetska resorna ministarstva	
	2.2.3.2. Founding of the Direction for implementation of the Strategy and setting up of Natura 2000 Network	Od 2008	vlada BiH, vlade entiteta i DB	
	2.2.3.3. Cooperation in the setting up of network of Natura 2000 sites	Od 2009	entitetska resorna ministarstva i stručne institucije	
2.2.4. Strengthening of cooperation between scientific institutions in the field of nature	2.2.4.1. Preparation of symposiums, conferences and seminars for identification of Natura 2000 sites	2008	naučne institucije	
2.2.5. Strengthening of cooperation within NGO's sector	2.2.5.1. Setting up of common projects for biodiversity monitoring	Od 2009	entitetska resorna ministarstva i NVO sektor	
2.3.1. Harmonization of sectoral strategies with strategic targets related to biodiversity management biodiverzitetom	2.3.1.1. Analysis of sectoral strategies	2009	vlade entiteta, DB	
	2.3.1.2. Identification of divergent targets	2009	vlade entiteta, DB	
	2.3.1.3. Identification of targets for optimizing of sustainable development	2009	vlade entiteta, DB	

	2.3.1.4. Harmonizing of sectoral targets in accordance with strategy for biodiversity protection	2010	vlade entiteta, DB	NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i DB	
2.3.2. Incorporation of biodiversity issue in sectoral policies and targets	2.3.2.1. Preparation of instructions for identification and preservation of biologically/ecologically specific forest areas	2010-2012	Expert team		
	2.3.2.2. Preparation of instructions for identification and management of biologically/ecologically specific areas	2010-2012	Expert team		
	2.3.2.3. Preparation of instructions for identification and management of biologically/ecologically specific areas	2010-2012	Expert team		
2.3.3. Development of integrated environmental management process	2.3.3.1. Preparation of instructions for identification of ecological values within B&H's regions	2011-2013	Expert team		
	2.3.3.2. Capacity building in relation to defining of optimal space use	Od 2011	entitetska resorna ministarstva		
	2.3.3.3. Capacity building needed for implementation of ecosystem approach in nature management	Od 2011	entitetska resorna ministarstva		
2.4.1 Strengthening of BH-CHM network for exchange of information on biodiversity	2.4.1.1. Establishment of CHM office	Od 2008	entitetska resorna ministarstva		NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva
	2.4.1.2. Development of IT CHM	Od 2009	entitetska resorna ministarstva		
	2.4.1.3. Establishment of data base	Od 2009	entitetska resorna ministarstva		
2.4.2. Promotion of practice on exchange of information	2.4.2.1. Setting up of local reporting network on biodiversity monitoring	Od 2009	entitetska resorna ministarstva		
	2.4.2.2. Preparing of publications in the field of biodiversity in B&H	Od 2009	Expert team		

2.5.1. Setting up of centres for maintenance of old knowledge and practice	2.5.1.1. Promoting programme for traditional practices through production of healthy food	Od 2009	entitetska resorna ministarstva	NADLEŽNOST: Vlada BiH; vlade i resorna ministarstva BiH, FBiH, RS i DB
	2.5.1.2. Administration of traditional knowledges and practices	Od 2009	entitetska resorna ministarstva	
2.5.2. Promotion of traditional knowledges and practices	2.5.2.1. Promoting programme for traditional practices through production of healthy food	2009	entitetska resorna ministarstva	
	2.5.2.2. Promoting programme for traditional values through publications and media	Od 2009	entitetska resorna ministarstva	
3.1.1. Identification of sensitive areas and ecosystems in Bosnia and Herzegovina	3.1.1.1. Mapping of habitats and ecosystems in B&H	2008	Expert team	
	3.1.1.2. Mapping of sensitive areas in B&H	2009	Expert team	
	3.1.1.3. Review of conservation status for areas protected by laws of SRB&H	2009-2010	entitetska resorna ministarstva	
3.1.2. Co-operation with physical planning sector	3.1.2.1. Identification of sensitive habitats in B&H through physical-planning documents of FB&H, RS and DB	2009-2010	Vlada FBiH, RS i DB	
	3.1.2.2. Enlargement of capacities for physical-planning documentation through intensified work of inspection services	Od 2008	Vlada FBiH, RS i DB	
	3.1.2.3. Enlargement of capacities for physical-planning documentation through intensified work of court's services	Od 2008	Vlada FBiH, RS i DB	
3.1.3. Strengthening of environmental licence tools	3.1.3.1. Strengthening of mechanisms for expert assessment on state in biological and landscapes diversity as a segment in environmental licence approval	Od 2008	entitetska resorna ministarstva	
	3.1.3.2. Assessment on expert evaluation for state in biological and landscapes diversity as a segment in environmental licence approval	Od 2008	Expert team	

