



REPUBLIC OF BULGARIA
MINISTRY OF ENVIRONMENT AND WATER

FIFTH NATIONAL REPORT

2009 – 2013

CONVENTION ON BIOLOGICAL DIVERSITY



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SUMMARY

The Fifth National Report on the Implementation of the Convention on Biological Diversity prepared by Republic of Bulgaria as a Party to the Convention on Biological Diversity covers the 2009–2013 period.

In accordance with the guidelines, it contains information on:

- the current status of and threats to biodiversity, and its socio-economic impact (Part 1);
- the implementation of the National Biodiversity Conservation Strategy and the Second Biodiversity Action Plan of Bulgaria (2005–2010) along with a reference to the National Program for Development: Bulgaria 2020 and other sectors of the economy (Part 2);
- progress in the implementation of the Strategic Plan for Biodiversity 2011–2020 and its Aichi Targets, adopted by the Parties in 2010 in Nagoya (Part 3).

Bulgaria is one of the richest in biodiversity countries in Europe. It encompasses parts of the Alpine, Black Sea and Continental biogeographic regions. The number of Balkan and Bulgarian endemics is relatively high. To protect this biodiversity Bulgaria has established a National ecological network (including the European ecological network Natura 2000 and protected areas) which is ca. 34 % of the national territory – one of the largest in Europe.

STATUS OF BIODIVERSITY

More than 3100 algae from ca. 580 genera, 15 classes and 7 divisions have been discovered so far. The bryoflora of Bulgaria contains 754 species of which 34% are of conservation importance (CR – 18, EN – 25, VU – 124 and NT – 20). Pteridophytes and seed plants (incl. neophytes) are ca. 4100 species. 270 are Balkan and 174 are Bulgarian endemics. Petrova & Vladimirov (2009) list 801 red species of which EX – 1, RE – 12, CR – 208, EN – 297, VU – 204, NT – 79, which constitute 19.5% of the national flora. So far, ca. 340 neophytes have been registered in Bulgaria, 16 of which – only in the period 2009–2013. Plant communities are represented by more than 1250 associations and over 300 formations. Forest communities prevail in the country and reach ca. 34%.

Animals in Bulgaria amount to ca. 30 359 species from 28 types and 75 classes which is only 50% of the estimated animal diversity in the country. Best studied are the vertebrates. The Bulgarian herpetofauna ranks third in Europe in species richness after Spain and Greece. Ca. 1200 animal species are endemic (790 Bulgarian and 410 Balkan endemics). More than 780 cave species occur in Bulgaria of which 110 are typical troglobionts. The new edition of the Red Data Book of Bulgaria, vol. 2. Animals includes 442 species: EX – 30, CR – 87, EN – 107, VU – 137, NT – 14, LC – 42 and DD – 25.

The number of invasive alien species has increased in the past years. Most vulnerable to invasions are the water ecosystems, riparian and man-made habitats.

The trends in the populations of some species are informative for the rate of biodiversity state/loss (common birds index) or the sustainable management of agricultural land. The general trend shows that the number of birds in agricultural lands has dropped down by 12% in the period 2005–2011 r.

The fungi and fungus-like organisms are considerably less studied. So far more than 4900 species have been registered but the expected number for Bulgaria can surplus 20 670. In the last 5 years 5 volumes of the multivolume edition of “Fungi in Bulgaria” have been published with original data for more than 470 species (Denchev 2012). The Red list of fungi in Bulgaria contains 215 species of ascomycetes and basidiomycetes of which CR – 37, EN – 105, VU – 40, NT – 14 and DD – 19.

According to the Palaearctic classification 977 habitat types from all hierarchical types occur in Bulgaria. The number of habitats at elementary level is 542 of which 96 are

restricted only to Bulgaria. Ninety of the habitats that occur in Bulgaria are in Annex I of the Habitats Directive constituting 38.86% of the whole list. The Red Data Book, vol. 3 Habitats (2012) contains 166 habitats classified as follows: CR – 28, EN – 71, VU – 47, NT – 20. According to the National Priority Actions Framework for Natura 2000 the total area of the network is 4 053 941.44 ha of which 56.47% are forests, 32.35% agricultural land and the rest is other types of land. Cultivated land, pastures and meadows are the prevailing types of agricultural land in NATURA 2000 network.

The following groups of **biological resources** (sensu CBD) are utilized in Bulgaria: forests – timber and non-timber resources; game species (16 mammal and 26 bird species); more than 40 species of Black Sea and fresh-water fish, molluscs, crabs, and snails.

Bulgaria has a rich pool of local **genetic resources**. In the National Seed Gene Bank in Sadovo 57 684 seed samples are preserved of which 13 269 samples are of Bulgarian origin. This constitutes the largest collection in SE Europe (<http://eurisco.ecpgr.org>). More than 60 breeds and tens of selection lines and hybrids of cattle, bulls, sheep, goats, horses, pigs, bees, dogs and birds have been registered in Bulgaria. Of the existing breeds 45 are local and 33 are autochthonous.

The total **aquaculture** production in the period 2009–2012 amounts to the average of 8427.4 t per year with its peak in 2010. Largest quantities are produced from rainbow trout, carp, and bighead carp, followed by grass carp, silver carp and catfish. The main species for marine aquaculture is the blue mussel.

The main threats for biodiversity can be classified as follows:

1. **Deterioration, fragmentation and loss of habitats.** Main driving forces are human activities such as overexploitation of natural resources and turning grasslands into arable land. In the underground habitats most dangerous is the anthropogenic pressure that can disturb the bats colonies.
2. **Overexploitation of biological resources and loss of genetic resources.** Biodiversity is subject to various businesses. The forest resources are threatened by non-regulated timber exploitation, poaching, illegal export of herbs and fungi, unregulated grazing. The main threats for the game species are change of habitats, change of structure and ways of use of agricultural crops and poaching. The fish resources are decreasing due to their overexploitation, lack of general program for regular fish stocking and lack of regular monitoring of fish- and non-fish resources. The loss of local breeds and plant varieties is mainly due to the intensification of production, limited selection to few species, introduction of alien breeds and varieties that replace the local ones.
3. **Pollution of air, soil and water.** Major soil pollutants are the synthetic fertilizers, pesticides, waste deposits and industrial waste accumulation. Major air pollutants are the industry, transport, noise in urban areas, military areas, airports, etc. The water quality depends on the ecological state and chemical composition of the surface waters and the quantities and chemical composition of the underground water. By 2012 of all 759 surface water bodies only 36 (4.7%) are of very good quality while of all 177 underground water bodies 123 are in good chemical conditions.
4. **Invasive alien species.** About 60 angiosperms are considered invasive or potentially invasive species that are competing with local flora, cause changes in the composition and structure of plant communities, etc. Of all 347 areal terrestrial arthropods that occur in Bulgaria 52 species are widely distributed and have negative impact on forestry and agriculture, horticulture and glass-house horticulture. Of all 29 alien marine invertebrates in the Black Sea 9 are invasive and they can be predators, can compete with local species or change habitats. The 3 fresh-water shells (*Corbicula fluminea*, *Anodonta woodiana*, and *Dreissena rostriformis bugensis*) together with

Dreissena polymorpha are among the most aggressive alien species in Europe. They might cause reduction of the habitat of other species, changes in the physic-chemical characteristic of the water, change the structure and number of bacterio-, phyto- and zooplankton, changes in the trophic structure of the macrozoobenthos and fish populations. As a potentially invasive vertebrate species can be considered the red-cheek turtle (*Trachemys scripta elegans*), which is an active predator and might compete local species and negatively impact the ecosystems as a whole.

5. **Climate changes.** Bulgaria is in one of the most vulnerable to climate change geographic regions. The *precipitation and temperature index* shows that the average terrestrial temperature has raised with 1.5°C in the period 1971–2011. In the same time the precipitation and snow cover are relatively constant. The impact of climate change on biodiversity is demonstrated by the indicator changes in the *wintering water birds in Bulgaria*. This number varies considerably in the past five years, e.g. in 2012 it is 46.87% smaller than in 2011. This variation depends mainly on the meteorological conditions in Bulgaria and northwards. Recently, also shifting of the peaks in the number of some water birds (mainly geese, ducks, etc.) occurs.

ASSESSING IMPLEMENTATION OF NBSAPs AND PROGRESS IN MAINSTREAMING OF BIODIVERSITY

2009–2013 is the first 5-year period of CBD implementation when Bulgaria is a member of the European Union (EU). This has been a period of rapid changes in state institutions and building their capacity.

The major strategic document that outlines the socio-economic development of Bulgaria is the **National Program for Development: Bulgaria 2020**. Among national priorities is environmental protection (incl. biodiversity), sustainable use of biological resources and development of agriculture and fish sectors. Biodiversity conservation has been among the priority goals of the **National Plan for Development of R Bulgaria 2007–2013 r.** and is included in the **National Program for Reforms of Bulgaria** within the EU. The **National Environmental Strategy 2009–2018** and the related action plan envisage actions for limitation and halting of biodiversity loss through its sustainable management.

The specific work related to biodiversity conservation follows the major priorities of the National Strategy for Biodiversity Conservation (1998) and the second Biodiversity Action Plan (2005–2010).

After the COP 10 Decision X/2 and the adoption of the Strategic Plan for Biodiversity 2011–2020 Bulgaria as a party has outlined a set of national priorities to implement the Aichi targets. Apart from the general goal to effectively implement them some of the major **national priorities** are:

- Elaboration of a new Strategy for Biodiversity Conservation and the related Biodiversity Action Plan (2014–2020)
- Further development and management of the National Ecological Network
- Elaboration of management plans for all protected areas and effective management
- Elaboration of National Priority Framework for Natura 2000 network until 2020
- Elaboration of action plans for endangered species
- Ratification and implementation of the Nagoya Protocol
- Mobilisation of the financial resources relative to BD
- Effective use of the resources of the new Operational Programme (OP) Environment of Bulgaria

The major challenges that has been identified during the period covered by the 5th National report can be summarized as follows:

- Low level of preparation for the designation of the Natura 2000 sites; lack of management plans for a number of Nature Parks; existing systematic problems in the approval and implementation of investment projects and plans, especially along the Black Sea Coast.
- Lagging behind with the timely implementation of OP Environment, especially when big investments, biodiversity related projects have been concerned at municipality level.
- Major gaps in the climate change policy of the country (missing national plan for participation in the EU emissions trading system; missing national scheme for international emission trading, missing of administrative structure responsible for the climate change policy).
- Lack of national targeted funding for biodiversity research since biodiversity is not among the priority topics of the Bulgarian Science Fund.
- To overcome these obstacles the Ministry of Environment and Water has started a constant dialogue with all its partners in Bulgaria and the EC; control and reporting before the society; conducting a policy of transparency and competitive environment for the business and citizens. To achieve these the Ministry started in 2009 and successfully implemented a number of reforms to concentrate the efforts on the achievement of the national priorities that are important not only for biodiversity and environment but also for the well-being and health of the Bulgarian citizens.

IMPLEMENTATION OF THE STRATEGIC PLAN FOR BIODIVERSITY AND PROGRESS TOWARDS AICHI TARGETS

The following major results have been achieved during the reporting period in Bulgaria with reference to the Aichi Biodiversity Targets:

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

The legal framework related to biodiversity has been developed together with more than 100 related regulations, ordinances and methodologies. To harmonize them with the global and EU priorities the necessary amendments have been made. Biodiversity issues have been integrated in all program documents of the country that have been implemented in the reporting period and in the new ones that will cover the period until 2020, e.g. National Regional Development Strategy (2012–2020), National Rural Development Program (2014–2020), National Action Plan for the Conservation of Wetlands in Bulgaria (2013–2022), National Forestry Strategy (2013–2020), National Program for Fishery and Aquaculture (2007–2013) and the related Action Plan, National Strategy for Sustainable Development of Tourism (2009–2013), Third National Plan on Climate Change (2013–2020), etc.

As a new member of the European Union (EU), Bulgaria's major funding instruments are the European structural funds. Their use is regulated by the operational programs of the country. Based on the National Plan for Development (2007–2013) and the related National Strategic Referent Framework, the Operational programmes have been elaborated. Biodiversity issues have been integrated specifically in three of them: OP "Environment", Rural Development Program and OP for development of the Fishery sector. Among them the first one plays the major role especially with its Axis 3. Conservation and restoration of biodiversity.

The Rural Development Program supports the agroecological measures and maintenance of Natura 2000 network in rural areas. For the new programming period a larger funding opportunities are envisaged for Natura 2000 sites, high nature value farmlands and protection of species in these areas. Same program supports also activities related to the restoration of the forest potential and of the country and implementation of prevention

measures as well as measures related to the implementation of the Water Framework Directive in Bulgaria.

The OP for development of the Fishery sector corresponds to the European Fishery Fund. Axis 3 provides measures for the maintenance of the natural fish resources.

The implementation of OP “Regional Development” and OP “Transport” is coherent to the national policy for biodiversity conservation in their part related to the obligatory assessment of the impact of the investments on the environment and biodiversity in particular.

The public concern and involvement in biodiversity conservation and sustainable management are important prerequisites for the success of the implemented actions. The public awareness measures and campaigns have been related specifically to the implemented projects and activities related to promotion of biodiversity and the ecosystem services, establishment and management of the National Ecological Network and more specifically designation of Natura 2000 sites; best practices in management of protected areas and species implemented by Park directorates, NGOs and research institutions; promotion of the national policy aspects related to biodiversity issues. Diverse target groups have been addressed with information about the implemented activities in the reporting period through specific websites, public awareness events, printed materials.

Increase of capacity for the implementation of biodiversity related actions

Administrative capacity. For the implementation of the national programs and action plans related to biodiversity specific departments in the respective state authorities have been established at national, regional and local levels. Inter-institutional expert groups have been established – related to CBD implementation (2008), Climate change and biodiversity (2009), Nagoya Protocol (2011) and Invasive species (2011).

Academic and research institutions. Bulgarian Academy of Sciences and Agricultural Academy together with the Universities in the country have taken measures to adequately implement biodiversity issues in their strategic development programs as well as their annual research plans. Additionally, in 2010 a new structure was established – Institute of Biodiversity and Ecosystem Research at the Bulgarian Academy of Sciences. The research activities implemented by its staff are dedicated to theoretical and applied biodiversity issues of national priority.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use

To reduce the direct pressure on biodiversity and promoting its sustainable use, the following measures and activities from the National Biodiversity Action Plan have been implemented: development of the legal framework, elaboration of plans, strategies and methodologies, conduction biodiversity monitoring. They are supported by measures and actions from the relevant sectors like forestry, waters, agriculture, fishery, aquaculture, etc. In the period 2009–2013 actions from the following strategies, programs and plans have been implemented: National Environmental Strategy and Action Plan; National Strategic Plan and Rural Development Program; National Program for Actions for Sustainable Land Management and Combating Desertification; National Strategy and Plan for Development of the Forestry Sector; River Basins Management Plans; National Program and Plan for Fishery and Aquaculture; National Program for Support of the Sustainable Development of Fish Resources; National Program for Waste Management, etc. A number of new documents have been elaborated such as: National Strategy for Sustainable Development of Agriculture; National Strategy for the Development of the Forestry Sector; Program for the Adaptation of the Bulgarian Forests and Reduction of the Negative Impact of the Climate Change; Strategy for the Development of the Game Enterprise; National Strategy for Management and Development of the Water Sector; Third National Action Plan for Climate Change Actions,

and the National Plan for the Conservation of the Most Important Wetlands in Bulgaria. In a process of elaboration are: River Basin Management Plans for the period 2016–2021; Risk Management Plans Against Floods; Marine Strategy of Bulgaria; Program for Marine Activities and Fishery and the National Strategy for Adaptation to Climate Change.

To assess the implementation of the objectives of **reducing the loss and fragmentation of natural habitats, incl. forests**, the following indicators have been used: *Ratio of forest, agricultural and urbanized areas; Share of the country with high risk of erosion; Quantitative status of surface waters; Species composition, abundance and distribution of the ichthyofauna in the river basins and Most significant summer underground bat habitats in Bulgaria*. Indicators show that the implemented measures are still not enough, especially in the water sector. A program for hydro-morphological monitoring of surface waters in relation to the assessment of the hydro-morphological status of surface water bodies has been implemented. However, the recommended measures in the program have not been put into action. The following measures from RBMP have not been conducted: afforestation, improvement of hydrological regime and reducing of the eutrophication in wetlands; technical and environmental measures for effective artificial barriers to fish migration; construction of fish ladders; restoration of river basins affected by aggregate extraction and others.

To assess the implementation of the **objectives of sustainable management of fish stocks, invertebrates and aquatic plants** the following indicators have been used: *Quantity of catches of fish and other aquatic organisms and Share of economically valuable species in the catches*. Indicators show that the implemented measures are insufficient or not implemented. Only a limited number of fish stocking has been conducted to support the sustainable development of fish resources. Bans on fishing have been introduced year-round or during the spawning season. As a final measure was introduced the 4-year ban on sturgeon fishing from 01.01.2012. In the implementation of the measure “annual survey and assessments of population status of resource species of fish and other aquatic animals” from the National Plan for Biodiversity trawl photos have been made for stock assessment of turbot as well as the method of acoustic stock assessment of pelagic fish species in the Black Sea have been tested. However, the stocks of most commercially valuable fish species in the Danube River and Black Sea have not been evaluated. A project “Implementation of activities of the National Action Plan for sturgeon fish in order to improve the status and conservation of sturgeons in Bulgaria” (2012–2015) has started. Until 20.08.2013 the Fishery Operating Program financed a total of 134 projects, 92 are fully paid with the total value of 22 670 549.44 euro. Most of the measures and activities financed by this Program have direct or indirect impact on biodiversity.

The achievement of the **goals for sustainable management of rural areas, water enterprises and forests and achieve biodiversity conservation** is measured by the following indicators: forest area, composition of tree species, forest restoration, defoliation, deterioration of forests, index of ordinary birds in Bulgaria, number of the populations of the brown bear, aquaculture production, etc.

Regarding the **forestry and game enterprises** some indicators show positive tendencies (increase of the forest areas through afforestation and natural succession; increase of the share of the natural and semi-natural forests; gradual increase of the populations of some large and small game species; good health status of the game, etc.), which suggests that some of the measures have been successfully implemented. On the other hand, a number of indicators show negative trends like: reduction of the areas of coniferous forests and plantations; increase of the share of defoliated trees; increase of the number of fires and the burnt forest areas; reduction of the exploited non-timber resources from the forest areas (wild fungi, forest fruits, herbs, forest seeds, etc.). This proves that the measures related to the forest protection are not enough.

As a result of activities performed in **animal husbandry** such as the selection control over local breeds, registers of males and breed herds of national gene pool, and maintenance of the national gene bank in animal husbandry indicators show positive trends such as increasing the number of most saved local breeds, number of animals and the farms where they are grown.

The measures and actions in **agriculture** have been funded by the Rural Development Program – mainly Axis 2 – Improvement of the environment and nature. It includes the agro-ecological payments and payments related to Natura 2000 sites and the Water Framework Directive. Implementing Measure 214 “Agro-ecological payments” for the period 2008–2012. 8084 projects have been approved with the total sum of 50 926 457.14 euro. Of them 98.40% (50 115 307.70 euro) were paid by 01.08.2013. Measure 213 “Natura 2000 for agricultural land” that started in 2011 supported 102 sites from Directive 2009/147/EEC for the protection of birds by February 2013. The total area declared for support is 214 585.97 ha, that constitutes 67% of the cultivated land, 43% of the pastures and 11% of the permanent crops, that are eligible for support in 93 sites from Natura 2000 network.

The **aquaculture** enterprises in the inland water bodies show an increase. The activities have been financed by Axis 2 of the Fishery Operating Program, i.e. Aquaculture, fishery in the inland waters, processing and marketing of products from fishing and aquaculture. By 20.08.2013 69 projects were approved with the total sum of 23 164 471.90 euro.

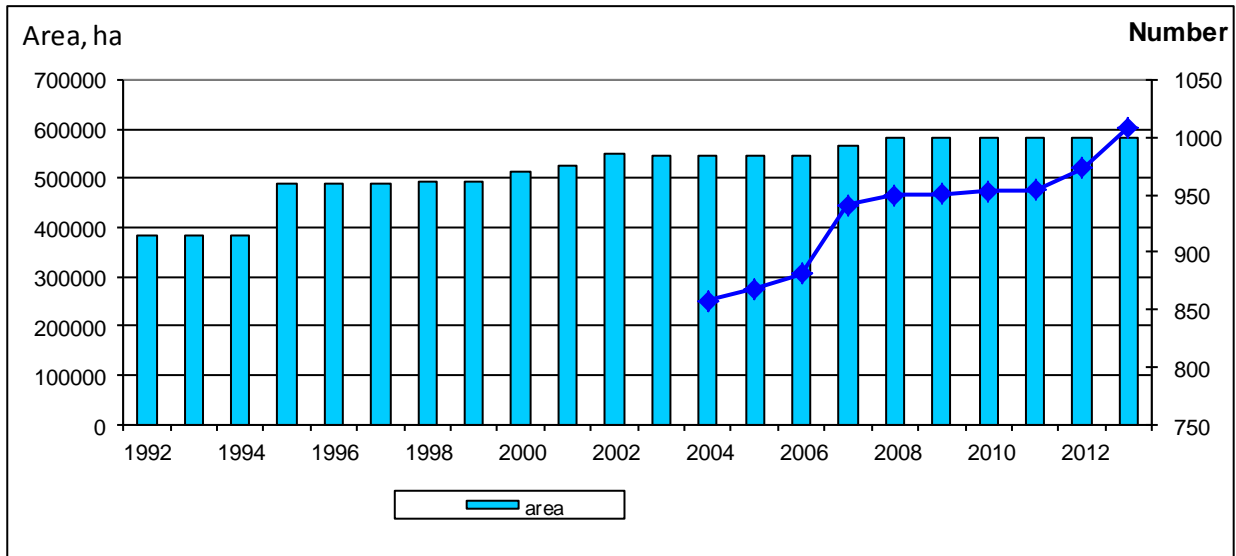
To meet the **objectives of reducing pollution, including from excess nutrients, to a level safe for the functioning of ecosystems and biodiversity**, ecosystem approach has been applied in the assessment of the impact on biodiversity in terrestrial, freshwater and marine ecosystems. Indicators show positive trends, reflecting the successful implementation of activities: 1) monitoring and assessment of the impact of air pollution on forest ecosystems show that the maximum permitted levels of acidity, sulfur and nitrogen in the forests are not exceeded; 2) As a result of physic-chemical and biological monitoring, assessment of ecological and chemical status of surface and ground water bodies has been made. There is a trend towards improvement of water quality in some of the indicators. In 2009–2010, 80% of the observed river crossings of the major river basins in Bulgaria are in the range of "very good – moderate condition". There are still water bodies at risk and those bodies are prepared and are in the process of implementing programs of measures to achieve good status.

To meet the **objectives of reducing the impact of invasive species** an inventory of the aliens has been made in several taxonomic groups of plants and animals within several national and international research projects. Data have been collected for distribution, abundance, and impact on native species and ecosystems. Results and indicators show extremely unfavorable trends – increasing the number of invasive alien species in the country, rapid spread and invasion of new territories, massive development and increasing the size of their populations. However, the measures envisaged in relation to invasive species are not implemented or are insufficient. National Strategy and Action Plan on invasive alien species have not been developed yet. With the active participation of Bulgaria a regional network was established – East and South European Network on Invasive Alien Species (ESENIAS, www.esenias.org).

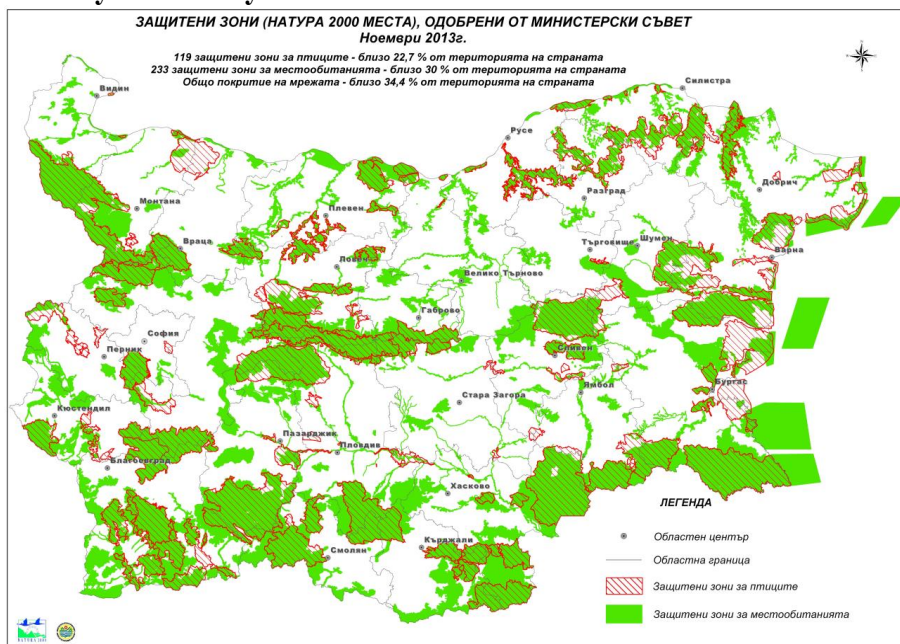
In terms of **objectives related to reducing the impact of climate change** indicators (rainfall and temperature, greenhouse gas emissions per capita, number of wintering water birds in Bulgaria) show variable or weak, but durable and adverse trends. Implemented measures are not yet effective.

Strategic Goal C: Improvement of the status of biodiversity by safeguarding ecosystems, species and genetic diversity

The **National Ecological Network** comprises sites of the European Natura 2000 sites (Special Areas of Conservation under the Habitats Directive and Special Protection Areas under the Birds Directive) and protected areas which may be included in or are outside Natura 2000 sites. At the end of 2013 Bulgaria has **1009 legally designated protected areas** in six categories (under the IUCN) with a total surface area of 584 587.1 ha that is ca. **5.3% of country's territory**). A national indicator 'Change of the number and area of protected areas' shows the increase in these figures since 1992:



Natura 2000 network in Bulgaria covers 4 053 941.44 ha that is ca. 34.4% of the country's territory.



The network includes 119 Special Protection Areas and 233 Special Areas of Conservation. By the share of the national Natura 2000 network of the country's territory Bulgaria ranks

third in the European Union after Slovenia (35.52%) and Croatia (34.80%). Mapping and assessment of the conservation status of all habitats and species of the Habitats Directive in Bulgaria have been done recently. A national Priority Actions Framework for Natura 2000 has been elaborated outlining the priority actions until 2020 for achieving favourable conservation status of the habitats and species of the network. For effective management of the sites of the National Ecological Network updating of already existing or elaboration of new management plans is ongoing.

According to the national Biological Diversity Act **legally protected in Bulgaria are 1057 endangered species** – 574 species of vascular plants and 483 species of animals. New Action plans for the conservation of 7 plant species and 4 animal species have been elaborated and adopted in the period 2009–2013. Seeds from over 90 endangered species from the Bulgarian flora have been deposited in seed banks for ex-situ conservation. Establishment of a national network of small protected areas has been initiated using the Plant Micro-reserve concept. Currently this network includes 58 legally protected sites for 44 vascular plants and 3 bryophyte species which are critically endangered in the Bulgarian flora and have single or strongly fragmented populations. Restorations of 100 habitats of animal species, 3 habitats of plant species, as well as of 5 plant and 3 animal populations have been done.

Protection of the genetic diversity of the cultivated plants and of crop wild relatives is the main task of the National Seed Genebank, both in ex-situ seed collections for long-term storage and in in-vivo garden collections. Establishment of a gene-bank for forest species is envisaged. For ca. 10 species of economically or socially important plants assessment of the national resources has been done and promising origins have been selected for use, including development of technologies for cultivation of some species to stop or significantly minimize collection from native populations.

Concerning the animal genetic resources the national Executive Agency on Selection and Reproduction in Animal Breeding is carrying out the registering, monitoring and management of the genetic resources of domestic animals in the country.

Strategic Goal D: Enhancement of the benefits to all from biodiversity and ecosystem services

So far no national assessments have been made on the impact of the biodiversity loss on the ecosystem services. The Bulgarian EEA is implementing a project Improving the Bulgarian Biodiversity Information system – IBBIS a central topic of which is the development of a module within the National System for Biodiversity monitoring to map the ecosystems and the services they provide. Interaction with external relevant data basis is envisaged.

The national legislation postulates the increasing of the role of the forests as the carbon reservoir. The Third National Action Plan on Climate Change (2013–2020) envisages an increase of the absorption of green-house gases based on the increase of wooded areas. The Executive Forestry Agency has developed a Program with measures for the adaptation of Bulgarian forests and reduction of the negative impact of the climate change on them.

Bulgaria is preparing for the effective implementation of the Nagoya Protocol – the existing relevant legislation has been assessed so that the necessary changes to be made; discussion with the various target groups and interested parties have been addressed and inter-sectoral working group has been established.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

It has been recognized the urgent need for updating of the National Biodiversity Strategy and development of a new Biodiversity Action Plan.

Although the topic is relatively new there are successfully implemented activities related to the study and preservation of traditional knowledge. There is a well established and functioning network of local communities that preserve and promote local knowledge and still produce artisan products promoting this knowledge. In 2010 Bulgaria has initiated a Balkan meeting of food communities in order to study and promote local knowledge and sustainable practices for biodiversity use. This activity is supported by an international, EU-funded project implemented in the Balkans – ESSEDRA (<http://www.essedra.com/>) that started in 2012. The topic of studying and preservation of traditional knowledge is part of the university curricula and research programs of a number of academic institutes. It is also incorporated in the management plans of the National and Nature Parks.

Biodiversity related research is conducted in a large number of academic institutes, and university faculties and departments:

- Agriculture and forestry – Agricultural Academy (<http://www.agriacad.bg/>) with 27 institutes, 19 experimental stations and 2 experimental plots; professional high schools for agriculture, forestry and food technology; Agrarian University – Plovdiv; Thracian University – Stara Zagora; Forestry University, etc.
- Biodiversity and biological resources – Bulgarian Academy of Sciences (<http://www.bas.bg/>) – a group of institutes dedicated to biodiversity, bioresources and ecology such as: Institute of Biodiversity and Ecosystem Research (<http://www.iber.bas.bg/>); Forestry Institute (<http://www.bas.bg/fribas/>); Institute of Plant Physiology and Genetics (<http://www.bio21.bas.bg/ippg/bg/>); National Natural History Museum (http://www.nmnh.com/index_bg.php) and Botanic Garden (<http://www.cu.bas.bg/garden/>).
- Sofia University “St. Kliment Ohridski” with its Faculty of Biology (https://www.uni-sofia.bg/index.php/bul/universitet_t/fakulteti/biologicheski_fakultet2) and Geologicogeographic faculty (https://www.uni-sofia.bg/index.php/bul/universitet_t/fakulteti/geologo_geografski_fakultet).
- Plovdiv University – Faculty of Biology (<https://uni-plovdiv.bg/pages/index/36/>)
- South-West University with its Faculty of Nature and Mathematics (<http://www.swu.bg/university-profile/faculties-and-colleges/mathematics-and-natural-sciences.aspx>).

In the period 2010–2013 Bulgaria is implementing consistent policy to increase the funding of projects related to sustainable use of biodiversity. A total sum of 70 656 514 Euro from the state budget have been spent for such projects.

Additionally Bulgarian NGOs and private donors have invested 538 395 Euro in total.

CONCLUSIONS

The implementation of the CBD in Bulgaria in 2009–2013 should be assessed as positive, which is mainly due to the following facts:

- The biodiversity issues have been integrated in the relevant national legislation and program documents that constitute the legal and operational framework of the country as an EU member-state.
- Measures from the past (2007–2013) and forthcoming (2014–2020) periods of the Operational Programs functioning in Bulgaria support biodiversity conservation and its sustainable use.
- The National Ecological Network (incl. Protected Areas and Natura 2000 sites) covers ca. 34% of the country’s territory, thus ensuring effective in situ conservation of biodiversity. However, it should be mentioned that the management plans of many of the protected areas and Natura 2000 sites have to be elaborated or updated.

- Red lists of plants, fungi, animals and habitats have been elaborated and the new edition of the Red Data Book has been published. Other books dedicated to the conservation needs of specific groups of organisms have been also published such as Important Plant Areas, Important Butterfly Areas, etc.
- There is a well developed capacity in the country for the assessment and undertaking actions related to invasive plant and animal species in different natural ecosystems.
- Public awareness and involvement of a large variety of target groups have been achieved through the available information tools: access to environment specific information postulated by the Aarhus Convention; internet sites of projects, protected areas and administration units; public campaigns; printed information materials; public debates on management plans for protected areas and action plans for endangered species.
- Ratification and future implementation of the Nagoya Protocol increase the economic potential of the national biodiversity especially regarding the rich genetic resources of Bulgaria.
- Biodiversity issues have been integrated into the national legislation and programs related to mitigation of the climate change and combating desertification.
- There is a reliable network of research centres – academic institutes and universities that deal with different aspects of the theoretical and applied biodiversity science. However, biodiversity has not been identified as a priority topic in the National Strategy of Scientific Research to 2020 and of the Bulgarian Science Fund which causes reduction of funding for research.
- Successful conservation of biological diversity still presents a big challenge, especially with regard to the modern approach, recognizing the importance of the value of ecosystem services in decision making and the economic, social and cultural value of biodiversity is assessed.
- Further knowledge is needed about the mechanisms that link species, habitats and the condition of the environment with their potential to provide ecosystem services.
- The development and implementation of valuation mechanisms for biodiversity resources and ecosystem services in such a way that they become a permanent element of prosperity assessment and national statistics and serve as considerable premises in current economic decisions, on the level of shaping sector policies, economic decisions made by entrepreneurs, or shaping individual consumption patterns.
- Spatial planning and the EIA not only when biodiversity issues are concerned but also when environmental protection and sustainability is considered. This will help to create synergies and achieve biodiversity protection, connectivity of wildlife corridors and increase the resilience of the ecosystems.
- Synergy can also be considered in the context of the added value of the implemented measures. For example, the development and promotion of organic agriculture and issuing quality certificates are measures that not only support the protection of the earth's surface through enhancing the country's food security and the health of its inhabitants, but also to particular economic benefits;
- Bringing up ethical arguments could support a broader inclusion of ecosystem services. This refers not only to nature protection as such but above all, to shaping desirable sustainable consumption patterns.

I. UPDATED INFORMATION ON THE STATUS, TRENDS AND THREATS TO BIODIVERSITY AND CONSEQUENCES FOR HUMAN WELL-BEING

1. Importance of biodiversity for the country

Bulgaria ranks among the richest in biodiversity countries in Europe. Although small in area (110 910 km²), the country's territory includes parts of three biogeographical regions – Alpine, Black Sea and Continental regions. The geographical position of the country in the southeastern part of the continent, the complex palaeogeographic and paleoclimatic history, diverse topography and climate, sufficient freshwater resources and proximity to the Black Sea, considerable forest resources, etc. are basic and important factors determining the rich diversity of species, communities and habitats. Biodiversity of Bulgaria is an invaluable asset, which is a significant part of the national identity of the country.

Biodiversity is a basis for the performance of ecosystem services (provisioning, regulating, supporting and cultural) that provide for the quality of life of the population and socio-economic prosperity of the country. The study, rational and efficient use of biodiversity are among the national priorities and underpin the development of cognitive and ecological tourism, green energy and transport, modern agriculture, stock breeding, forestry, fisheries and aquaculture, expanding of the raw material base for the pharmaceutical, food and cosmetics industries, traditional herbalism and collection of "gifts of nature".

Conservation of biodiversity and creation of favorable conditions for its sustainable use, and in particular – genetic resources in agriculture, is vital for the development of agriculture. Its adaptation to environmental and climatic changes is impossible without the natural resources provided by the plant and animal diversity. Conservation of genetic resources is the basis for the conservation of traditions in agriculture and provides opportunities for the development of related industries, contributing to the enrichment of food diversity and acquisition of new positions in the changing market.

Endemic and sub-endemic species and communities together with those of conservation value constitute a significant part of the national biodiversity. Their conservation, especially this of the endemics, is not only of national importance but also is important at European and global level. To conserve this biodiversity, as well as to protect and preserve areas with specific biological, aesthetic and cultural values, a National Ecological Network (including protected areas and Natura 2000 sites) has been established. For example, the most representative coniferous forests are protected in the Rila-Rhodope massif; in Stara Planina Mountains centuries-old beech forests are protected and in Strandja Mountains – the unique in Europe deciduous forests of Sout-Euxinian type with evergreen shrub storey is preserved. Implementation of sustainable management schemes is the goal of many of the policies related to the use of biological resources. In this respect, protected areas provide opportunities to stimulate local economic development, mainly in remote and mountainous areas, which are often “hot spots” of biodiversity.

2. Major changes in the status and trends of biodiversity in Bulgaria

2.1. Flora and vegetation

So far, more than 3100 **algae species** have been identified in Bulgaria. They belong to ca. 580 genera, 15 classes and seven divisions. Given the relatively small territory of Bulgaria the algoflora can be considered as one of the richest in Europe. The territory of the country is not completely studied yet, therefore it is expected that the number of registered species will increase. The orders Dinophyta, Chrysophyta, Botrydiophyta, Raphidophyta, and the class Chlorophyta have been poorly studied. The ecological groups of the benthic algae, the speleophyton, aerophyton, cryophyton and picoplankton of the Black Sea as well as the

thermophyton have been poorly studied. For the period 2009–2013 six new species for the country have been reported, one variety and one form have been described as new to science, and new chorological data have been reported for 40 species. The conservation value of 83 species of macroalgae has been assessed – Regionally Extinct (RE) – 11 species, Critically Endangered (CR) – 17 species, Endangered (EN) – 12 species, Vulnerable (VU) – 22 species, Near Threatened (NT) – 9 species and Data Deficient (DD) – 12 species. In the second edition of *Red Data Book of the Republic of Bulgaria* (2011) one Critically Endangered (CR) and five Endangered (EN) species are included. It is expected that the number of threatened species will increase, once a larger number of taxa is assessed.

Currently, the **Bulgarian bryophyte flora** comprises 754 species, ranking the country in the third place in species richness in the Balkans after Romania and Slovenia. The greatest species richness has been registered in the mountain areas, while lowlands remain significantly under-explored. For the period 2009–2013 35 new species of the Bulgarian bryoflora have been recorded and new chorological data for eight species have been reported. The threat status of the species in Bulgaria has been assessed and a Red list of bryophytes has been published. It includes a total of 187 species or 34.4% of the country's bryoflora: Critically Endangered (CR) – 18, Endangered (EN) – 25, Vulnerable (VU) – 124 and Near Threatened (NT) – 20 species. No changes in the conservation status of the species have been registered in the period 2009–2013. In *Red Data Book of the Republic of Bulgaria* (2011) 102 bryophyte species are included.

Vascular plants in Bulgaria are about 4100 species, including neophytes. Although the diversity of this taxonomic group is relatively well studied, still new species are being discovered. For the period 2009–2013, the number of this group in the country has increased with ca. 70 species, mainly due to the discovery of dozens of new species for Bulgaria, including alien ones, and revisions of difficult taxonomic groups. Seven taxa are described as new for science and new chorological data for more than 250 species have been reported. Endemism has been analyzed, and it has been found that 444 species (12.8% of the native flora or 10.8% of the entire flora, including neophytes) are endemic – 174 Bulgarian and 270 Balkan endemics. The Red List of the Bulgarian vascular plants includes a total of 801 species: Extinct (EX) – one, Regionally Extinct (RE) – 12, Critically Endangered (CR) – 208, Endangered (EN) – 297, Vulnerable (VU) – 204, Near Threatened (NT) – 79, which account for about 19.5% of the flora in Bulgaria. *Red Data Book of the Republic of Bulgaria* (2011) includes 551 species of vascular plants. The number of alien species increases. So far ca. 340 neophytes have been registered in the Bulgarian flora, and only for 2009–2013 16 new species have been reported. There is a clear tendency for a relatively constant increase in the number of alien species since 1900 (Fig. 1).

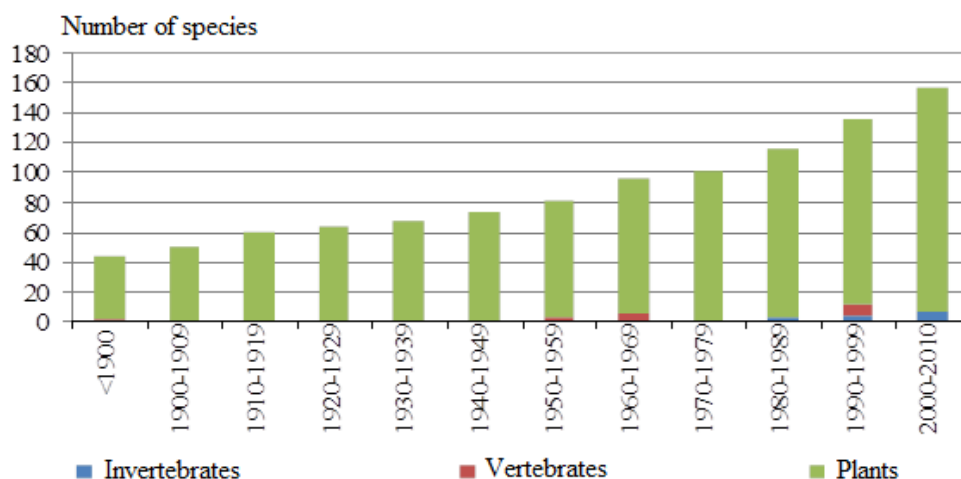


Fig. 1. Cumulative number of alien species of plants and animals in terrestrial ecosystems in Bulgaria by decades until 2010. Green columns illustrate the number of species of vascular plants; blue columns – of invertebrates; red columns – of vertebrates (Source: ExEA).