	3.1.3.3. Monitoring of biodiversity protection measures assigned by environmental licence	Od 2008	stručne institucije	NADLEŽNOST: Vlada Bi H; vlade i resorna ministarstva BiH, FBiH, RS i DB
3.2.1. Monitoring of the effects that climate changes have got on state in species diversity in B&H	3.2.1.1. Setting up of efficient legal framework for monitoring on state of species	2008	entitetska resorna ministarstva	
	3.2.1.2. Development of human and technical capacities for species monitoring 100.000 KM	2008	entitetska resorna ministarstva	
	3.2.1.3. Setting up of reporting system for species monitoring	2009	entitetska resorna ministarstva	
3.2.2. Monitoring of the effects that climate changes have got on state in ecosystem's diversity in B&H	3.2.2.1. Setting up efficient legal framework for monitoring of ecosystem's state	2008	entitetska resorna ministarstva	
	3.2.2.2. Development of human and technical capacities for ecosystem's monitoring	2009	entitetska resorna ministarstva	
	3.2.2.3. Setting up of reporting system for species monitoring	2009	entitetska resorna ministarstva	
3.2.3 Co-operation by the implementation of Convention on biological Diversity and Framework Convention on climate changes at local level	3.2.3.1. Co-operation at level of focal points and referring centres	Od 2008	entitetska resorna ministarstva	
	3.2.3.2. Setting up of reporting system on CBD target's implementation	Od 2008	entitetska resorna ministarstva	
	3.2.3.3. Setting up inter-conventional body at local level	Od 2008	entitetska resorna ministarstva	
3.3.1. Identification of invasive species on the territory of B&H	3.3.1.1. Identification of species and populations of invasive plants and fungi in B&H	2008	Expert team	
	3.3.1.2. Identification of species and populations of invasive fauna in B&H	2008	Expert team	
	3.3.1.3. Establishment of data base on invasive species in B&H	2008	Expert team	
3.3.2. Monitoring of invasive species in B&H	3.3.2.1. Setting up of system for monitoring and actions related to invasive species	Od 2009	entitetska resorna ministarstva	NADLEŽNO ST: Vlada

	3.3.2.2. Setting up of monitoring posts	Od 2009	entitetska resorna ministarstva
	3.3.2.3. Setting up of monitoring services	Od 2010	entitetska resorna ministarstva
3.3.3. Restrain of dispersal of invasive species on the territory of B&H	3.3.3.1. Identification of modes and ways for dispersal of invasive species in B&H	2010-2012	Expert team
	3.3.3.2. Setting up and conduction of restrain methods against dispersal of invasive plants and fungi in B&H	Od 2011	ekspertni tim i službe ministarstava
	3.3.3.3. Setting up and conduction of restrain methods against dispersal of invasive animals in B&H	Od 2011	ekspertni tim i službe ministarstava
3.4.1. Public awareness raising on importance and values of biodiversity in B&H	3.4.1.1. Setting up of the system for environmental education	Od 2011	vlada FBiH, RS i DB
	3.4.1.2. Strengthening of NGO's activities	Od 2009	vlada FBiH, RS i DB
	3.4.1.3. Connecting of NGO's sector and the system for monitoring and reporting	Od 2009	entitetska resorna ministarstva
	3.4.1.4. Programme for persistent biodiversity appearances in media	Od 2009	entitetska resorna ministarstva

Sadržaj strateških zadataka za zaštitu biološke i pejzažne raznolikosti Bosne i Hercegovine

STRATEGIC TASK CONTENTS

1.1.1.1. Analysis and encoding of both ecosystem and habitat types, including preparation of instructions needed for their identification. Identification of ecosystem types and setting up of the international encoding system. Interpretation of codes and ecosystem types with simple usage purposes.