Diversity of **plant communities** in Bulgaria is considerable – over 1250 associations and over 300 formations. Tree communities prevail and they occupy about 34% (3.9 million ha) of the country. They are followed by the herbaceous communities, mainly pastures and meadows, covering an area of more than 2 million ha. Bush and semibush communities cover a much more limited area. For 2009–2013 the investigations focus mainly on herbaceous vegetation as a result of which 12 associations and four sub-associations new to science have been described.

2.2. Fauna

2.2.1. Species diversity

So far **30 359 animal species** have been found in Bulgaria. They belong to 28 phyla and 75 classes (including Protozoa). It is believed that they represent only about 50% of the existing animal species in the country. Among invertebrates the highest species richness perform phylum Arthropoda and phylum Nematoda, class Insecta, class Arachnida and class Crustacea, and the following orders: Coleoptera, Hymenoptera, Diptera, Lepidoptera and Hemiptera. The best studied in Bulgaria are the vertebrates, of which 781 species are known until 2009: two species of Cyclostomata, four species of Chondrichthyes, 213 Osteichthyes, 19 species of Amphibia, 37 Reptilia, 409 Aves and 97 species of Mammalia. Of all European countries only Spain and Greece have similarly to Bulgaria rich herpetofauna, and from 35–36 species of bats identified in Europe, 33 are found in Bulgaria. Until 2009 the total number of endemic genera, species and subspecies of animals in Bulgaria is considered to be about 1200, of which Bulgarian endemics are about 790, and the Balkan endemics – about 410. Particularly diverse and unique is the cave and subterranean fauna of Bulgaria since the country is rich in karst formations and groundwater. Over 780 species of cave animals of different taxonomic groups have been registered, of which over 110 species inhabit the deepest parts of the caves and belong to the category of typical troglobionts. Bulgaria is among the first countries in Europe in richness, diversity and endemism of the cave fauna.

In the period 2009–2013, through the application of modern taxonomic and faunistic methods, **the information about the faunistic diversity of Bulgaria has been expanded.** A number of species, new to science or new for the territory of Bulgaria have been discovered and described, e.g. one new genus and two new species of protozoa, nine protozoan blood

parasites, one genus and 10 species of nematodes, two genera and five species of tapeworms, two species of millipedes, two species of spiders, 27 species of insects, five genera and 50 species of freshwater snails (Fig. 2), five subspecies of terrestrial snails, one new amphibian species (Fig. 3); one protozoa family and 14 species of invertebrates (nematodes and molluscs) have been re-described; the taxonomic status of six species of protozoa and one grasshopper species has been changed; the names of one family of protozoa, 16 species of Orthoptera, one spider species and one amphibian species have been put in synonymy. A rich and diverse invertebrate fauna along the Bulgarian Black Sea coast have been registered – 1537 species (excluding the unicellular organisms and endoparasitic forms of Plathelminthes, Nematoda and Acanthocephala) which live in the open sea and the coastal brackish lakes and estuaries.

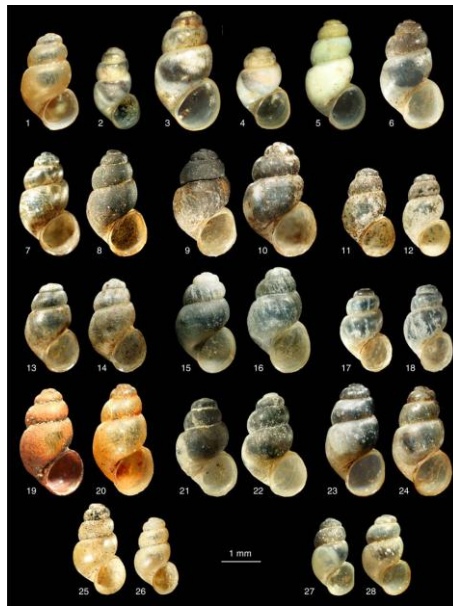


Fig. 2. New to science freshwater snails in Bulgaria. 1–6: *Bythinella* spp., described until 2009; 7–28: New to science *Bythinella* spp., described in the period of 2009–2013 – 7–8: *Bythinella angelovi*, 9–10: *B. dedovi*, 11–12: *B. dierckingi*, 13–14: *B. elenae*, 15–16: *B. izvorica*, 17–18: *B. kleptucica*, 19–20: *B. rhodopensis*, 21–22: *B. slaveyae*, 23–24: *B. smolyanica*, 25–26: *B. strandzica*, 27–28: *B. valkanovi* (Source: Dilian Georgiev; Georgiev, Hubenov 2013).



Fig. 3. New to science amphibian species *Triturus ivanbureschi*, described from Bulgaria (Wielstra *et al.* 2013; Photo: Georgi Popgeorgiev).

The conservation status of animals in Bulgaria have been evaluated and updated. The new, revised edition of *Red Data Book of the Republic of Bulgaria* (2011) includes a **total of 442 species of invertebrates and vertebrates**: 30 species are listed with a status of Extinct (EX), 87 species as Critically Endangered (CR), 107 species as Endangered (EN), 137 species as Vulnerable (VU); 14 species are categorized as Near Threatened (NT), 42 species as Least Concern (LC), and for 25 species the existing data are insufficient (DD). For comparison, in the first edition of the Red Data Book (1985) were included only vertebrates, of which 16 were listed as Extinct, 90 as Threatened by extinction and 52 as Rare. Some species perform a significant change in their conservation status, such as the sturgeon fish, which once used to be a valuable biological resource in the Danube River (Table 1), while today they are ‘Endangered’ or ‘Critically Endangered’ and two of the species are ‘Extinct’. Information about the measures taken to improve the state of their populations is presented in the section describing the implementation of Target 6 of Aichi in Chapter III of this Report.

Table 1. Changes in the conservation status of the sturgeon fish in Bulgaria according to the Red Data Book.

№	Species	Category according to Red Data Book of P.R. Bulgaria (1985)	Category according to Red Data Book of R. Bulgaria (2011)
	Fam. Acipenseridae		
1	<i>Acipenser gueldenstaedtii</i>	Not categorized	Critically Endangered (CR)
2	<i>Acipenser nudiiventris</i>	Threatened by extinction	Extinct (EX)
3	<i>Acipenser ruthenus</i>	Not categorized	Endangered (EN)
4	<i>Acipenser stellatus</i>	Not categorized	Critically Endangered (CR)
5	<i>Acipenser sturio</i>	Threatened by extinction	Extinct (EX)
6	<i>Huso huso</i>	Not categorized	Critically Endangered (CR)

In recent years, **the number of alien animal species has increased**. So far, 347 terrestrial arthropods (Arthropoda), 29 species of marine invertebrates, three species of freshwater mussels, 28 species of freshwater fish, one reptile species, 14 bird species and 15 mammal species have been recorded in Bulgaria. Only for the period 2009–2013, 31 alien species of terrestrial arthropods have been newly recorded. Two species of zooplankton, one species of zoobenthos and three fish species have been recorded for the first time along the Bulgarian Black Sea coast. Figs. 1 and 4 illustrate the trend of increasing the cumulative number of alien animal species in terrestrial and freshwater ecosystems for the period 1900–2010. The most vulnerable to the introduction and establishment of alien plant and animal species are the aquatic ecosystems, riparian habitats and man-made habitats.

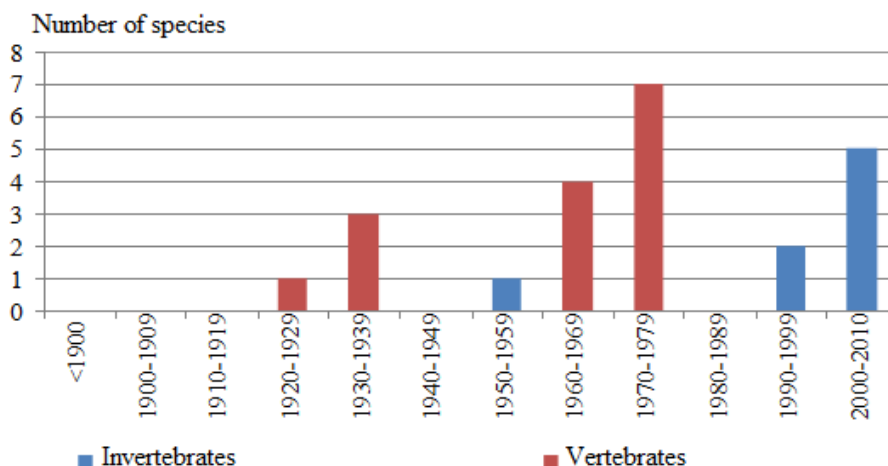


Fig. 4. Cumulative number of alien animal species in the freshwater ecosystems in the period 1900–2010 in Bulgaria. (Source: ExEA).

2.2.2. Status and trends in populations

A number of changes in the status and trends of biodiversity at the population level have been registered in the period 2009–2013. The **population abundance of the brown bear** (*Ursus arctos*) has been assessed in Bulgaria. In 2011, the total number of bears in Bulgaria was about 510 individuals, which includes the number of the permanent breeding population of 480 bears and the 25–30 bears scattered in different parts of the country. The mating territory of the four subpopulations of the bear species in Bulgaria covers up to 960 000 ha.

To assess the trends in the abundance of some bird species for a certain period of time and assess the extent of loss of biodiversity in Bulgaria the **Common birds index in Bulgaria** has been used. The indicator includes also an index of birds from agricultural habitats, an important indicator for the sustainability of the management of agricultural lands. The general trend for the period 2005–2011 shows that the population abundance in 38 species has decreased by 12% (Fig. 5). Of the evaluated 38 species, 45% live in farmland, 26% are forest species and 29% live in other types of habitats. Only the birds inhabiting agricultural lands decreased by 14% for the period 2005–2011.

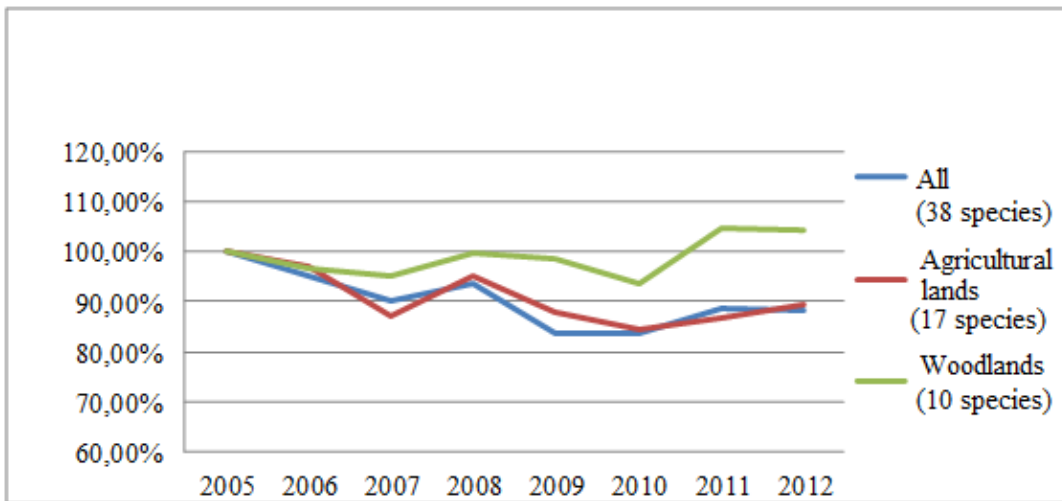


Fig. 5. Trends in the Common birds index in Bulgaria. Green line illustrates the trends in 10 species of woodlands; red line – in 17 species of agricultural land; blue line – in all 38 species monitored (baseline 2005 = 100%) (Source: BSPB).

The **distribution area of some invasive alien species has significantly increased** in Bulgaria (see Case studies 1 and 2).

Case study 1:

The invasive alien species *Corbicula fluminea* was established for the first time in Bulgaria in 2001 in the Danube River at Vetren village. For a period of 11 years the species has spread throughout the Bulgarian part of the Danube River, reaching a very high abundance at some sites (16 560 ind./m² at Zagrazhden village, 2012) and changing the entire ecosystem (Figs. 6 and 7). The species has rapidly spread also to the Danube tributaries (8 km/year) reaching 80 km upstream, e.g. in Iskar River. In the period 2009–2013 alone, 22 new localities of *Corbicula fluminea* were registered in the Danube River, 24 localities in the inland rivers and four localities in standing water basins in Bulgaria. Most likely the distribution of the species in the inland waters of the country is supported by human activities such as fishing, fish stocking, recreation, etc.

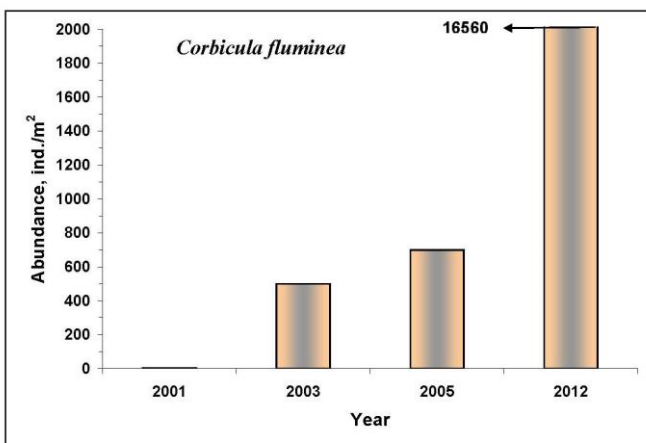


Fig. 6. Maximal abundance of the population of



Fig. 7. Mass shell deposits of *Corbicula*

Corbicula fluminea in the Bulgarian part of the Danube River, 2001–2012 (Source: Hubenov *et al.* 2013).

fluminea along the Danube River bank at Zagrazhden village, September 2012 (Source: Hubenov *et al.* 2013, Photo: T. Trichkova).

Case study 2:

Recently, a rapid spread of the invasive freshwater mussels from the genus *Dreissena* (*D. polymorpha* and *D. rostriformis bugensis*) was registered in Bulgaria. *Dreissena polymorpha*, which is native to Bulgaria has been recorded in 60 water bodies, incl. the Danube River (Fig. 8). Five of them are part of the species native range and 55 are result of the species invasion. In the period 2009–2013 alone, 31 newly invaded water bodies have been registered. *Dreissena rostriformis bugensis* which is alien to Bulgaria has been found in the Danube River and four inland water bodies along the Ogosta River. Both species have changed completely the ecosystem of the infested water bodies.

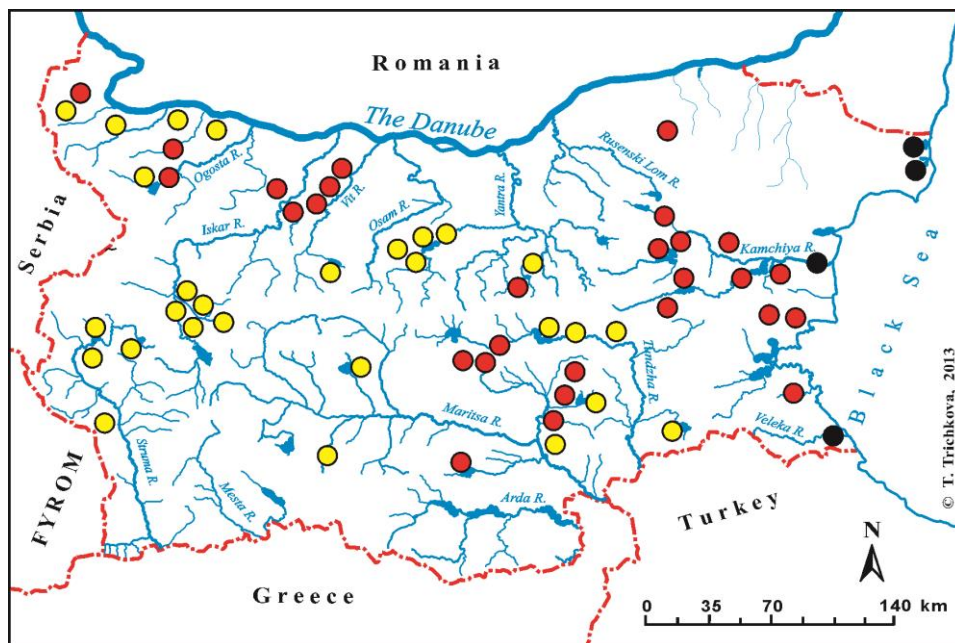


Fig. 8. Distribution of *Dreissena polymorpha* in Bulgaria, 2012. Black dots – native range; yellow dots – water bodies infested before 2009; red dots – water bodies infested in the period 2009–2012 (Source: Trichkova 2013).

2.3. Mycota

Compared to plants and animals, the fungi and fungus-like organisms are significantly less studied in Bulgaria. **So far over 4900 species have been recorded.** Using modern approaches for the assessment of fungal diversity that are based on the proportion between the number of fungi and fungus-like organisms and the number of higher plants one can assume that the expected number of species in the country is over 20 670. Basic research is related mainly to the preparation of the monographic series ‘Fungi in Bulgaria’. Five volumes have been published over the past five years presenting original data about more than 470 species. For the period 2009–2013, 89 species new to the country have been found and new chorological data about 156 taxa have been published. The Red list of fungi in Bulgaria (2006) includes a total of 215 species of ascomycetes and basidiomycetes of which

Critically Endangered (CR) are 37 species, Endangered (EN) – 105, Vulnerable (VU) – 40, Near Threatened (NT) – 14 and Data Deficient (DD) – 19. No changes in the conservation status of these species have been registered in the past 5 years. In *Red Data Book of the Republic of Bulgaria* (2011) 149 fungi species are included.

2.4. Habitat Diversity

Almost all main habitat types represented in Europe can be found in Bulgaria. According to the first estimates, based on the Palaearctic classification, 977 habitat types from all hierarchical levels exist in the country. At the elementary level the number of habitats is 542. Such diversity can be assessed as extremely high. A total of 96 habitats occur only in Bulgaria. Inventory and assessment of the diversity of natural habitats in the country continues and new data and estimates are expected.

In Annex I of the Directive 92/43/EEC, and respectively in Annex 1 of the Bulgarian Biodiversity Act, 90 Bulgarian habitats are considered to be of community interest and need special attention. They represent 38.86% of all natural habitats listed in the Habitats Directive.

In *Red Data Book of the Republic of Bulgaria* (2011) 166 natural habitats are included with the following threat categories – Critically Endangered (CR) – 28, Endangered (EN) – 71, Vulnerable (VU) – 47, Nearly Threatened (NT) – 20.

No changes in the habitat diversity of Bulgaria have been registered in the period 2009–2013. Nevertheless, changes in the status of various habitats have been recorded. They are associated both with natural processes (e.g. natural vegetation successions) and anthropogenic factors (see Section 3. Threats to biodiversity in Bulgaria).

2.5. Biological resources in Bulgaria

According to the Convention on Biological Diversity, ‘biological resources’ are genetic resources, organisms or parts thereof, populations or any other biotic components of ecosystems with actual or potential value.

2.5.1. Forests

By 31/12/2012 woodlands in Bulgaria occupy 4 163 415 ha, which constitutes one third of the country’s territory. Of these, 3 795 338 ha (91.0%) are forests. Since 2009, the total area of woodlands in the country has increased by 32 519 ha (0.78%), and the area of forested territories – by 46 209 ha (1.22%). Main factors that favour the dynamics of this process are self-forestation of treeless areas and abandoned lands outside forest areas and afforestation of treeless forest areas.

Compared with 2009, by 31/12/2012 the coniferous forests had decreased by 14 495 ha. Coniferous plantations constitute 53.9% of the total area of coniferous woodlands. In the period 2009–2012, the area of broadleaved high-forest woodland has increased with 15 799 ha, this of coppice forests for conversion – with 14 658 ha, and low-stem woodlands – with 16 557 ha. This is a result of the transformation of the forests for conversion into the mentioned types of deciduous forests. Deciduous forests occupy 69.6% of the total woodlands in the country.