**1.1.2.1. Estimation of natural values in mountain belt of bosnia-herzegovina's Dinaric Alps
Identification and assessment on state of both species and ecosystems within the mountain landscapes of bosnia-herzegovina's Dinaric Alps. Identification of space possessing high biological and ecological values.**

**1.1.2.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and following IUCN principles
Legal procedure on designation of protected areas identified through the evaluation process focused at mountain landscapes of bosnia-herzegovina's Dinaric Alps**

1.1.3.1. Estimation of natural values in endemic development centres of narrow passages and canyons of Neretva, Una, Sana, Vrbas, Bosna and Drina river including their tributaries Identification and assessment on state of both species and ecosystems within the narrow passages and canyons of streams, which represent refugio-relict landscapes in Bosnia and Herzegovina.

**1.1.3.2. Setting up of protected areas according to the Law on nature protection in FB&iH, RS and DB, following IUCN principles
Legal procedure on designation of protected areas identified through the evaluation process focused at canyons and narrow passages of streams in B&H**

1.1.4.1. Estimation of natural values in karst fields of B&H Identification and assessment on state of both species and ecosystems within the karst fields, which represent specific landscapes in Bosnia and Herzegovina.

**1.1.4.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following IUCN principles
Legal procedure on designation of protected areas identified through the evaluation process focused at karst fields of Bosnia and Herzegovina.**

1.1.5.1. Estimation of natural values in wetland landscapes of B&H Identification and assessment on state of both species and ecosystems within the wetlands, which represent specific landscapes in Bosnia and Herzegovina.

**1.1.5.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS, following DB and IUCN principles
Legal procedure on designation of protected areas identified through the evaluation process focused at wetlands of Bosnia and Herzegovina.**

1.1.6.1. Estimation of natural values in specific kind of forest ecosystems Identification and assessment on state of both species and ecosystems within woodland of Bosnia and Herzegovina

**1.1.6.2. Setting up of protected areas according to the Law on nature protection in FB&H, RS and DB, following IUCN principles
Legal procedure on designation of protected areas identified through the evaluation process focused at forest ecosystems of Bosnia and Herzegovina.**

1.2.1.1. Flora of Bosnia and Herzegovina Scientific publication on morphology, systematic and ecology of plants identified in Bosnia and Herzegovina.

1.2.1.2. Fauna of Bosnia and Herzegovina Scientific publication on morphology, systematic and ecology of animals identified in Bosnia and Herzegovina.

1.2.1.3. Fungia of Bosnia and Herzegovina Scientific publication on morphology, systematic and ecology of fungi identified in Bosnia and Herzegovina.

1.2.2.1. Red list and Book of plants of Bosnia and Herzegovina Scientific publication/document on endangered plants in B&H.

1.2.2.2. Red list and Book of animals of Bosnia and Herzegovina Scientific publication/document on endangered animals in B&H.

1.2.2.3. Red list and Book of fungi and lichens of Bosnia and Herzegovina Scientific publication/document on endangered fungi and lichens in B&H.

1.2.3.1. Identification of areas important for protection of species diversity in B&H Identification of distribution area for some endangered species in B&H.

1.2.3.2. Setting up of areas designed to protect species diversity in B&H Legal procedure on designation of protected areas with purpose to protect habitats of endangered species in Bosnia and Herzegovina.

1.2.3.3. Setting up of monitoring mechanisms Setting up of methodology, legislative fundamentals and monitoring services on endangered species in B&H.

1.2.4.1. Reviving of existing capacities (Botanical garden, Arboretum, Mediterranetum, natural scientific collections of Land's Museum)

1.2.4.2. Setting up of gen's bank for endemic and threatened gen pool Setting up of *ex situ* conservation of endemic and threatened species at level of gens.

1.2.4.3. Setting up of the national Botanical garden Establishment of the representative garden for conservation of endangered species.

1.3.1.1. Identification and estimation of significance for indigenous genetic resources in B&H Identification and assessment of the indigenous gen pool in Bosnia and Herzegovina.