The following trends have been registered:

- Increase of the woodlands mainly through natural succession of plant communities.
- Reduction of woodlands created as a result of afforestation – from 5097.5 ha in 2009 to 1289.4 ha in 2012.
- Reduction of the coniferous forests and coniferous plantations. It is expected that their area will be further reduced due to several factors: (1) the process of natural regeneration, which favours deciduous trees; (2) secondary succession accompanying

the resumption of areas occupied by coniferous plantations, that are mature and ready for cutting; (3) forest fires and subsequent regeneration, mainly with deciduous species.

- Increase of the area of monotypic forests with 182 949 ha and reduction of the area of mixed forests with the participation of 4–5 tree species with 164 299 ha. The forests with the participation of 2–3 tree species remained without significant change.

Regarding the **non-timber forest resources** in the period 2006–2011, there was a reduction of the amount of non-timber products harvested from state forests – mushrooms, berries, herbs, rose hips, forest seeds (Table 2). Accordingly, the total amount of income from non-timber forest products, services and benefits in state forest areas also has decreased – from 3 279 719 BGN in 2006 to 1 667 974 BGN in 2011.

Table 2. Goods obtained from the state forests in the period of 2006–2011 (Source: ExEA).

Type of goods	Mea- sure	2006	2007	2008	2009	2010	2011
Nuts	T	22 302	14 584	2884	9135	19 995	24 891
Wild fungi	Kg	4 821 806	573 323	155 094	541 768	375 691	184 768
Forest fruits	kg	2 747 715	826 679	208 180	348 167	664 594	427 655
Lime flowers	kg	566 483	626 728	569 800	182 042	271 630	268 673
Rose hips	kg	401 445	186 374	149 020	74 540	117 052	83 020
Other herbs	kg	4 430 323	837 474	736 126	489 555	749 795	534 779
Forest seeds	kg	5864	8280	1016	3727	7380	595
Forest saplings	number	913 770	879 494	829 411	299 586	423 277	521 530
Decorative saplings	number	16 091	57 205	47 330	27 154	73 061	39 193

2.5.2. Game resources

There are 42 game species in Bulgaria – 16 mammals and 26 bird species (Table 3). With its number of game species Bulgaria occupies a leading position in Europe.

The following number of game species have been recorded in 2012 in Bulgaria: red deer – 21 300, fallow deer – 6500, deer – 87 000, wild pigs – 80 000, mouflons – 1500, capercaillie – 2600, black grouse – 310 000 and rock partridges – 23 000. Data until 2011 show that the populations of 11 species have increased, of 18 species – have decreased and of 10 species – remained permanent (Table 3). Game populations of the large game species have been established and have increased in the period of 2009–2012 in all game enterprises in the country. Slow but steady growth is reported for the small game species. The health status of the game species in Bulgaria have been characterized as good.

The decrease in the population abundance of the large game species in public hunting areas is a result of the failure of game-management activities – feeding and maintenance of biotechnical equipment, increasing number of predators, including sheep dogs, planned shooting, and poaching.

Table 3. Game species in Bulgaria and their status (2011–2012). Migration status: R – the major population is local; M – the major population conducts seasonal migrations; P – part of the population conducts seasonal migrations; + the population increases; – the population decreases; = the population is stable (Sources: University of Forestry; Forestry Executive Agency).

	Species	Migrat ion status	Number (2011)	Number (2012)	Trend (until 2011)
	Mammals				
1	<i>Cervus elaphus</i>	R	21 100	21 300	+
2	<i>Dama dama</i>	R	6200	6500	+
3	<i>Capreolus capreolus</i>	R	85 600	87 000	–
4	<i>Ovis ammon musimon</i>	R	4800	1500	=
5	<i>Sus scrofa</i>	R	76 400	80 000	+
6	<i>Lepus europeus</i>	R	402 900		–
7	<i>Sciurus vulgaris</i>	R			–
8	<i>Martes foina</i>	R	30 000–40 000		+
9	<i>Putorius putorius</i>	R	15 000–28 000		=
10	<i>Meles meles</i>	R	40 000–60 000		=
11	<i>Nyctereutes procyonoides</i>	R			–
12	<i>Canis lupus</i>	R	700–2100		+
13	<i>Canis aureus</i>	R	10 000–39 300		+
14	<i>Vulpes vulpes</i>	R	39 000–43 900		=
15	<i>Ondatra zibethica</i>	R			
16	<i>Myocastor coypus</i>	R			
	Birds				
17	<i>Columba palumbus</i>	P	200 000–500 000		+
18	<i>Streptopelia turtur</i>	M	200 000–500 000		–
19	<i>Streptopelia decaocto</i>	R	10 000–30 000		–
20	<i>Coturnix coturnix</i>	M	500 000–750 000		–
21	<i>Scolopax rusticola</i>	P	6000–8000		=
22	<i>Gallinago gallinago</i>		100–200		+
23	<i>Anas platyrhynchos</i>	P	85 000–51 500		–
24	<i>Anas penelope</i>	M	3400–2600		–
25	<i>Anas clypeata</i>	M	1200–1300		=
26	<i>Anas querquedula</i>	M	100–300		–
27	<i>Anas crecca</i>	M	5300–4600		–
28	<i>Anas acuta</i>	M	20–300		–
29	<i>Aythya fuligula</i>	M	1900–1700		–
30	<i>Fulica atra</i>	P	67 000		+
31	<i>Anser albifrons</i>	M	244 900		=
32	<i>Perdix perdix</i>	R	303 000	310 000	–
33	<i>Alectoris graeca graeca</i>	R	10 100		–
34	<i>Alectoris chukar</i>	R	12 100		–
35	<i>Phasianus colchicus</i>	R	91 500		–
36	<i>Phasianus colchicus mongolicus</i>	R	127 700		–

37	<i>Tetrao urogallus</i>	R	2600	2600	=
38	<i>Pica pica</i>	R	1 000 000		+
39	<i>Corvus cornix</i>	R	150 000		+
40	<i>Garrulus glandarius</i>	R	500 000–700 000		=
41	<i>Corvus monedula</i>	R	500 000–1 000 000		=
42	<i>Sturnus vulgaris</i>	R			

2.5.3. Fish resources

2.5.3.1. Commercial and recreational fishing

Over 40 species of **Black Sea and freshwater fish as well as other aquatic organisms** (mussels, crabs, snails) are used for commercial and recreational fishing in the country. Commercial fishing is done in the Black Sea, the Danube River and inland waters (reservoirs). The largest share belongs to the catches in the Black Sea (Table 4). The catches in 2009–2012 vary slightly, showing general decrease when marine and anadromous species are concerned. All species show decline in their catches in 2012 compared to previous years with the exception of rapana, mussels and shrimps (Table 4).

Table 4. Total catch of fish and other aquatic organisms (in tons) in Bulgaria per water bodies for the period of 2009–2013 (Source: NAFA).

	2009	2010	2011	2012	Variation 2012/2011
Total catch in the Black Sea, including:	7 394.5	9 685.9	8 147.6	8 161.4	0.2%
Marine species	5 096.4	4 793.8	4 973.9	4 338.0	–12.8%
Anadromous species, Pontic shad	37.4	59.1	51.8	22.1	–57.3%
Rapana, mussels, shrimps	2 260.7	4 832.7	3 121.9	3 801.2	21.8%
Others	0.03	0.3	0.02	0.02	0.0%
Total catch in the Danube River, including:	96.1	86.6	136.3	111.1	–18.5%
Freshwater fishes	90.6	78.6	122.6	102.7	–16.2%
Anadromous species, Pontic shad	2.6	4.5	6.2	2.9	–53.7%
Other species	2.9	3.5	7.5	5.5	–26.9%
Total catch in the inland waters	1 494.2	1 001.7	1 350.6	1 322.7	–2.1%
Total catch of fishes and other aquatic organisms	8 984.8	10 774.2	9 634.5	9 595.2	–0.4%

The main species that are subject to commercial fishing in the Black Sea are presented in Table 5. The largest shares in the catches for 2007–2012 correspond to sprat, horse mackerel and the alien rapana species. Over the years the following species are prevailing also in the catches: *Alosa immaculata*, *Squalus acanthias*, *Engraulis encrasicolus*, *Pomatomus saltatrix*, *Mullus spp.*, *Sarda sarda*, *Scophthalmus maximus* (Case study 3), *Raja clavata* and Gobiidae (Table 5). The average annual catch for the period 2009–2012 was 8 347.4 t, which constitutes 86% of the total catch in the country (Table 4).

Table 5. Catches of fish and other aquatic organisms (in tons) in the Black Sea for the period of 2007–2012 (Source: NAFA).

Fish and other aquatic organisms	2007	2008	2009	2010	2011	2012
<i>Squalus acanthias</i>	23.98	22.75	9.46	77.16	81.01	28.69
<i>Raja clavata</i>	3.56	25.58	46.81	72.21	93.43	68.59
<i>Dasyatis pastinaca</i>	2.39	1.69	2.18	6.72	4.48	6.88
<i>Engraulis encrasicolus</i>	60.44	28.03	42.41	64.73	18.11	8.82
<i>Alosa immaculate</i>	25.81	27.48	37.38	59.08	51.80	22.10
<i>Sardina pilchardus</i>	0.88	0.21	3.48	8.04	4.16	4.62
<i>Sprattus sprattus</i>	2 984.59	4 309.43	4 551.32	4 041.38	3 957.90	2 836.21
<i>Merlangius merlangus</i>	16.11	0.44	2.27	14.67	1.38	1.44
<i>Liza aurata</i>	1.40	2.37	3.30	1.83	2.63	0.95
<i>Liza saliens</i>	15.17	3.67	6.87	8.76	7.51	14.64
<i>Mugil cephalus</i>	5.84	9.28	10.62	18.73	14.69	24.82
<i>Liza haematocheila</i>	0.83	0.09	2.30	0.33	0.43	0.18
<i>Atherina spp.</i>	9.44	2.23	13.55	27.07	16.52	28.11
<i>Belone belone</i>	2.75	3.61	5.48	3.71	4.53	2.52
<i>Dicentrachus labrax</i>	0.00		0.04		0.02	0.06
<i>Pomatomus saltatrix</i>	8.22	25.18	52.54	63.49	29.39	550.80
<i>Trachurus mediterraneus</i>	115.89	179.92	176.91	165.27	394.84	381.37
<i>Spicara spp.</i>		0.66	0.15	1.29	0.61	0.00
<i>Mullus spp.</i>	14.30	18.71	72.16	110.65	209.12	143.23
Gobiidae	73.89	25.66	36.82	44.24	85.18	89.98
<i>Sarda sarda</i>	0.90	16.07	4.87	16.31	8.26	96.25
<i>Scophthalmus maximus</i>	66.89	54.87	52.47	46.45	38.06	40.34
<i>Platichthys flesus luscus</i>		0.05	0.07	0.12	0.04	9.36
<i>Solea nasuta</i>	0.01	0.02	0.10	0.17	0.02	0.03
<i>Leander spp.</i>	0.02	0.05	0.31	1.44	1.28	2.77
<i>Crangon sp.</i>	0.03	0.01	0.12	0.02	0.03	0.16
<i>Eriphia verrucosa</i>	0.04			0.02		
<i>Mytilus galloprovincialis</i>	82.95	35.11	45.49	0.26	1.32	3.71
<i>Mya arenaria</i>	1.56	0.84	0.83	0.11	0.40	0.89
<i>Rapana venosa</i>	4 309.99	2 871.55	2 213.94	4 830.91	3 118.87	3 793.43
Other species	3.47	0.04	0.27	0.73	1.63	0.42
Total:	7 831.33	7 665.60	7 394.53	9 685.88	8 147.61	8 161.4

Case study 3:

One of the most valuable species in the Black Sea, an object of commercial fishing, not only for Bulgaria but for all Black Sea countries, is the turbot (*Scophthalmus maximus*). Because of the intensive exploitation of the stocks of the species in the past, stocks and catches are substantially reduced after 1980. Current estimates from Bulgaria show low stocks and poor size/age structure. The biomass index tended to decrease during the period 2008–2011 (Fig. 9). Illegal fishing and unsustainable use of the common resources by the Black Sea countries are the main reasons to be considered for this phenomenon.

The average annual catch of turbot in Bulgaria in 2009–2012 is low – 44.33 t. A general trend for reduction of the quantities is observed not only for the reporting period, but also compared to previous years (2007–2008) (Table 5).

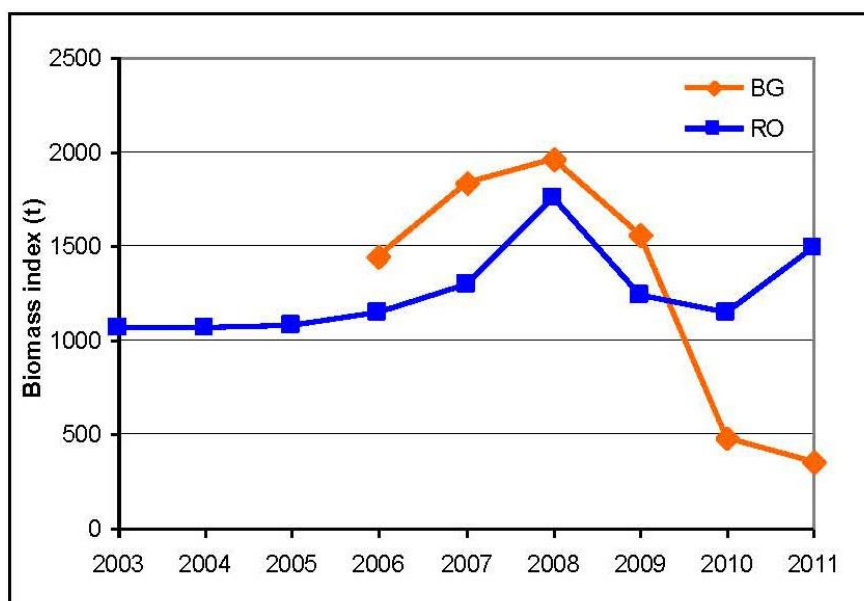


Fig. 9. Biomass indices (in tons) for the turbot (*Scophthalmus maximus*) in the Bulgarian and Romanian aquatory of the Black Sea in the period 2003–2011 (Source: Georgi Daskalov; Daskalov *et al.* 2012).

The main fish species that are subject to commercial fishing in the Danube River are: the native species – *Alosa immaculata*, *Barbus barbus*, *Abramis brama*, *Cyprinus carpio*, *Silurus glanis*, *Vimba vimba*, *Sander lucioperca*, *Alburnus alburnus*, *Chondrostoma nasus*, *Aspius aspius* and *Esox lucius*, and from the Asian carps – *Carassius gibelio*, *Hypophthalmichthys molitrix*, *Aristichthys nobilis* and *Ctenopharingodon idella* (Table 6).

Table 6. Catches of fish and other aquatic organisms (in tons) in the Danube River in the period 2005–2012 (Source: NAFA).

Fish species and other aquatic organisms	2005	2006	2007	2008	2010	2011	2012
<i>Acipenser gueldenstaedtii</i>	0.3	0.0	0.1	0.0	0.0		
<i>Acipenser ruthenus</i>	4.8	4.1	0.3	0.0	0.3		
<i>Acipenser stellatus</i>	0.7	0.1			0.0		
<i>Huso huso</i>	13.2	6.4	0.3	0.3	0.8	0.1	
<i>Alosa immaculata</i>	16.0	1.1	0.2	1.7	4.5	6.20	2.87
<i>Abramis brama</i>	30.1	33.2	5.8	5.8	5.9	14.48	13.58
<i>Alburnus alburnus</i>	17.7	20.0	0.7	0.6	2.6	3.68	3.13
<i>Aristichthys nobilis</i>	20.8	18.3	10.9	22.2	12.6	12.39	13.59
<i>Aspius aspius</i>	16.7	18.1	2.5	2.3	2.3	2.31	1.76
<i>Barbus barbus</i>	34.4	33.3	10.4	10.7	11.5	28.39	19.06

<i>Carassius gibelio</i>	9.1	17.1	5.2	6.2	3.2	6.45	5.80
<i>Chondrostoma nasus</i>	17.7	11.9	1.2	2.6	1.9	2.97	3.07
<i>Ctenopharingodon idella</i>	15.2	13.8	1.3	1.5	2.5	2.90	3.93
<i>Cyprinus carpio</i>	19.5	26.6	9.0	12.5	9.5	10.22	10.24
<i>Hypophthalmichthys molitrix</i>	21.8	20.3	4.2	2.7	6.6	5.70	5.04
<i>Leuciscus idus</i>	7.2	10.8	0.2	0.4	0.3	0.33	0.20
<i>Pelecus cultratus</i>	1.4	0.5	0.0	0.0	0.0	0.03	0.00
<i>Rutilus rutilus</i>	6.9	9.7	0.0	0.1	0.1	0.14	0.23
<i>Scardinius erythrophthalmus</i>	7.3	6.7	0.4	0.1	0.4	0.23	0.28
<i>Vimba vimba</i>	19.4	12.7	3.1	1.5	4.6	7.50	4.67
<i>Silurus glanis</i>	27.2	22.7	3.9	3.6	6.6	11.97	9.49
<i>Esox lucius</i>	10.5	17.6	1.6	0.6	2.2	1.59	1.51
<i>Lota lota</i>	0.7	5.1	0.2	0.2	0.6	0.54	0.03
<i>Perca fluviatilis</i>	1.7	1.4	0.2	0.2	0.1	0.07	0.22
<i>Sander lucioperca</i>	14.1	15.0	2.3	1.7	3.6	7.29	4.63
Other species	26.4	19.4	4.1	4.2	3.9	10.80	7.75
Total:	360.8	345.9	68.1	81.7	86.6	136.28	111.08

The total catch in the Danube River is relatively small, as the populations of economically valuable fish species in the river are extremely unstable and highly reduced, hence their catch can neither be guaranteed nor planned. The average annual catch for the period 2009–2012 was 107.5 t, which is only 1% of the total catch in the country (Table 4). There is over 3-fold reduction in the catches compared to previous years (2005–2006) (Table 6). The main reason for the low catch is the poor and even critical state of the populations of the anadromous species, Pontic shad (*Alosa immaculata*) and the sturgeons. Since 20/01/2012 the fishing of the sturgeons *Acipenser gueldenstaedtii*, *Acipenser ruthenus*, *Acipenser stellatus* and *Huso huso* in the Bulgarian aquatory of the Danube River and the Black Sea has been banned for a 4-year period.

A large part of the catch (24%) for the period 2010–2012 is due to the alien carp species imported from Asia. The largest catches have been registered for the *Aristichthys nobilis*, *Hypophthalmichthys molitrix*, *Carassius gibelio* and *Ctenopharingodon idella* (Table 6). *Aristichthys nobilis* is the only species, the catch of which has substantially increased in 2012. The percentage of alien species in the catches is maintained or even slightly increased in comparison with the previous period from 2005 to 2008, when it was 22%. According to NAFA in recent years no fish stocking to the Danube River has been conducted, therefore it is possible that the maintenance of the populations of *Aristichthys nobilis*, *Hypophthalmichthys molitrix* and *Ctenopharingodon idella* is due to natural reproduction in the river.

The main fish species that are important for commercial fishing in the inland waters of Bulgaria are *Aristichthys nobilis*, *Hypophthalmichthys molitrix*, *Cyprinus carpio* and *Carassius gibelio*. The average annual catch for the period 2009–2012 was 1 292.3 t, which is 13% of the total catch (Table 4). The largest share of the catch falls to *Cyprinus carpio* (average annual catch for 2010–2012 – 575 t), *Aristichthys nobilis* (338 t), *Carassius gibelio* (158 t), *Hypophthalmichthys molitrix* (30 t), *Ctenopharingodon idella* (19 t), *Silurus glanis* (17 t) and *Sander lucioperca* (15 t).

2.5.3.2. Aquaculture

The constant decline of fish resources in natural waters as a result of environmental changes and excessive exploitation have resulted in increased interest in aquaculture. Aquaculture production in Bulgaria is playing an increasingly important role, adding to the sea and river fishing.

In 2009–2012, the total aquaculture production (for fish stocking and for fish and other aquatic organisms for consumption) has amounted to 8 427.4 t per year. The highest production was recorded in 2010 and decreased in the subsequent years (Fig. 10). For example, at the end of 2012 the total number of active fish farms in the country reached 388, compared to the number of 322 in the previous year. Of these, 347 are for freshwater aquaculture, and 41 – for marine aquaculture. In 2012, the total aquaculture production from them (stocking material) was 7 557.1 t (Table 7). This is 2.5 % less than the previous year due to a 29.2% decline in the production of stocking material, while the production of fish for consumption shows an increase of 8.2%.

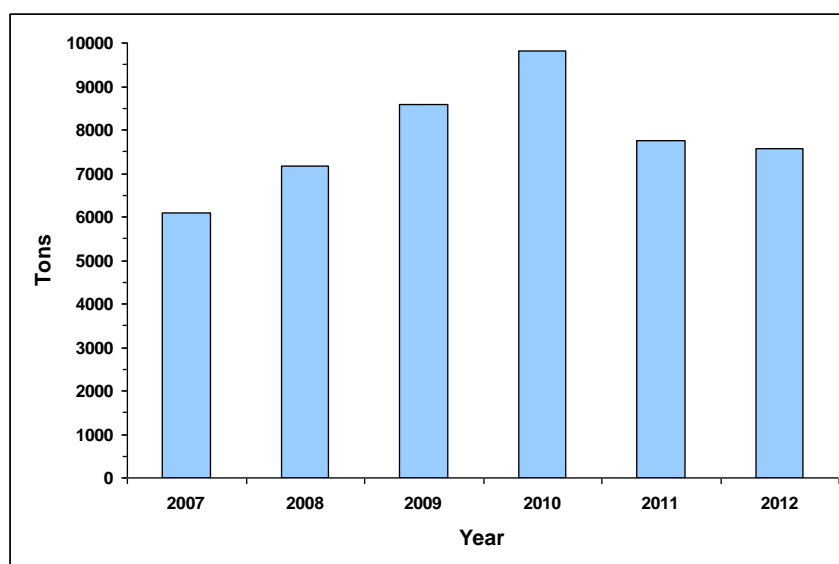


Fig. 10. Annual average total production of aquaculture in the fish farms (in tons) for the period 2007–2012 (Source: NAFA).

The largest quantities are produced from *Oncorhynchus mykiss*, *Cyprinus carpio*, and *Aristichthys nobilis* followed by *Ctenopharingodon idella*, *Hypophthalmichthys molitrix* and *Silurus glanis* (Table 7). The main marine aquaculture is the Mediterranean mussel (*Mytilus galloprovincialis*). In 2012 its production in the fish farms increased with 36.7% compared to the previous year and reached 877.8 tons (Table 7).

After the legal amendments in 2012, the interest for aquaculture development has increased. For instance, in the period 01/01/2013 – 14/05/2013 alone, 103 new fish farms have been registered.

Table 7. Production of stocking material, and fish and other aquatic organisms for consumption (in tons) in the fish farms for the period 2010–2012 (Source: NAFA).

Species	Stocking material			Fish for consumption			Total quantity		
	2010	2011	2012	2010	2011	2012	2010	2011	2012
<i>Acipenser baerii</i>	0.0	0.6	0.0	0.0	18.6	13.7	0.0	19.1	13.7
<i>Polyodon spathula</i>	0.0	0.1	0.2	0.6	0.3	0.3	0.6	0.4	0.5

<i>Abramis brama</i>	0.0	0.0	0.0	7.5	7.3	7.4	7.5	7.3	7.4
<i>Alburnus alburnus</i>	3.0	0.0	0.0	3.0	6.8	2.4	6.0	6.8	2.4
<i>Aristichthys nobilis</i>	209.7	203.8	291.7	1 294.2	926.3	820.5	1 503.9	1 130.1	1 112.2
<i>Carassius gibelio</i>	1.0	0.2	0.3	167.7	218.6	94.1	168.7	218.8	94.3
<i>Ctenopharingodon idella</i>	94.9	51.0	64.8	168.5	162.4	150.6	263.4	213.4	215.5
<i>Cyprinus carpio</i>	698.1	621.9	444.5	1 905.8	1 389.6	1 288.4	2 603.9	2 011.5	1 733.0
<i>Hypophthalmichthys molitrix</i>	3.7	64.1	18.9	28.5	93.0	77.7	32.2	157.1	1 96.5
<i>Mylopharyngodon piceus</i>	0.0	0.0	0.0	0.0	0.1	4.0	0.0	0.1	4.0
<i>Squalius cephalus</i>	0.0	0.0	0.0	2.6	1.2	0.0	2.6	1.2	0.0
<i>Tinca tinca</i>	0.1	4.0	1.1	0.0	0.0	0.6	0.1	4.0	1.6
<i>Ictalurus sp.)</i>	112.5	105.0	2.4	108.0	98.0	14.3	220.5	203.0	16.7
<i>Silurus glanis</i>	39.9	36.9	24.0	87.2	78.2	75.7	127.1	115.1	99.7
<i>Clarias gariepinus</i>	18.0	0.0		9.7	1.8		27.7	1.8	
<i>Esox lucius</i>	3.9	6.0	3.9	18.8	16.9	5.8	22.7	22.9	9.7
<i>Salmo salar</i>	1.7	8.2	7.3	7.2	1.7	4.5	8.9	9.9	11.8
<i>Salmo trutta fario</i>	4.4	12.1	10.8	17.8	17.4	34.6	22.2	29.5	45.4
<i>Oncorhynchus mykiss</i>	476.4	951.6	674.2	2 908.7	1 534.8	2 167.7	3 385.1	2 486.4	2 841.9
<i>Salvelinus fontinalis</i>	0.9	0.1		1.1	0.1		2.0	0.2	
<i>Perca fluviatilis</i>	0.2	0.0	0.0	1.8	1.0	0.4	2.0	1.0	0.4
<i>Sander lucioperca</i>	3.7	4.5	7.7	17.6	16.4	19.3	21.3	20.9	27.0
<i>Lates calcarifer</i>	0.0	4.4	9.98	8.2	0.0	0.0	8.2	4.4	10.0
<i>Astacus leptodactylus</i>	0.5	0.4	0.0	9.9	6.2	3.4	10.3	6.6	3.4
<i>Mytilus galloprovincialis</i>	213.6	104.5	0.0	698.3	642.1	877.8	911.8	746.6	877.8
Others	11.2	39.3	9.32	460.1	292.8	322.9	471.5	332.2	428.7
Total:	1 897.4	2 218.7	1 571.1	7 932.8	5 531.6	5 986.1	9 830.2	7 750.3	7 557.1

The sturgeon with the highest production in the sturgeon fish farms is *Acipenser gueldenstaedtii* (Table 8). The interest in other native sturgeon species, such as *Acipenser ruthenus*, *Acipenser stellatus* and *Huso huso* as well as to some alien species – *Acipenser baerii* and *Polyodon spathula* has also increased in 2011–2012.

Table 8. Total production of sturgeon species (for stocking material and consumption, in tons) for the period 2007–2012 (Source: NAFA).

Species	Year					
	2007	2008	2009	2010	2011	2012
<i>Acipenser gueldenstaedtii</i>	147.1	129.1	258.1	343.6	253.1	287.0
<i>Acipenser ruthenus</i>	4.6	0.0	3.8	1.0	0.4	0.6
<i>Acipenser stellatus</i>	2.2	0.0	0.0	0.0	6.1	7.2
<i>Huso huso</i>	46.2	0.0	1.0	115.1	62.3	24.4
<i>Acipenser baerii</i>	0.0	0.0	0.0	0.0	19.1	13.7
<i>Polyodon spathula</i>	0.0	0.0	0.0	0.6	0.4	0.5
Total:	200.1	129.1	262.9	460.3	341.4	333.4

2.6. Genetic resources

According to the Convention on Biological Diversity ‘genetic resources’ means genetic material of actual or potential value. They are the basis for the development of important economic sectors in Bulgaria such as agriculture, stock breeding, fisheries, perfumery, cosmetics, pharmaceutical industry. *Ex situ* stored genetic resources of wild species of

conservation value can be used as source for a variety of conservation and restoration activities related to extinct or endangered species.

2.6.1. Genetic resources in agriculture

Bulgaria has a significant diversity of cultivated plants and their wild relatives. The National Seed Genebank at the Institute of Plant Genetic Resources in Sadovo contains 57 684 seed samples of which 13 269 are of Bulgarian origin. This is the richest collection of plant genetic resources preserved in a gene bank in Southeast Europe (<http://eurisco.ecpgr.org>). Over 70% of the samples are at conditions for long-term storage. The available gene pool is enriched at annual basis, its preservation is controlled and sent to national and international research centers upon request. Preservation of the original germplasm includes not only products of plant breeding, but also traditional for the country but little known in other areas, raw material sources:

- Medicinal, oil and decorative plants, spices, etc.;
- “Forgotten” plant varieties, the use of which directly corresponds to organic agriculture and healthy eating (leafy vegetables, roots, nuts);
- Local varieties related to gastronomic culture and agriculture that offer unique diversity at the Bulgarian table.

Specialized genetic collections are maintained in other scientific centres, such as the Institute of Plant Physiology and Genetics (seed bank with 118 samples from wheat, oat, sunflower, maize, pea, tobacco, tomatoes, pepper), Agrobioinstitute, etc.

2.6.2. Genetic resources in stock breeding

The breeds that are kept in the country constitute the genetic resources in stock breeding. More than 60 breeds of cattle, bulls, sheep, goats, horses, pigs, bees and birds are kept in Bulgaria. Of all breeds 45 are local and 33 are autochthonous. Part of the genetic resources in the country are still not identified and described. Table 9 presents the dynamics in the number of animals from the autochthonous breeds in Bulgaria in the period 2009–2013.

Table 9. Dynamics of the number of animals from the autochthonous breeds in Bulgaria in the period 2009–2013 (Source: EASRSB).

Breed	2009	2010	2011	2012	2013
Cattle and bulls					
Rhodopi shorthorn cattle	361	514	698	1067	1320
Bulgarian gray cattle	1156	1411	1630	1908	2149
„Iskar cattle“	605		604	723	958
Sheep					
Local Stara Zagora sheep	649	704	680	643	750
White Maritsa sheep	860		757	711	646
Black Maritsa sheep	1887	3115	2343	2974	3299
Central Stara Planina sheep	7847	9078	10788	10221	9289
Dabene sheep	3532	6601	4100	4272	5941
Central Rhodope sheep		4856	3356	5783	5574
Teteven sheep	1606	625	592	636	1846
Koprivstitsa sheep	1625	538	1069	1142	385
Karakachan sheep	5732	4509	5200	5722	6394
Local Karnobat sheep	155	255	160	150	250

West Stara Planina sheep		919	984	1893	1692
Replyana sheep	1871	1349	1696	1905	1682
Sakar sheep			1686	3157	3452
Sofia (Elin Pelin) sheep		1646	1543	1054	1110
Breznik sheep		1239	951	953	490
Copperred Shoumen sheep	3436	4465	4505	4789	5836
Goats					
Kalofer long-hair sheep			727	1368	1989
Local long-hair, twist-horn goat					515
Horses					
Karakachan horse	264	1234	1704	1870	1842
Pigs					
East Balkan pig	595	1269	1277	1176	1314

For the period 2009–2013, the number of indigenous breeds of cattle has increased 3.5 times, the increase is sustainable and consistent over the years. Most significant is the increase of the number of Karakachan horses – nearly 7 times. But after the initial registration, the last three years the rate dropped down. The situation is similar to other horse breeds – the East horse, the Danube horse and the Pleven horse.

The initial registration of goats that has taken place during the reporting period resulted in a rapid increase of the number of the animals, similar to other animal groups in the previous years.

Sheep show the most diverse dynamics in number. Consistent sustainable growth rates were observed in two breeds – the copperred Shoumen sheep and Central Stara Planina sheep, the latter reaching the limit beyond which it cannot be considered endangered. Most breeds, after the initial increase in the number of animals, show inconstant dynamics in the reduction and growth of the number of animals. In other breeds, such as local Stara Zagora sheep and Replyana sheep the dynamics is smaller. Worrying is the situation with the White Maritsa sheep, Sofia sheep and Breznik sheep, where despite the support, the number of controlled animals decreases.

In 2009–2013 the number of animals of some commercial breeds dropped below the threshold to be considered endangered, e.g. Bulgarian Rhodope cattle, Bulgarian white dairy goat, Northeast Bulgaria thin-fleece sheep, Karnobat thin-fleece sheep, Thracian thin-fleece sheep, Balkan tsigai sheep and Danube white pig. They were added to the list of endangered local breeds and since then their breeding has been supported.

2.6.3. Genetic resources in microbiology

The Institute “National Bank for Industrial Microorganisms and Cell Cultures” (NBIMCC) at the University of Chemical Technology and Metallurgy is a national resource centre for bacteria, actinomycetes, yeasts, moulds, plasmidia-containing microorganisms, animal and plant viruses, animal cell cultures. Patented and collection strains from all over the world are stored there. The resource centre is unique with the diversity of the microbiological groups and the large number of strains from more than 900 microorganism species from more than 250 genera. NBIMCC is registered under № 135 in the World Federation of Culture Collections (WFCC) and is a member of the European Culture Collections Organization (ECCO). It is also a depository for microbiological samples according to the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure of **World Intellectual Property Organization** (WIPO).

The total number of microbiological samples includes:

- Bacteria – first risk group – 15%;
- Bacteria – second risk group – 54%;
- Plasmidia-containing bacteria – 4%;
- Actinomycetes – 7%;
- Yeasts – 9%;
- Moulds – 7%;
- Plant viruses – 1%;
- Animal viruses – 1%;
- Animal cell cultures – 2%.

By the end of 2013 NBIMCC contains 7426 strains and cell cultures, preserved in 84 615 samples (80 106 are lyophilized, and 4509 – frozen in liquid nitrogen). In ‘Gene Pool Bulgaria’ the strains from Bulgarian depositories are 2096, of which 1987 are isolated from Bulgarian biotopes, and the rest are from Antarctica, Arctica and other places. The strains deposited as a result of scientific work are 212.

NBIMCC maintains the 47 control strains of bacteria, yeasts and mould, necessary for microbiological standards and standardized methods in the control of food, water, disinfectants, etc. (ISO, AFNOR, EN, FDA, FIL, NF, SP-VG, XP V, European Pharmacopoeia).

The microbiological collections at NBIMCC serve mainly as referent cultures (more than 80%) during testing of food quality, food preservatives, medicine substances, for the verification and validation of microbiological methods for analysis of food, water and cosmetic products, to obtain accreditation to BS and ISO standards, laboratory and production control, in ensuring the traceability of microbiological tests. It provides specific microbiological samples for the needs of universities and research institutes for research and educational purposes. The Institute offers more than 100 standard and reference cultures.

3. Threats to biodiversity in Bulgaria

3.1. Deterioration, fragmentation and loss of habitats

3.1.1. Freshwater and brackish habitats

Major habitat changes in inland water bodies of the country as a result of human activity leading to loss of biodiversity are: construction and operation of Hydroelectric Power Plants; construction of hydraulic structures; maintenance dredging of the Danube River for navigation; sand and gravel extraction in river beds; withdrawal of water quantities from surface waters; felling of riparian vegetation. Hydromorphological alterations and regulation of the water flow are the main reasons for not achieving a good ecological status of surface waters.

3.1.2. Marine habitats

Major threat to marine biodiversity is the **physical loss and damage to habitats**. Activities leading to physical harm are building hydraulic structures, shore protection, dredging, drilling for oil and gas, and others. Physical damage to the bottom substrates and associated biological communities in the Bulgarian part of the Black Sea shelf is mainly caused by commercial fishing with active pelagic or demersal fishing gears. Fishing with bottom gear (beam trawling permitted since 2012) leads to abrasion of the seabed and in particular the vulnerable biogenic substrates, e.g. causes a decrease in the number of the Mediterranean mussel (*Mytilus galloprovincialis*).

Another threat is the **change in hydrological processes** that causes changes in the processes of sedimentation, siltation, burying the bottom, increased turbidity, changes in wave

action and currents. These effects also cause changes in species composition of biological communities.

3.1.3. Terrestrial habitats

Deterioration, fragmentation and loss of terrestrial habitats is caused by: the construction and infrastructure projects (e.g. construction of transport corridors, construction of large tourist resorts and facilities on the Black Sea coast and in some of the highest mountains of the country), ploughing of land for agricultural purposes, quarrying and extraction of aggregates, construction and operation of wind and photovoltaic parks, fires, overgrazing, or lack of grazing, afforestation of open land and planting species that are unusual for the area, the unsustainable exploitation of forest overgrowth of open spaces with bushes and trees due to regime change of use of land and natural changes in vegetation cover. Threats are usually of anthropogenic and less natural causes (e.g. landslides, floods, natural succession of vegetation cover).

Deterioration of habitats and loss of biodiversity in agricultural lands are due to: termination of the haymaking; conversion of pastures, grasslands and meadows to arable land and perennial crops; destruction of plant and animal species; change in the water regime, etc. The negative impact is due to two main trends: 1) The agricultural policies are geared more towards intensive farming than to agricultural practices, providing more environmental public goods, such as the biodiversity; and 2) the abandonment of rural areas, limited employment and demographic changes.

3.1.4. Subterranean habitats (caves)

Subterranean habitats and their protection is of particular importance for bats given their high conservation status (33 bat species in Bulgaria, all protected!), their importance to ecosystems, their low reproductive potential. In 2010 Bulgaria identified 18 subterranean summer bat habitats of national and international importance. The main threat to bats in the caves is their disturbance. The presence of anthropogenic impact in subterranean habitats can lead to lower numbers and breeding success of the unique bat colonies in Bulgaria.

3.2. Overexploitation of biological and genetic resources

With regard to the forest resources threats are associated with unregulated logging, poaching, illegal mining and export of herbs and mushrooms, uncontrolled grazing. Currently, practices in planning forest operations in the country are mainly focused on the management of forest resources. The main parameters that are important for biodiversity conservation such as forest type, habitat area and amount of rare and endangered plant and animal species, quantity and type of deadwood are not yet taken into account. Inventory and planning activities in forest areas do not sufficiently take into account biodiversity. There is lack of a comprehensive system for the collection and exchange of information, monitoring and evaluation of the existing biodiversity in forest ecosystems. It is necessary to raise the level of knowledge and practical experience related to biodiversity conservation of the bodies responsible for the forest management at the local level and of the companies that conduct inventory of forest areas and forest planning.

The main threat to **game resources** is the change of habitats, including changes in the structure and methods of use of agricultural crops. The fences, highways, irrigation canals, etc., also have negative impact on game resources. However, it is easier to deal with them using additional facilities such as green bridges, viaducts, tunnels, planting of suitable locations and other ways to facilitate the passage of wild animals through these facilities. Poaching is the second main factor causing a decrease in the game resources.

With regard to **fish resources**, the main reasons for the deterioration of the stocks of valuable fish species and other aquatic organisms in the Black Sea, the Danube River and the inland waters are:

- Overexploitation of fish and non-fish resources;
- Lack of or failure to implement a comprehensive science-based program for regular stocking in order to maintain optimum stocks in water bodies under intensive fishing;
- Unregulated or uncontrolled stocking mostly in inland water bodies, which violate the structure of fish populations and the balance of ecosystems;
- Lack of in-depth and comprehensive studies on the ichthyofauna and fish stocks, as well as threats and use of their results in the management of fish resources;
- Lack of systematic monitoring of the status of fish and non-fish resources, their exploitation, and environmentally oriented development of fisheries.

When stock breeding and crops are considered the main causes of the loss of genetic resources are complex, but more essential are: application of intensive farming methods and exploitation; conducting one-sided selection; frequent change in the production relations – changes in tenure and land use and land management; lack of markets for products made from local breeds that leads to spontaneous crossings in search of improved productivity and better commercial properties; introduction of foreign breeds and varieties that displace the local ones; gaps in legislation related to the protection of local breeds and plant varieties and their proper cultivation, etc.

3.3. Pollution of air, soils and water

Major causes of pollution in the **soil** are the use of chemical fertilizers and pesticides, construction and operation of landfills serving urban areas, improper disposal of solid waste, deposition of pollutants from industry and transport.

Among the causes of **air pollution** are industry, road transport, noise pollution in villages, military sites, airports and more.

Water quality is determined by the ecological and chemical status of **surface water bodies** and the quantitative and chemical status of groundwaters. From a total of 759 surface water bodies (freshwater, transitional, coastal and marine), assessed until 2012 in Bulgaria, 36 bodies were in very good ecological status (4.7%), 293 – in good ecological status (38.6%), 242 – in moderate ecological status (31.9%), 109 – in poor ecological status (14.4%) and 78 – in very poor ecological status (10.3%).

Deterioration of surface waters is due to:

- Point source pollution – waste waters from urban areas and industry (mainly energetics enterprises, manufacturing and processing of metals, mineral industry, chemical industry, production and processing of paper and wood, factory farming and processing, etc.);
- Pollution from diffuse sources – agriculture (fertilizers, plant protection and treatment of animals) and other sources (discharging waste into rivers and reservoirs, waste waters from small settlements without sewerage system and landfills without insulating underlay surface and drainage system);
- Flow regulation and morphological changes of rivers;
- Water abstraction;
- Other sources – watershed erosion, pollution from old mines, drought and water shortages, etc.