1.3.1.2. Creation of Action Plan for conservation of herbal genetic resources in B&H under *in situ* conditions Programme of activities for preservation of the indigenous herbal gen pool in Bosnia and Herzegovina under natural conditions

1.3.1.3. Creation of Action Plan for conservation of animal genetic resources in B&H under *in situ* conditions Programme of activities for preservation of the indigenous animal gen pool in Bosnia and Herzegovina under natural conditions

1.3.2.1. Identification of priorities for conservation purposes under *ex situ* conditions Assessment of state and threat's level for species enlisted on Red lists. Programme of priority actions to be undertaken regarding critically endangered species.

1.3.2.2. Founding of bank of gens, polens, seeds, setting up of tissue cultures etc.
Development of conservation actions for species occurring out of their natural habitats in B&H.

1.3.2.3. Setting up of gen's bank by manipulating and keeping DNA molecules *in vitro*
Development of specific *ex situ* conservation modes for B&H species.

1.3.2.4. Setting up of network of centres for reproduction under *in vitro* conditions
Setting up of specific centres aimed at breeding of endangered species with re-introduction and preservation purposes.

1.3.3.1. Monitoring and regular research on variation within informative genetic markers
Development of monitoring system that should enable follow up of species state at level of gens.

1.3.4.1. Development of system for controlling the quality and biosafety of imported food and raw material. Control on quality and import of genetically modified food.

1.3.4.2. Setting up of GMOs monitoring system in animal and herbal production, as well as monitoring of possible outburst of transgens within local ecosystems Control on potential dispersal of GMOs into natural environment.

2.1.1.1. Cost-benefit analysis for setting up of nature management sector including economic mechanisms and programmes. Assessment of costs arising from the establishment of main and potential nature management mechanisms.

**2.1.1.2. Setting up of continuous allocation originating in budget means as a support for biodiversity conservation system
Procedure required for identification of sources and amount of financial means, as well as achieving the agreement on continuous financial support.**

**2.1.2.1. Review of ongoing currents for fund rising by sectors based on use of resources, with proposal for adequate measures
Identification of sources, amounts and allocation modes for means provided by economy sectors based on their use of resources.**

**2.1.2.2. Monitoring of ongoing means current coming from allocation by sectors on the base of resources use
Setting up of transparency principles when it comes to existing economy mechanisms.**

**2.1.3.1. Analysis of effective management modes in the field of nature preservation including proposal for economic discounts
Development of incentive measures for economy subjects found in the field of nature protection.**

**2.1.3.2. Introducing programme for private sector regarding protected areas management
Development of activities for undertakers in the field of nature protection.**

2.1.4.1. Identification of investors and corresponding programmes . Research on options for using foreign means.

**2.1.4.2. Strengthening of capacities required for application, adequate claim and use of foreign means
Education in corresponding field.**

**2.2.1.1. Development of sub-legislative acts and mechanisms for their implementation
Adjustement of current laws with the European legislative in corresponding field.**

**2.2.1.2. Review of the Law on nature protection in FB&H, RS and DB according to NBSAP targets
Creating of operational possibilities for implementation of the Law.**

**2.2.2.1. Strengthening/founding of expert institutions for the implementation of Law on nature protection in RS, DB and FB&H
Setting up/strengthening of expert bodies for nature protection.**

2.2.2.2. Education of trained personnel .Strengthening of expert and widening of human resources for nature protection.

2.2.2.3. Setting up of adequate technical capacities. Strengthening and widening of technical capacities for nature protection.