As a result of these loads as the most significant threats to water quality are identified: the nutrient pollution, organic substances, and waste and pollution by hazardous substances

(e.g. chlorides, sulphates, calcium, magnesium, iron, manganese, phenols, petroleum, zinc, copper, chromium, arsenic, cyanide, etc.).

Noise pollution is registered in the Danube River and the Black Sea that is due to river and sea transport, seismic active sonar systems, underwater explosions, industrial activities and construction.

In **groundwater** of 177 groundwater bodies assessed by 2012, 123 were of good chemical status (69.5%) and 54 – in poor chemical status (30.5%), while 170 water bodies were in good quantitative status (96%) and seven – in bad quantitative status (4%).

Deterioration of groundwater is due to:

- Pollution from point sources (landfills, settlements without sewerage system, earth lagoons, former uranium mines, industrial sites, mines and oil bases);
- Pollution from diffuse sources (mainly farming);
- From water abstraction (in areas with intense economic activity).

3.4. Invasive alien species

Invasive alien species are alien species whose introduction and/or spread outside their native range threatens or adversely affects local biodiversity and ecosystem services. They can also have a negative impact on human health and the economy.

In Bulgaria, about 60 species of flowering plants are considered invasive or potentially invasive. Among the most problematic for local biodiversity are *Ailanthus altissima*, *Amorpha fruticosa*, *Fallopia ×bohemica*, and recently – *Opuntia humifusa*. The impact of these species is caused by their competition with native plants, changes in the composition and structure of plant communities and habitats, parasitism.

Of all 347 alien terrestrial arthropods 52 species are widespread crop pests with potential negative impact on forestry, agriculture, horticulture and greenhouse production. The greatest threat to biodiversity in Bulgaria are two species: the multicolored Asian ladybird *Harmonia axyridis* (see Case study 4) and chestnut leafminer moth *Cameraria ohridella*.

Case study 4:

The multicolored Asian ladybird *Harmonia axyridis* is native to Central and East Asia. The species was introduced to North America and Europe for biological control of aphids. It feeds on aphids as well as on pollen and larvae of other insects, including native ladybird species. The multicolored Asian ladybird was recorded for the first time in Bulgaria in 2009. For the period 2009–2013 it had spread very quickly throughout Bulgaria and reached high numbers (Fig. 11). In 2013, it dominates on white birch, lime, poplar, gardens and parks in Sofia, where previously the native doublespotted ladybird used to dominate. Adverse effects are as follows: feeding on local ladybirds and other beneficial insects; damage to the fruits by sucking the fruit sugar from them; entering houses in the autumn; induction of allergic reactions in some people.

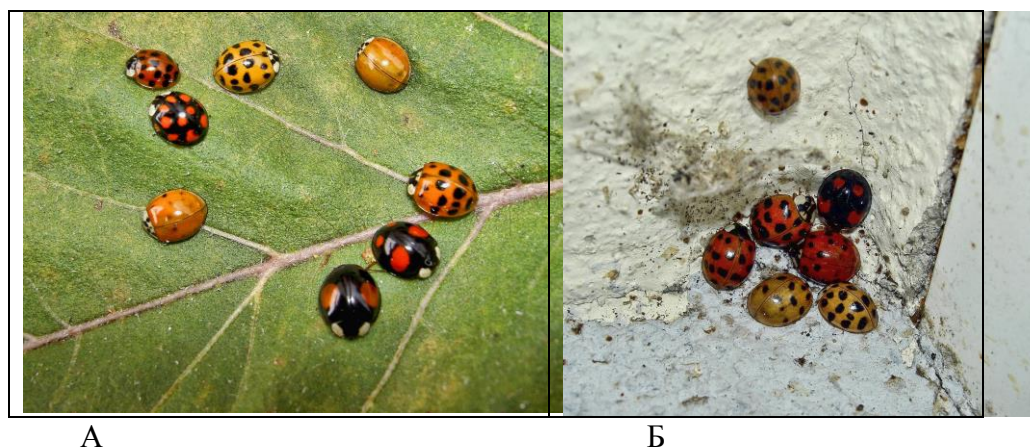


Fig. 11. The multicolored Asian ladybird *Harmonia axyridis* – a new invasive alien species in Bulgaria recorded in 2009–2013. A. Crowding of individuals in the nature; B. Crowding in a balcony corner, where they enter the houses for the winter (Source: Kalushkov 2013; Photos: Plamen Kalushkov).

From a total of 29 alien species of marine invertebrates found along the Bulgarian Black Sea coast, nine species are considered invasive. The introduction of some of them has entirely changed the ecosystem of the Black Sea, such as: *Ficopomatus enigmaticus*, *Rapana venosa*, *Mya arenaria* and *Anadara inaequalis*, *Mnemiopsis leidyi* and *Beroe ovata*. Their impact is due to predation, competition and habitat change. For example, the highly invasive *Rapana* is considered the major cause of the destruction of the populations of the oyster *Ostrea edulis* and *Flexopecten glabratus*, the reduction in the population of *Chamelea gallina* and a widespread deterioration of the mussel fields of the Mediterranean mussel (*Mytilus galloprovincialis*), incl. for the period 2009–2012 (Table 5).

All three species of alien freshwater mussels, introduced in Bulgaria in recent years (*Corbicula fluminea*, *Anodonta woodiana*, and *Dreissena rostriformis bugensis*), together with *Dreissena polymorpha* are some of the most aggressive invasive alien species in Europe and worldwide. The massive development of *Corbicula fluminea*, as reported in the period 2009–2012 in Bulgaria (Figs. 6 and 7), can change or reduce the habitat of other benthic species; due to its high rate of filtration it can reduce plankton and larvae of other mussels, and thus adversely affect biodiversity. Mussels of the genus *Dreissena* through its filtering and fouling activities can also cause dramatic changes in the ecology of the affected water bodies. In the period 2009–2013 water bodies infested by *Dreissena* spp. have shown changes in physical and chemical properties of water, changes in the structure and abundance of bacterioplankton, phytoplankton, zooplankton, and changes in the trophic structure of benthic macroinvertebrates and fish populations.

A potential vertebrate invasive species in Bulgaria can be considered *Trachemys scripta elegans*, which in the period 2009–2013 is already widespread in nature. As an active predator species it may compete with native species of turtles and negatively affect the ecosystem as a whole.

3.5. Climate change

Bulgaria is in a geographical region that is among the most vulnerable to climate change. The following facts can be mentioned:

- Since the late 1970s there is a trend toward warming in Bulgaria; in the second half of the 20th century, the winters are milder;

- 20 of the last 23 years since 1989 show positive anomalies of mean annual air temperature, compared to the climate norm (1961–1990);
- The longest droughts have been observed in the 1940s and the last two decades of the 20th century and the most significant droughts were in 1945 and 2000;
- The number of longer periods of drought followed by severe storms and flooding with heavy damage and casualties increases;
- The number of extreme weather and climate events has increased and there is a significant increase in the average number of days with daily rainfall over 100 mm – about 30% in the period 1991–2007, compared to the baseline (1961–1990); heavy rainfall, spring-summer rains, thunderstorms and hail in the winter months like January and February; increased frequency of the average number of days with thunderstorms and hail in April and September compared to the baseline 1991–2006;
- The annual amplitude between the maximum and minimum air temperature drops down – the minimum temperature is increased more rapidly compared to the maximum values;
- The number of months with snow in the mountains dropped down; there is a constant trend for thinning of the snow cover;
- The upper limit of the deciduous forests is shifting to higher elevations;
- Data from phenological observations show advancement in plant development with 7–15 days in different climatic regions. This is an unambiguous evidence of warming over the last 30 years.

To assess the climate change in Bulgaria the **Rainfall and temperature indicator** is used, which shows that for the period 1971–2011, the average surface air temperature in the country has increased by 1.5°C (Fig. 12). The average annual temperature in Bulgaria in 2009, 2010 and 2011 is above the climate norm for the country by more than 1°C. Only in 2011 the average annual temperature is 0.41°C above the climate norm. This is the consequent, 14th year with temperatures higher than usual for the country. There is a steady trend of increase of the air temperature (Fig. 12), while precipitation and snow cover have remained relatively constant.

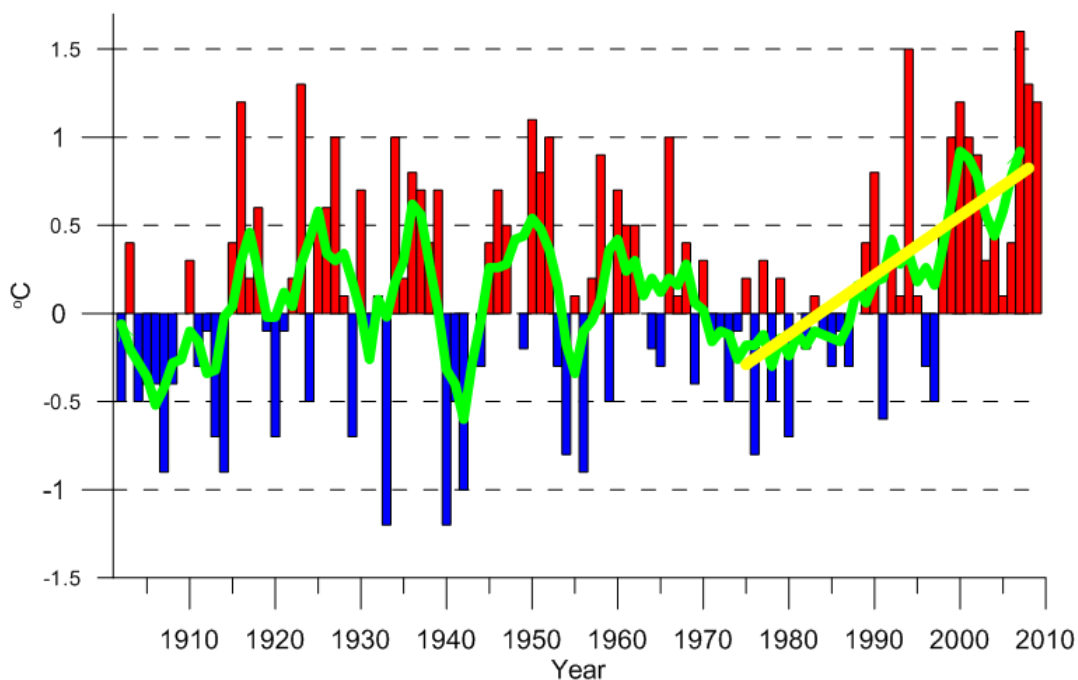


Fig. 12. Mean annual air temperature and trends of change compared to the climatic norm for the period 1961–1990: **red** – positive anomaly of the mean annual temperature for 1961–1990; **blue** – negative anomaly of the mean annual temperature compared to the climatic norm in 1961–1990; **green** – filter (creeping average) to measure the variations in the anomaly of the mean annual temperature; **yellow** – linear trend of the anomalies of the mean annual temperature for the period 1971–2010 (Source: NIMH – BAS).

The impact of climate change on biodiversity can be illustrated by the indicator **Change in the number of wintering waterbirds** in Bulgaria. For the past five years the number of wintering in Bulgaria bird species varies widely. Compared to the initial year of counting the number of wintering birds there is a decrease of more than 60%. In the short term, the number of birds recorded in 2012 is 46.87% less than in 2011 (Fig. 13). The variation in number mainly depends on the weather conditions in the country and to the north of it. In warmer winters with relatively high temperatures many waterfowl remain in the north. While in the winter period, there is a delay of the arrival of some wintering species due to the late cold snap. In recent years, there are changes in the numbers of some waterfowl – mostly geese, ducks and grebes.

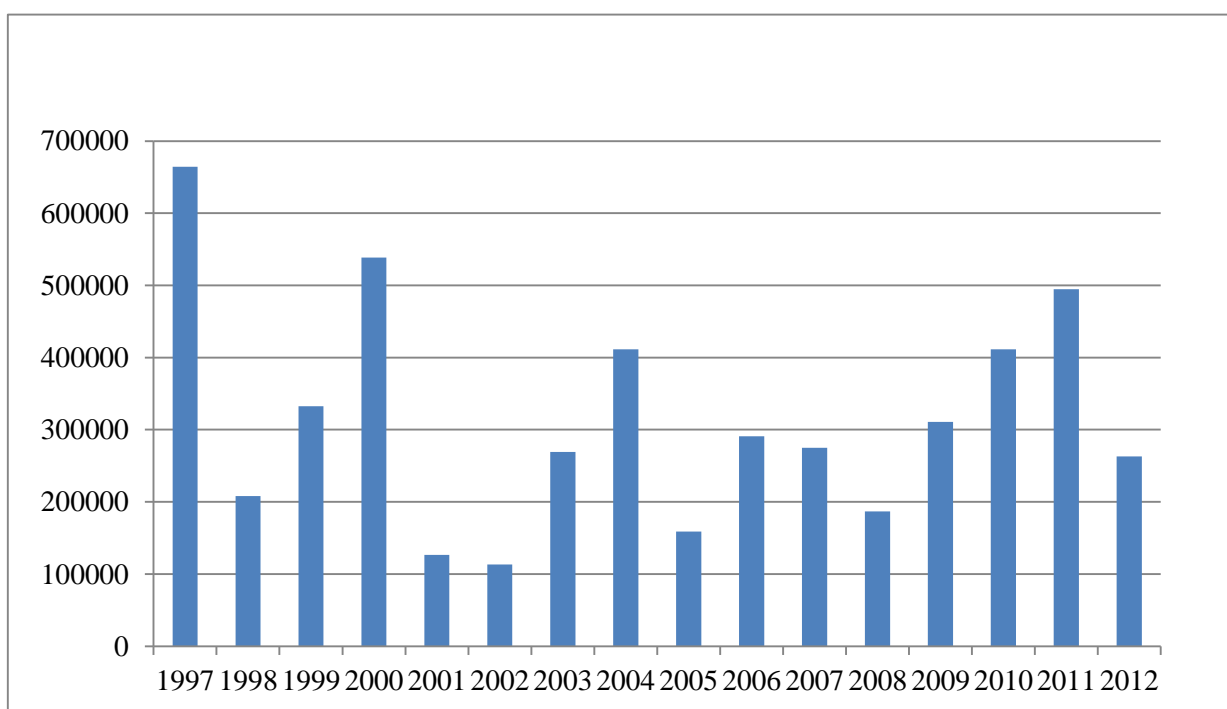


Fig. 13. Changes in the number of wintering water birds in the period 1997–2012 (Source: BSPB).

3.6. Threats to biodiversity in protected areas

In the period 2011–2012, an assessment of all types of threats and impacts on natural habitats and species of Directive 92/43/EEC (the Habitats Directive) in all sites of NATURA 2000 network in Bulgaria has been conducted (Table 10). The results show that in most cases the natural habitats are negatively affected by intensive grazing, burning, dispersed urbanization, afforestation with alien trees and pollution. Regarding the species, in most cases the impacts and threats are associated with fires, transport infrastructure, intensification of agriculture, the use of biocides, hormones, etc., and in forestry, additionally, by afforestation of open spaces with non-native species.

Table 10. Total number of threats (present and future) to species and habitats in the sites of NATURA 2000 network in Bulgaria in all biogeographical regions (Source: MOEW, National Priority Action Framework for NATURA 2000 network in Bulgaria).

Category of impact/ threat	Number of threats in each category			
	Habitats		Species	
	Present threats	Future threats	Present threats	Future threats
Agriculture	194	194	376	390
Forestry	288	288	376	437
Mining, exploitation of earth resources, energetics	80	80	108	115
Transport and service corridors	128	128	124	130
Urban development and trade	232	232	222	177
Exploitation of biological resources different	74	74	117	77

from agriculture and forestry				
Human impact and disturbance	103	103	213	229
Pollution	143	143	199	168
Invasive and other problematic species	24	24	21	17
Changes in the natural systems	137	137	326	357
Natural biotic and abiotic processes (excl. catastrophies)	138	138	85	98
Geological event, natural catastrophies	75	75	64	68
Climate changes	45	45	30	41
Unknown threats and impacts	0	0	2	1
Lack of threats and impacts	0	0	28	10

4. Socio-economic and cultural implications of changes in biodiversity and ecosystem services in Bulgaria

Changes in biodiversity, depending on the type and intensity, have impact on ecosystems and ecosystem services.

Ecosystem services are four types: provisioning, regulating, supporting and cultural. They originate from the functions of ecosystems to provide food, water, clean air, regulate climate, water currents, diseases, maintain the conditions necessary for life, providing welfare rights. The indicator for the proper functioning of the ecosystem is the ecosystem integrity – or its ability for self-organizing and self-sustaining. The basis of the functioning of ecosystems is biodiversity. In this sense, any drastic change of biodiversity leads to changes in the ecosystem functioning. Additionally, changes in biodiversity often lead to various socio-economic and cultural implications.

The introduction and widespreading of a number of invasive alien species have negative socio-economic consequences. For example, the impact of invasive alien plant species can be expressed in competition with cultivated plants and may lead to economic losses to agriculture. Many of these plants often become the worst weeds in crops, e.g. *Amaranthus retroflexus*, *A. hybridus*, *Cuscuta campestris*, *Erigeron annuus*, *E. bonariensis*, *E. canadensis*, *E. sumatrensis*, *Galinsoga parviflora*, *G. quadriradiata*, *Sorghum halepense*, and *Xanthium italicum*. Eleven terrestrial arthropod species are proven to have a negative impact on the economy: *Leptinotarsa decemlineata*, *Trialeurodes vaporariorum*, *Myzus persicae*, *Diaspidiotus perniciosus*, *Pseudaulacaspis pentagona*, *Viteus vitifoliae*, *Hyphantria cunea*, *Phthorimaea operculella*, *Helicoverpa armigera*, *Grapholita molesta* and *Frankliniella occidentalis*. Their control requires substantial funds.

The most significant environmental and socio-economic impacts in inland waters of the country were caused by the invasions of *Dreissena polymorpha* and *Dreissena rostriformis bugensis* (Case study 5).

Case study 5:

As major biofoulers, the mussels of the genus *Dreissena* can interfere with vital water facilities, such as: reservoirs and water supply systems, pumping stations, measuring equipment, pipe systems, turbines, protective screens, exit tunnels and canals, aquaculture facilities, etc. (Fig. 14). They may also cause plugging ducts, pipes and fencing, underwater corrosion of metal equipment, impeding the operation of hydro- and thermoelectric power plants, water supply and drainage hydraulic equipment, fish cages farms. Thus, in the period 2009–2013 they caused significant economic damage in different regions of the country and different sectors – power generation, drinking and industrial water supply, irrigation and fish farming. Massive deposits of shells on the

shores, decaying shells left on the beach after a decrease in the water level may have negative impact on tourism, water sports and recreation.

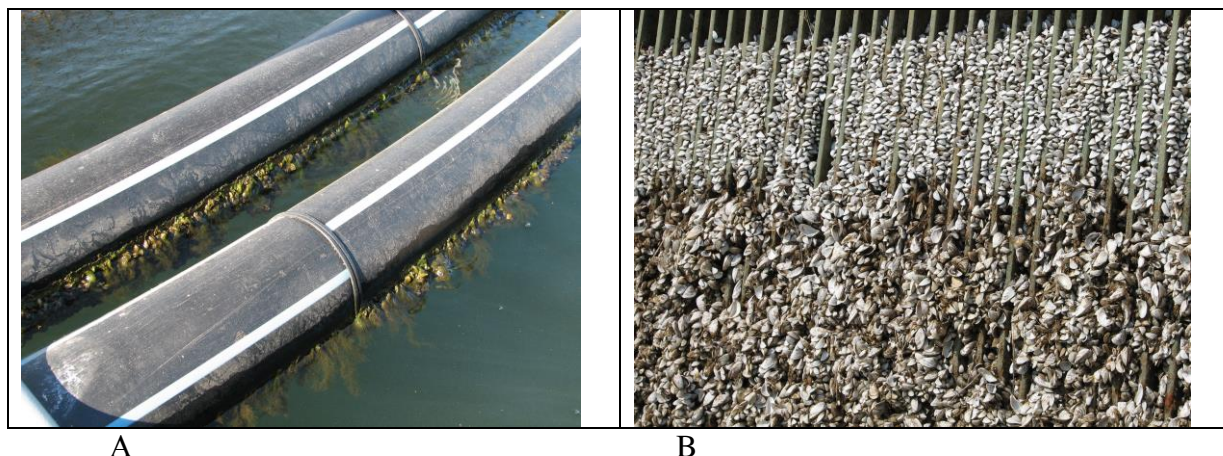


Fig. 14. Fouling by *Dreissena polymorpha* on fish cage facilities (A) and water intake tower (B) (Photos: T. Trichkova).