**2.2.3.1. Establishment of uniform nature management process based on decisions from Ministry departments
Co-operation and adjustment of global activities in the field of nature protection aimed at achieving better and greater effects.**

**2.2.3.2. Founding of the Direction for implementation of the Strategy and setting up of Natura 2000 Network
Creation of expert body for conducting control over realization, as well as for monitoring on efficiency of the Strategy and development of the unified Natura 2000 Network.**

**2.2.3.3. Co-operation in the set up process for the network of Natura 2000 sites
Adjustments of the criteria and full co-operation in the process of Natura 2000 development.
B.2.4.1. Preparation of symposiums, conferences and seminars for identification of Natura 2000 sites
Identification of specific bosnia-herzegovina's criteria required for the identification of Natura 2000 sites.**

**2.2.4.1. Preparation of symposiums, conferences and seminars for identification of Natura 2000 sites
Identification of specific bosnia-herzegovina's criteria required for the identification of Natura 2000 sites.**

**2.2.5.1. Setting up of common projects for biodiversity monitoring
Realization of common projects aimed at species, habitats and ecosystems whose distribution range is to be found over entire territory of B&H.**

**2.3.1.1. Analysis of sectoral strategies
Analysis of targets defined by development strategies per economy sectors in B&H.**

2.3.1.2. Identification of divergent targets
Identification of targets having quite opposite effects.

2.3.1.3. Identification of targets for optimizing of sustainable development
Identification of targets defined by sectoral strategies that show some effects of synergism.

2.3.1.4. Harmonizing of sectoral targets in accordance with strategy for biodiversity protection
Cross sectoral analysis

2.3.2.1. Preparation of instructions for identification and preservation of biological/ecological specific forest areas
Development and strengthening of actions aimed at protection of biological and landscapes diversity through forestry sector.

2.3.2.2. Preparation of instructions for identification and management of biological/ecological specific areas
Development and strengthening of actions aimed at protection of biological and landscapes diversity through agricultural sector.

2.3.2.3. Preparation of instructions for identification and management of biological/ecological specific areas
Development and strengthening of actions aimed at protection of biological and landscapes diversity through water management sector.

2.3.3.1. Preparation of instructions for identification of ecological values within B&H's regions
Development and strengthening of actions aimed at protection of biological and landscapes diversity through physical planning sector.

2.3.3.2. Capacity building relevant for defining optimal space usage
Development of manpower able to evaluate natural values in the field of physical planning.

2.3.3.3. Building of capacities needed for implementation of ecosystem approach in nature management
Creation of expert teams able to evaluate and use in a sustainable way the potentials and resources in any area.

2.4.1.1. Opening of CHM office
Establishment of the office for information exchange.

2.4.1.2. Development of IT CHM services
Development of technical and capacities in manpower required for network on information exchange to get set up.

2.4.1.3. Establishment of data base

Setting up of data base on scientific capacities and information.

2.4.2.1. Setting up of local reporting network considering biodiversity monitoring

Establishment of monitoring and reporting process considering both species and ecosystems state in Bosnia and Herzegovina.

2.4.2.2. Preparing of publications considering the biodiversity in B&H

Development of actions designed to promote the significance of biodiversity related records, as well as the public character they have got.

2.5.1.1. Maintenance of indigenous practices and knowledges through ecotouristic activities

Development of actions of synergism regarding implementation of Article 8 (j) of the Convention on Biodiversity, between touristic sector and programmes for reduction of poverty.

2.5.1.2. Administration of traditional knowledges and practices

Setting up of data base on relevant expert institutions in order to preserve indigenous knowledge and practices.

2.5.2.1. Programme of promotion of traditional practice through healthy food production

Development of actions of synergism regarding implementation of Article 8 (j) of the Convention on Biodiversity and programmes for reduction of poverty.

2.5.2.2. Programme of promotion of traditional values through publications and media

Development of actions of synergism regarding implementation of Article 8 (j) of the Convention on Biodiversity and programmes for public awareness raising.

3.1.1.1. Mapping of habitats and ecosystems in B&H

GIS map and interpretation of naturally important sites in B&H which are sensitive to anthropogenic impacts.

3.1.1.2. Mapping of sensitive areas in B&H

GIS map and interpretation of the identified habitat/ecosystem types in B&H

3.1.1.3. Review of conservation status for areas protected by laws of SRB&H

Assessment on state of previously protected areas after adjustments with IUCN categories being made.

3.1.2.1. Identification of sensitive habitats in B&H through physical-planning documents of FB&H, RS and DB

Re-new of physical-planning documentation of FB&H, RS and DB according to the map of sensitive areas.

3.1.2.2. Enlargement of capacities for physical-planning documentation through intensified work of inspection services

Control on implementation of physical-planning documents within the identified ecologically important areas in B&H.