Some invasive alien species pose a threat to human health. For instance, the pollen of *Ambrosia artemisiifolia* is among the strongest allergenic agents to humans and cause hay fever, rhino-conjunctivitis, asthma-like symptoms. Plants contain volatile oils, which upon prolonged contact causes skin irritation, dermatitis, forming a refractory serous blisters and itching. For these reasons in many European countries there is a ban on the import of seeds and grains with an admixture of seeds of *Ambrosia*. In turn, this leads to significant economic losses to farmers in areas with mass development of ambrosia, due to the lack of realization of production or the need of significant investment for the clearing of seed crops. Such a threat is now available to farmers in the country, especially in the Northern and Northeastern Bulgaria.

Of animal species, the Asian tiger mosquito *Aedes albopictus*, which was recorded for the first time in Bulgaria in 2011, poses a threat to human health.

Human activities related to the **exploitation of fish and non-fish aquatic resources**, cause a drastic reduction of their stocks, changes in the population level, as well as disruption of the food chain, leading to penetration and dominance of non-commercial or alien species in the ecosystem, which in turn leads to both negative but sometimes positive socio-economic impacts.

In the Black Sea in the period 2009–2012, the largest share in the catches fall to the sprat (*S. sprattus*) (46% of the average annual catch for the period) and the invasive snail *Rapana* (42%) (Fig. 15). Economically valuable species such as turbot, Atlantic bonito, European anchovy, bluefish, Mediterranean horse mackerel and others have a negligible share in the total catch. *Rapana* is an alien species that is native to northwestern Pacific Ocean (the coast of Japan, China and Russia). The average annual catch of *Rapana venosa* in 2009–2012 was 3489 t. Due to its rapid growth and high fertility the species quickly reaches a high number and recovers its stocks. The main part of its diet are the Mediterranean mussels. It is believed that this is the main reason for the reduction and almost destroying of the mussel banks along the Bulgarian coast. The catches of mussel in 2009–2012 have decreased significantly, not only in the reporting period but also in the previous years (Table 5).

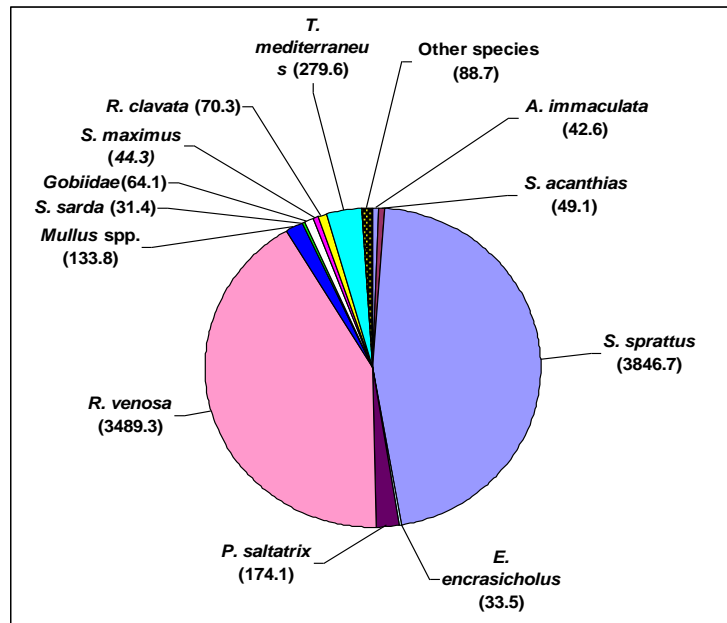


Fig. 15. Average catch per species (in tons) in the Black Sea for the period 2009–2012 (Source: NAFA).

Apart from the fact that the total catch in the Danube River for the period 2010–2012 is very low (1% of the total catch in the country, Table 4), a dominance of non-commercial species and alien species – Asian carps (24%) is also reported (Fig. 16). Of native species the largest share in the catches has barbel (18%), followed by bream, carp and European catfish (Fig. 16). These changes, as well as the ban on sturgeon fishing affect the employment of local people whose main livelihood is fishing. On the other hand the decrease in employment in this sector can be reflected in the increase of production in other sectors such as in aquaculture production.

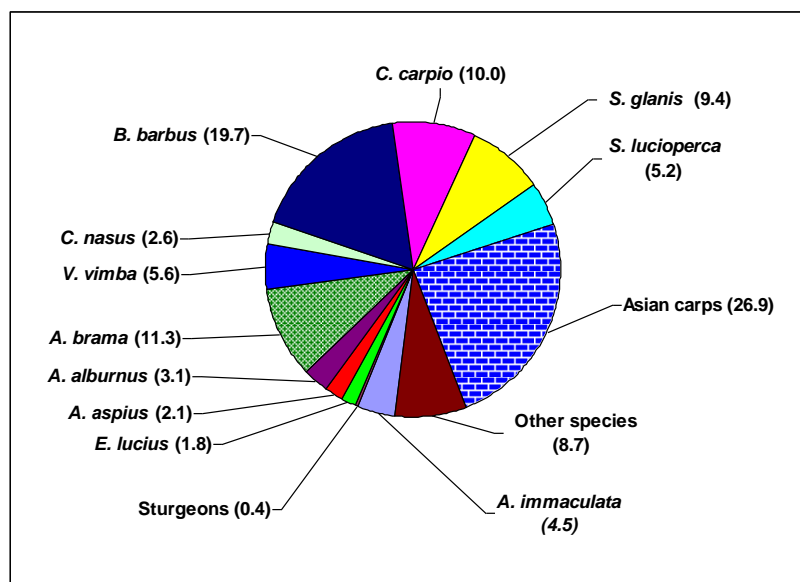


Fig. 16. Average annual catch (in tons) in the Danube River for the period 2010–2012 (Source: NAFA).

Maintaining ecosystem functions of wetlands through sustainable use of their resources is related to the quality of life of local communities, their livelihoods, but also contributes to limiting the adverse effects of climate change and facilitating adaptation to them. Numerous models and studies have shown that climate change and anthropogenic impacts are expected to cause drought and temperature change in the country, which will lead to significant changes in biodiversity, ecosystem functioning and ecosystem services, including wetlands.

For the maintenance of local plant varieties and animal breeds national policies are needed for the conservation of biodiversity and increase of the investment in conservation of the near-extinct and endangered breeds and varieties in order to prevent the loss of traditional knowledge and practices. This knowledge and practices are part of the culture of local communities, maintain their lifestyle and traditions which are also part of our national identity. Loss of entire populations of old, traditionally grown and adapted to local conditions Bulgarian breeds and varieties is contrary to the principles of sustainable development and good governance of genetic resources in agriculture.

II. NATIONAL STRATEGY AND ACTION PLAN FOR BIOLOGICAL DIVERSITY – IMPLEMENTATION AND INTEGRATION OF BIODIVERSITY IN SECTORAL POLICIES

5. Policies and goals related to biodiversity in Bulgaria

2009–2013 is the first five-year reporting period on the implementation of the Convention on Biological Diversity (CBD), in which Bulgaria is a member of the EU. During these years many state and scientific institutions have changed rapidly, and new structures have been established, aimed at increasing the national capacity to implement the Convention.

The biodiversity conservation policy is defined by a large set of documents linked with each other in a hierarchical structure. This is the Constitution of the Republic of Bulgaria, strategies and action plans for their implementation, laws, regulations, orders, methodologies, decisions, etc. National documents are streamlined with the key documents in the field of biodiversity in the European Union and at the global level (Fig. 17).

The conservation of biodiversity is one of the priorities in the **National Plan for Development of the Republic of Bulgaria 2007–2013**.

The **National Reform Programme** is prepared within the European semester – a new tool for better coordination of economic policies within the EU in implementing the Strategy for smart, sustainable and inclusive growth, Europe 2020. The purpose of this mechanism is the consistency of actions for sustainable economic growth, financial stability, increased employment and social inclusion, etc.

In the **National Strategy for Environment 2009–2018**, and the related Action plan is included a dedicated Strategic Goal V: *Limitation and halting of the biodiversity loss*, with a specific objective 1: *Sustainable management of biodiversity*.

The **National Development Programme: Bulgaria 2020** (2012) is the leading strategic and programming documents detailing policies for the socio-economic development of the country by 2020. The main purpose of the document is to achieve quality and balanced long-term economic growth. The document reflects the relationship between the EU priorities in the context of the Strategy ‘Europe 2020’ and the national priorities in Bulgaria. Among the national priorities are set environment, including biodiversity, rational use of biological resources and the development of the agricultural and fisheries sector.

The **National Biodiversity Conservation Strategy**, adopted in 1998, outlines the priorities for immediate action:

- Strengthen the scientific basis of nature conservation;
- Support legislative initiatives;
- Expand and strengthen the network of protected areas;
- Environmental education and supplementary training;
- Development and implementation of a policy on ecotourism;
- Promote the protection of the Black Sea basin;
- Promote the conservation of the Balkans.

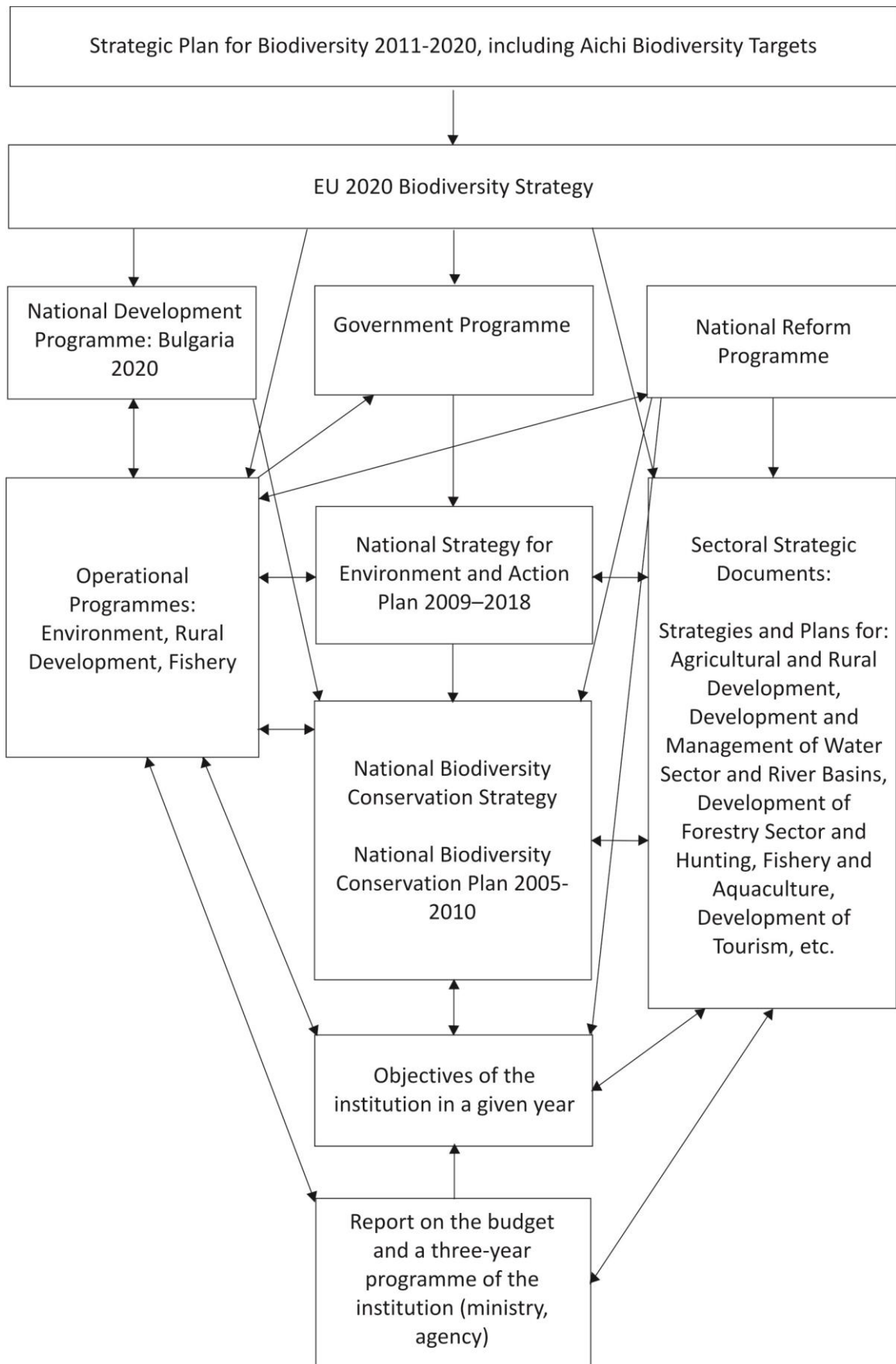


Fig. 17. Chart of the strategic documents in Bulgaria related to the implementation of the biodiversity conservation policy.

The major national document related to biodiversity is the second **National Biodiversity Conservation Plan 2005–2010**. Its long-term goal is: *conservation, restoration and sustainable management of biodiversity in the country in order to achieve optimal conditions, environment and life perspective for the Bulgarian population*. Its strategic goal is: *halting the biodiversity loss in Bulgaria by 2010*. Its operational goals are:

- 1) Protection and restoration of species, habitats, ecosystems and landscapes. Conservation of genetic diversity and bio-safety
 - Assessment of threats and study of the mechanisms to limit/eliminate their negative impact;
 - Developing, strengthening and sustainable management of the National Ecological Network (NEN), based on application of the ecosystem approach, and integration of NEN in the global ecological network by launching transboundary protected areas, zones and corridors;
 - Financial support of the activities for the conservation and sustainable use of biodiversity and optimization of the management of insured financial resources;
 - Supporting programs for *ex situ* conservation of biological diversity and the application of best practices in this area;
 - Monitoring of species, habitats, ecosystems and landscapes based on standard EU indicators and methodologies and coordination of lists of species and habitats in Bulgaria that are of Community interest;
 - Improve awareness and increase the activity of the society on the protection of biodiversity;
 - Creating conditions for effective training and education for biodiversity conservation;
 - Identification of invasive alien species and developing measures to reduce their impact on native species, ecosystems and human health;
 - Finalize the transposition of European legislation on use of genetically modified organisms (GMOs) in controlled conditions, release into the environment and placing on the market with the adoption of GMO Act and corresponding regulations;
 - Provide public access to information about the use of GMOs and biosafety.
- 2) Maximum integration of biodiversity issues into national environmental and sectoral legislation and national policies and programs
 - Integration of biodiversity issues in the elaboration and enforcement of environmental legislation related to water, soil, hazardous substances and GMOs, forests, hunting, medicinal plants, fisheries and aquaculture, marine resource management, eco-labeling, environmental impact assessment and environmental assessment, the implementation of the Aarhus Convention;
 - Revision and update of the principal and resource laws in the field of biodiversity in order to achieve effective conservation of biodiversity;
 - Integration of the issues related to conservation and sustainable use of biological diversity in the regional development policy and planning;
 - Legal regulation of the participation of professional organizations in the sharing of rights and responsibilities with the state on issues related to conservation and sustainable use of biological resources;
 - Implementation and optimization of compensation and payment mechanisms to encourage businesses and NGOs in favour of sustainable management and use of biological resources;

- Providing scientific basis for defining policy decisions for conservation and management of natural resources.

3) Sustainable use of biological resources

Integrating biodiversity in agricultural sector

- Introduction and implementation of good agricultural practices and conservation of traditional agricultural practices for the conservation of biodiversity in agricultural lands;
- Adoption and implementation of agri-environmental measures for long-term conservation of biodiversity;
- Strengthening and expansion of organic farming;
- Increasing the awareness of employees in the agricultural sector on issues related to the conservation and sustainable use of biological diversity and the potential of the agri-environmental measures.

Biodiversity conservation through sustainable forest management

- Implementation of the Birds and the Habitats Directives in forest policy and forestry legislation;
- Implementation of priority measures for biodiversity conservation of old-growth forests and natural forests;
- Reduction of the volume and the area affected by the illegal logging in forests and strengthening the control on it;
- Application of modern forestry and forest management practices based on research and the ecosystem approach;
- Achieving a balance between the public interest for the use of forests, including hunting and other non-timber biological resources and biodiversity conservation;
- Monitoring of forest biodiversity.

Conservation and sustainable use of fish resources

- Implementation and use of structural funds in the field of fisheries and aquaculture for investment in the development of environmentally sound management practices;
- Providing a favorable conservation status of marine habitats and species that are not subject to economic exploitation;
- Limitation of the amount and composition of bycatch species and preventing damage to the benthos;
- Assessment and reduction of the adverse impacts of aquacultures and fishing on the environment and biodiversity;
- Raising the awareness and promote the participation of stakeholders in the development of fisheries and aquaculture;
- Monitoring the status of fish stocks, their exploitation and nature-friendly aquaculture;
- Building and maintaining a control DNA bank and database to work on genetic certification of fish species of the families *Acipenseridae* and *Salmonidae*;
- Measures for control and periodic monitoring of the development and efficient operation of the fish passages at hydropower facilities, dams and thresholds which prevent normal fish migration to sites of spawning or feeding and other measures for restoration of aquatic ecosystems damaged by anthropogenic impacts;
- Assessment of the state of the stock of the Black Sea turbot along the Bulgarian Black Sea coast and preparation of regular trawl pictures;

- Construction of a center for the artificial breeding and rearing of Black turbot.

Optimization of the Bulgarian policy with respect to international trade in biological resources

- Identification of the contradictions and problems in national legislation on (international) trade of biological resources and identifications of measures to reduce the harmful effects;
- Increasing of the effectiveness of control on trade with species listed in CITES Convention and other types of regulated mode of use;
- Monitoring of trade with biological resources.

Development of sustainable tourism

- Development of forms of nature-friendly tourism;
 - Creating conditions for the management of protected areas in line with developing tourism;
 - Maintaining high recreational capacity of ecosystems and landscapes;
 - Monitoring the impact of different forms of tourism on biodiversity.
- 4) Preventing or reduction of the negative impacts on biodiversity caused by climate change and their mitigation
- Study the effects of climate change on biodiversity and measures to mitigate them;
 - Assessing the impacts of desertification and land degradation on biodiversity and mitigation of their consequences.

6. Updating the national biodiversity targets according to the Strategic Plan for Biodiversity 2011–2020 at CBD and the Aichi Targets

The National Biodiversity Conservation Plan 2005–2010 has not been formally updated, but since 2011, besides the support of a large part of the activities from the Plan, new national priorities have been formulated and implemented:

- Implementation of the Aichi targets of the Strategic Plan for Biodiversity 2011–2020 from the Convention on Biological Diversity with particular attention to:
 - ✓ reduce the loss of natural habitats;
 - ✓ sustainable management of natural resources and application of the ecosystem approach;
 - ✓ identification of invasive species and prevention of their introduction and spread;
 - ✓ classification and preparation of a list of ecologically and biologically significant marine areas (EBSA), called ‘hidden treasures of flora and fauna’;
 - ✓ improving knowledge of the relationship between biodiversity and climate change, and implementation of mitigation and adaptation measures;
 - ✓ restoration of habitats and populations of animal and plant species;
 - ✓ exploitation of biodiversity products, goods and services obtained in a way which does not threaten the existence of the species and their habitats;
 - ✓ conducting information campaigns: May 22 – International Biodiversity Day and other dates related to the environment.
- Implementation of the EU 2020 Biodiversity Strategy;
- Development of a new National Biodiversity Conservation Strategy of Bulgaria and the Third National Biodiversity Action Plan 2014–2020;

- Completion, maintenance and management of the National Ecological Network of protected areas and Natura 2000 sites in order to ensure territorial protection, preservation, and restoration of ecosystems, habitats, species and genetic material;
- Development of a National Priority Action Framework for Natura 2000 in Bulgaria for the period 2014–2020, so that to determine the necessary conservation measures and measures to prevent future negative impacts on protected areas;
- Development and adoption of management plans for protected areas and Natura 2000 sites and action plans for plant and animal species which are important tools for state and local authorities to support control functions, and to search for funding sources to implement the measures envisaged in them;
- Ratification and implementation of the Nagoya Protocol on access to genetic resources and fair and equitable sharing of benefits arising from their use;
- Progress on Strategy for Resource Mobilisation according to national or locally specific circumstances – financial resources and financial mechanisms;
- Application and membership in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES);
- Implementation of the objectives of the Global Strategy for Plant Conservation 2020 and other activities, including conservation of medicinal plants;
- Reduction of illegal trade in species listed in the Convention on International Trade of Endangered Species of Wild Fauna and Flora. Further implementation of important biodiversity-related projects funded by the Operational Programme “Environment 2007–2013”: Mapping and identification of the conservation status of habitats and species; Development and implementation of an information system for the Natura 2000 sites and National information and communication strategy for Natura 2000 network; Field studies of the distribution of species/assessment of the status of species and habitats throughout the country; Improving knowledge and updating information on the populations of migratory birds and endangered mammals (bear, chamois, lynx, etc.);
- Registration of laboratories for genetically modified organisms under controlled conditions, and issue the relevant permits to work with GMOs under controlled conditions.