3.1.2.3. Enlargement of capacities for physical-planning documentation through intensified work of court's services
Increased efficiency of court's services considering files submitted by inspection services.

3.1.3.1. Strengthening of mechanisms for expert assessment on state in biological and landscapes diversity as a segment in environmental licence approval. Strengthening/development of capacities in expert manpower able to evaluate biological and landscapes diversity and to assess measures required to get the environmental licence.

3.1.3.2. Assessment on expert evaluation of state in biological and landscapes diversity, as a segment in environmental licence approval
Expert agreement on expert evaluation of state in biological and landscapes diversity in the course of environmental licence approval.

3.1.3.3. Monitoring of biodiversity protection measures assigned by environmental licence
Establishment of mechanisms designed to control implementation measures which are required to get the environmental licence.

3.2.1.1. Monitoring of biodiversity protection measures assigned by environmental licence
Establishment of mechanisms designed to control implementation measures which are required to get the environmental licence.

3.2.1.2. Development of human and technical capacities for species monitoring **Development of both human and technical capacities which should be able to conduct the monitoring on species condition.**

3.2.1.3. Setting up of reporting system for species monitoring
Development of passable information flow in vertical sense on species condition which is necessary for actions to be undertaken.

3.2.2.1. Setting up efficient legal framework for monitoring of ecosystem's state **Development of operational mechanisms needed to conduct monitoring on state in ecosystems.**

3.2.2.2. Development of human and technical capacities for ecosystem's monitoring **Development of both human and technical capacities which should be able to conduct the monitoring on ecosystem's condition.**

3.2.2.3. Setting up of reporting system for ecosystem's monitoring
Development of passable information flow in vertical sense on ecosystem's condition which is necessary for actions to be undertaken.

3.2.3.1. Co-operation at level of focal points and referring centres
Porosity for information flow throughout horizontal levels of institutions in the system of nature management and improvement of their role in decision making

3.2.3.2. Setting up of reporting system on CBD targets implementation
Connecting of information between horizontal and vertical level on state in biological and landscapes diversity in B&H.

3.2.3.3. Setting up inter-conventional body at local level
Development of co-operation among focal points responsible for implementation of complementary conventions.

3.3.1.1. Identification of species and populations of invasive plants and fungi in B&H
Identification of invasive plants and fungi in B&H, as well as of distribution range of their populations.

3.3.1.2. Identification of species and populations of invasive fauna in B&H
Identification of invasive animals in B&H, as well as of distribution range of their populations.

3.3.1.3. Identification of species and populations of invasive fauna in B&H
Identification of invasive animals in B&H, as well as of distribution range of their populations.

3.3.2.1. Setting up of system for monitoring and actions related to invasive species Development of institutional framework which is required to conduct monitoring on invasive plants, animals and fungi in B&H.

3.3.2.2. Setting up of monitoring posts
Development of physical network aimed to screen invasive plants, animals and fungi.

3.3.2.3. Setting up of monitoring services
Development of services required to conduct monitoring on invasive plants, animals and fungi.

3.3.3.1. Identification of modes and ways of dispersal of invasive species in B&H Identification of dispersal mechanisms for invasive plants, animals and fungi.

3.3.3.2. Identification of modes and ways of dispersal of invasive species in B&H Identification of dispersal mechanisms for invasive plants, animals and fungi.

3.3.3.3. Setting up and conduction of restrain methods against dispersal of invasive animals in B&H Both scientific and expert identification, as well as implementation of restrain methods against dispersal of invasive animals in B&H.

3.4.1.1. Setting up of the system for environmental education Innovation of educational plans and programmes which means also introduction of environmental education at any level.

3.4.1.2. Strengthening of NGO's activities Strengthening of financial support in order to broaden and improve both quality and efficiency of NGO's sector oriented toward nature protection.

3.4.1.3. Connecting of NGO's sector and the system for monitoring and reporting Development of programmes required to include NGO's sector in the monitoring system for species, ecosystems and landscapes.

3.4.1.4. Programme for persistent biodiversity presence in media Development of actions designed to promote the significance and value of biological and landscapes diversity in Bosnia and Herzegovina.