7. Main results from the implementation of the national biodiversity objectives and their integration in the sectoral policies

In relation with the implementation of the national biodiversity targets for 2009–2013 the following major results have been achieved:

1) Development of the regulatory framework and program documents in the field of biodiversity conservation, incl. integration of biodiversity into sectoral policies

In order to harmonize the national legislation with global and European objectives regarding biodiversity, changes have been made in all major laws and regulations, including the Environmental Protection Act, Biological Diversity Act, Protected Areas Act, Medical Plants Act, Genetically Modified Organisms Act, Forestry Act, Law on Hunting and Game Protection, Law on Fisheries and Aquaculture, Law on the Protection of New Plant Varieties and Animal Breeds and others.

The legal framework builds and ends with over 100 rules, regulations and procedures to the relevant laws, which are also aligned with the requirements of international conventions and EU legislation in the field of biodiversity and its conservation and aim to minimize the

impact of threats, e.g. Ordinance on the conditions and procedures for environmental assessment of plans and programs.

Newly developed or amended are the programming documents in the filed of biodiversity conservation, **including in order to integrate biodiversity into sectoral policies:**

The **National Strategy for Regional Development 2012–2022** establishes a strategic framework for public policy to achieve balanced and sustainable development of the regions of the country and to address the intra- and inter-regional disparities. Biodiversity is included among the priorities, e.g. priority: *Development of infrastructure for environmental protection*, with a specific goal: *the preservation, maintenance and restoration of biodiversity as a part of the natural potential for sustainable development of the regions.*

In the field of agriculture and forestry is implemented the **National Strategic Plan and Program for Agricultural and Rural Development 2007–2013**. One of the objectives of the Plan is the *protection of natural resources and the environment in rural areas* by implementing the following secondary and operational objectives: expansion of sustainable land management, conservation of biodiversity and high nature value farmland and promotion of the sustainable management of forests and lands covered with forests. Another goal of the Plan and Program is related to the conservation of soil and water resources, including in areas with a risk of loss of nutrients (such as nitrate vulnerable zones) or at risk of other forms of pollution from agricultural activities.

In the sector ‘Agriculture’ was developed **National Strategy for Sustainable Development of Agriculture in Bulgaria in the period 2014–2020**. One of its priorities is the sustainable management of natural resources and activities related to climate change. Such goals are included: *Support for agricultural production with economical use of resources; Development of the territories and rural infrastructure in a way which does not threaten the ecological balance, especially biodiversity, etc.*

In the sector ‘Water’ **National Strategy for Development and Management of Water Sector** (2012) is implemented. The long-term strategic objective of the country in this sector is: *Sustainable use of water resources, ensuring optimal level of satisfaction of the present and future needs of the population, the economy, and aquatic ecosystems*. All targets are directly or indirectly connected with the conservation of biodiversity and aquatic ecosystems: *to ensure water for households and businesses in terms of climate change causing drought; Maintaining and improving the status of surface and groundwater; Improving the efficiency of the integrated management of water as an economic resource; and reduce the risk of damage from flooding.*

Management Plans for River Basins in Bulgaria 2010–2015 have been elaborated. Their objectives are directly related to the conservation of biological diversity and biological water resources: water and water bodies are protected from depletion, pollution and damage in order to maintain the necessary quantity and quality of water and a healthy environment, conservation of ecosystems, preservation of landscape and prevention of economic damage.

In 2012 was developed the **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013-2022**, with the following priorities: *wise use of wetlands in the country with a view to long-term conservation of their ecosystem services and related benefits to society; Maintain good environmental status of wetlands and prevent the net loss of territories occupied by wetlands in the country, including through supportive measures; Limiting adverse anthropogenic factors that affect wetlands as ecosystems; Wetlands restoration when the conditions are violated due to various anthropogenic impacts, but have a high potential for recovery and/or are an important habitat for rare and endangered species.*

In the forestry sector are implemented: **National Strategy for Sustainable Development of Forestry Sector 2006–2015**, **Strategic Plan for the Development of the Forestry Sector 2007–2011** (updated in 2009) and **Program of Measures for Adaptation of Forests in Bulgaria and Reduction of the Negative Impact of Climate Change** (developed in 2011). In 2012 was developed **National Strategy for the Development of the Forestry Sector in the Republic of Bulgaria 2013–2020**, in which the following objectives shall have priority: *maintaining healthy, productive and multifunctional forest ecosystems, contributing to the mitigation of the negative effects of climate change and Conservation, restoration and maintenance of biological and landscape diversity in forest areas*. It is envisaged that the introduction and implementation of special procedures of management of forest areas, including the maintenance of the islands of old age, that are of high conservation value for the conservation of endangered plant and animal species.

In 2012 was developed the **Strategy for the Development of Hunting in Bulgaria 2012–2027**, which aims to provide guidelines for the sustainable development and use of game resources, protection and conservation of biodiversity and habitats, restoration of extinct species, reducing and, in some cases, eliminating the influence of the factors that have a negative impact on game populations.

In sector ‘Fisheries’ are performed: **National Program for Fishery and Aquaculture 2007–2013** with strategic objectives: *Sustainable use of fish resources and Protection of the marine environment*; **National Strategic Plan for Fishery and Aquaculture 2007–2013**, structured according to the seven areas of the Common Fisheries Policy of the EU, including the *sustainable exploitation of fish resources, sustainable development of aquaculture and conservation of environment and water*; **National Program for the Sustainable Development of Fish Resources 2008–2013**, which aims to ensure sustainable development of fish resources, restoration and conservation of biological balance and enrichment of the diversity of fish resources in aquatic ecosystems.

In the ‘Tourism’ sector is implemented the **National Strategy for Sustainable Development of Tourism in the Republic of Bulgaria 2009–2013**, in which one of the strategic objectives is to *conserve, protect and improve the quality of tourism resources, including natural, cultural and anthropogenic ones*. Implementation of the Strategy is based on 12 core principles, which include: biological diversity – “conservation of natural areas, habitats and species by minimizing the negative impact on them”, the efficient use of resources and preserved nature and clean environment.

In the **Third National Action Plan on Climate Change 2013–2020** among the sustainability criteria is the requirement that the raw fuels are not produced on land with high carbon stock, on land with high biodiversity or in areas essential for conservation of biodiversity and the Natura 2000 network.

In the **National Program for Waste Management 2009–2013** targets were set to reduce the effects of soil pollution as a threat to biodiversity by building playgrounds and procedures for the processing of waste and improvement of waste collection and disposal in urban areas.

In the period 2007–2013, the main financial mechanisms to support activities related to biodiversity were the EU Structural Funds. Based on the **National Development Plan for 2007–2013** was developed **National Strategic Reference Framework 2007–2013**, which sets general guidelines and strategies, as well as operational programs (OPs) for certain key sectors where the priorities and operations that can be funded are described in more details. Objectives for biodiversity are set mainly in three operational programs: OP ‘Environment’, Rural Development Programme and OP for Development of the Fishery Sector 2007–2013.

The main strategic objective of the **Operational Programme ‘Environment 2007–2013’** is to improve, protect and restore the natural environment and the development of

environmental infrastructure. It includes the following specific objectives: *protecting and improving water status; improving of waste management and soil protection; and conservation of biodiversity and nature protection*. To achieve these objectives four priority areas are defined: 1) Improvement and development of infrastructure for drinkable and waste water; 2) Improvement and development of infrastructure for waste treatment; 3) Conservation and restoration of biodiversity; and 4) Technical assistance.

Rural Development Programme 2007–2013 has been prepared in accordance with the priorities of the Community Strategic Guidelines and the National Strategic Plan for Rural Development of Bulgaria for the period 2007–2013. The targets for biodiversity are set out in the Priority axis 2 – Improveing the environment and nature, and some of the measures involved are: Agri-environmental payments; First afforestation of non-agricultural land, Restoring forestry potential and introducing prevention actions; Natura 2000 payments and payments linked to the Water Framework Directive – for agricultural land; and Natura 2000 payments – for forests.

Operative Program for Development of the Fishery Sector 2007–2013 has been developed in accordance with the National Strategic Plan for Fisheries and Aquaculture and the requirements of Council Regulation EC № 1198/2006 on the establishment of the European Fisheries Fund. The program includes measures in four priority axes, and the measures to ensure the sustainability of natural resources are part of the measures of general interest (Priority axis 3).

Some goals and measures affecting indirectly biodiversity are implemented within the **Operational Programme Regional Development 2007–2013** and **Operational Programme Transport 2007–2013**.

2) Direct actions for the implementing of the national targets for biodiversity

Significant progress is achieved in the implementation of the national targets for biodiversity, objectives of the Convention on Biological Diversity and the Strategic Plan for Biodiversity 2011–2020, such as:

- Expanding the National Ecological Network of protected areas and Natura 2000 sites and improving their management;
- Improving the scientific basis and monitoring of biodiversity, protection of species and habitats;
- Support and recovery of species and habitats;
- Reintroduction of extinct species, etc.

Detailed presentation of results and case studies are given in Part III of this national report when reporting the advancements towards the Aichi targets.

3) Education and raising public awareness

Public understanding of the importance of biodiversity and its benefits is an essential prerequisite for effective conservation and sustainable use. Such an understanding is essential to achieve the necessary public support for government policies. Actions have been implemented to promote biodiversity and its benefits, the role of the National Ecological Network and especially the European network Natura 2000, best practices for management of protected areas and Natura 2000 sites, etc. Presentation of results and case studies is made in Part III of the national report to the respective Aichi targets.

4) Strengthening the capacity to implement the biodiversity objectives (new structures, interinstitutional committees, etc.).

Enhanced is the national capacity to implement the objectives in terms of biodiversity. Completed are activities in the following major areas, mainly in connection with the implementation of the Operational Programme ‘Environment 2007–2013’, Priority axis 4 – Technical assistance:

- Establishment and strengthening of new units and building the necessary capacity in terms of personnel and material resources in the existing units of the Ministry of Environment and Water (MOEW, Table 11);

Table 11. Amendment of the Management Rules and staff numbers of the existing units at the Ministry of Environment and Water

Date of change of the Management Rules of MOEW	Staff	Notes
01.06.2009	449	
01.12.2009	441	<i>New or restructured Directorates:</i> Directorate ‘Internal audit’ Directorate ‘Budget, finance and accounting’ (restructured one) Directorate ‘Legal services and public tenders’ (restructured one) Directorate ‘Economic activities, human resources, office and information services’ (restructured one) Directorate ‘Environmental policy’ Directorate ‘EU coordination and international cooperation’ (renamed one) Directorate ‘European and international projects’ Directorate ‘Climate change policy’
21.09.2010	476	
01.03.2011	452	Directorate ‘Waste management and soil conservation’ (‘Waste Management’ Directorate takes over functions related to soil conservation).
01.01.2012	450	
13.09.2013	436	

- Staff and technical support for existing units – secondary authorizing officers to the Ministry, namely the Executive Environment Agency, 16 Regional Inspectorates of Environment and Water, Directorates of the three National Parks (DNP) and four Basin directorates: in 2009 with 561 full-time employees, and at the end of 2013 – with 1431 full-time employees;
- Training of employees in the existing structures. For the reporting period experts have developed their skills and the administrative capacity has been enhanced through training conducted at the Institute of Public Administration as follows:
 - 2009 – 113 persons
 - 2010 – 72 persons
 - 2011 – 332 persons
 - 2012 – 320 persons

2013 – 192 participants, 188 graduates.

Specialized seminars with experts and employees of partner organizations have been organized.

- Creation of interinstitutional expert working groups – Interinstitutional Working Group at the Convention on Biological Diversity (established in 2008), Interinstitutional Panel on Climate Change and Biodiversity (2009), Interinstitutional Panel for the Nagoya Protocol (2011), Working Group on Invasive Alien Species (2011).
- A new integrated research unit has been established at the Bulgarian Academy of Sciences – Institute of Biodiversity and Ecosystem Research (2010), for the purpose of scientific research of national and supranational level in the field of theoretical and applied aspects of biodiversity, ecology, environmental protection and sustainable use of biological resources.

Key challenges witnessed after IV National Report

The start of EU membership has imposed new conditions in the application of legislation and policies related to biodiversity. There have been a number of difficulties and challenges associated with:

- Lack of preparation and real work on mapping of the areas of the European ecological network Natura 2000 in the pre-accession period; missing management plans for a number of nature parks; welded systemic problems in approving investment projects and plans with gaps against the requirements of environmental legislation, especially along the Black Sea coast.
- Lack of environmental investment projects of municipalities and other potential beneficiaries in the biodiversity sector under the Operational Programme ‘Environment 2007–2013’ and a large delay in the launch and implementation of the program funds.
- Major policy gaps on climate change/lack of a National allocation plan for allocation of allowances for greenhouse gas emissions trading for participation of Bulgaria in the European greenhouse gas emission allowance trading scheme, lack of a national scheme for “green” investments, lack of an administrative unit responsible for climate change policy.

A serious weak point is the significant insufficiency of national funding for research in the field of biodiversity, since biodiversity is not included among the priorities of the National Science Fund and of the National Strategy of Scientific Research to 2020.

To overcome these difficulties, the Ministry of Environment and Water introduced the principle of permanent dialogue with all partners in the country and the European Commission, monitoring and reporting to the public, and creating a competitive business environment, transparent rules and simplifying the administrative procedures for citizens and the business. To solve the very serious challenges in the autumn of 2009, the Ministry launched consistently and successfully implemented a series of reforms that continue and concentrate efforts on compelling national priorities that are important not only for the environment but also for quality of life and health of people .

III. Implementation of the Strategic Plan for Biodiversity (2011–2020) and the Aichi targets of the Convention on Biological Diversity

8. Achieved results from the implementation of the Aichi targets for conservation and sustainable use of biodiversity

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society



Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably

Promoting the importance of biodiversity and the need to take steps for its conservation and sustainable use are included in a number of policy documents at national, regional and local level as well as in strategies for development of science and research and in the work of many environmental NGOs.

A set of activities for public awareness and involvement of stakeholders related to the conservation and sustainable use of biodiversity are among the priorities for immediate action and support in the **National Biodiversity Conservation Strategy**. The second **National Biodiversity Conservation Plan 2005–2010** reflects this priority in IV.2.6. “*Raising public awareness and involvement in the process of decision making*”. This priority is implemented through:

- Changes in legislation for greater democratization of procedures and opening of the administration to individuals and economic operators;
- Creating a system of regular public campaigns to work with local people, society and public attitudes and expectations.

After Bulgaria's accession to the EU the **OP “Environment” (OPE)** has become the main program document for actions related to the environment (including biodiversity). An investigation on the level of awareness of the target groups of OPE in 2010 shows that an increased sensitivity to nature conservation in the country is naturally registered among the potential beneficiaries of the program. However, there is a clear need to further promote the issues and the opportunities to limit the negative impacts on the environment among all strata of society.

The **strategic goal VI of the National Strategy for Environment 2009–2018** envisages a new behaviour patterns in society, respectful to the environment and promoting sustainable development, as well as access to more detailed information and monitoring of the environment. It is underlined the need to integrate the environmental and sustainable development issues in the education in kindergartens, schools and universities, and that a system of life-long education on sustainable development is established.

The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the Aarhus Convention) and the directives, transposing it into the EU legislation – Directive 2003/4/EC on public access to environmental information and Directive 2003/35/EC on public participation in the preparation of certain plans and programs shall provide for:

- Integrated education for sustainable development at all levels of schools by 2018;
- Information and education campaigns, and publishing of information materials on issues related to nature conservation and sustainable development.

Informing and involving the public in the conservation and sustainable use of biodiversity are an integral part of the sectoral policies, programs, strategies and action plans, which cover the last programming period 2007–2013 and are enshrined in the new programming documents until 2020.

Agriculture

Within the **Rural Development Programme 2007–2013 (RDP)** – Axis 2, Measure 214 “Agri-environment payments” the following has been implemented:

- Annual reports on progress in the implementation of the Program that include also information on the implementation of Measure 214 are published at <http://prsr.government.bg/index.php/bg/sections/12/55>;
- Information campaigns to foster the implementation of the measures in the Program that are related to nature conservation and sustainable development. Implementation of this measure is difficult due to the lack of capacity and experience among all stakeholders that is a negative heritage from SAPARD program;
- Information seminars (including Measure 214) were organized;
- Over 30 media are trained within the project “Information campaign aimed at steps 112, 121, 142, 214 and 213” in 2011. Periodic meetings to promote the RDP and in particular the measures related to nature conservation of biodiversity were organized;
- Map of the high nature value farmlands has been prepared;
- List of physical blocks of high nature value farmlands has been prepared.

Forests

- According to the **Forestry Act** (2011) the Executive Forest Agency (EFA) implements policies for conservation and sustainable use of forests, promotes innovations in forestry among workers in the sector, forest owners and the public. Companies are due to promote and provide the means and conditions for training of their employees. There is a need to update the communication strategy and plan for public relations, including the necessary means for their implementation. There is a need to strengthen ties with partners and implement more effectively joint media campaigns with NGOs;
- New tools based on sustainable management of forest ecosystems have been developed in order to achieve a balance between the functions and services of the forests;
- EFA supports a Web-based information system for modular data on the status of forest areas at national, regional and local level. Information modules have been created to provide information about the forest fires, results from the monitoring on forest pathology, projects that are being implemented in the forestry sector, etc.

Fisheries and agriculture

- The **National Program for Fishery and Aquaculture 2007–2013** and the **Operative Program for Development of the Fishery Sector 2007–2013** envisage information measures for the Operative Program and collection of feed-backs;
- The **National Program for the Sustainable Development of Fish Resources 2008–2013** envisages measures to address the civil society. The goal is to stimulate NGOs to promote nature-friendly attitude in the Bulgarian society, knowledge about the fish resources and to maintain high level of information.

Conservation and sustainable use of biodiversity is promoted by the administration of national parks in Bulgaria: Central Balkan National Park (www.visitcentralbalkan.net/), Rila National Park (www.rilernationalpark.bg/), Pirin National Park (www.pirin.bg/), and the nature parks in Bulgaria ([http://www.bg-parks.net/main.php?act =](http://www.bg-parks.net/main.php?act=)).

Activities and campaigns in support of conservation and sustainable use of biodiversity were conducted:

- Bulgaria joined the celebration of 2010 – International Year of Biodiversity with a national program with ca. 60 national events in partnership with governmental and non-governmental organizations, scientific institutions, nature lovers. Additionally, 350 events were organized at regional level. A major event was the scientific conference “Biodiversity and Environment”. More information is available at <http://www.cbd.int/2010/country/?country=bg>. Thus Bulgaria achieved the main goal of UN to raise the public and political awareness on the importance of biodiversity and the consequences from its loss and to shape a public vision through events organized throughout 2010;
- Together with the Decade of Biodiversity, 22 May – the International Day of Biological Diversity was celebrated under different topics in 2011, 2012 and 2013. In 2011 MOEW and the RIOEW together with their partners promoted the role of forest throughout the country. A number of events were organized, e.g. planting trees, information campaigns, discussions, exhibitions, games, competitions dedicated to protected areas, forests and their inhabitants. In 2012 the importance of Black Sea and marine ecosystem services were celebrated and 2013 – the significance of water as the source of life on Earth, as a topic in different sectoral policies and the need for partnership in the process of its management;
- Various important environment-related dates have been celebrated, e.g. 5 June – World Environment Day, 2 February – World Wetlands Day, 22 March – World Water Day, 22 April – Earth Day, 22 September – Day without Cars, etc. Every year, a large number of events and information campaigns have been implemented within the European Bat Night, International Migratory Bird Day;
- The major biodiversity-related documents have been translated into Bulgarian: Strategic Plan for Biodiversity 2011–2020 and Aichi targets, the European Biodiversity Strategy 2020, the Nagoya Protocol, the Global Strategy for Plant Conservation (<http://www.moew.government.bg/?show=top&cid=568>);
- LIFE+ Programme of the EU has funded 18 projects in Bulgaria on different topics, each of them including activities related to the promotion of biodiversity and its sustainable use. Of these, 10 projects are managed by NGOs, 4 by national or regional government institutions, one of by a research institution and 3 – by business entities. (<http://ec.europa.eu/environment/life/project/Projects/>);
- Bulgarian-Swiss Cooperation Programme has funded 11 projects all including activities related to the promotion of biodiversity and involvement of public (<http://www.swissbgcooperation.bg/en/Implementation-of-Projects-1>);
- Renewal of the membership, contacts and cooperation of Bulgaria with international institutions related to management and conservation of animal genetic resources – IKAR, EURFR and EAAP;
- A number of academic forums to promote the importance of biodiversity in Bulgaria have been organized: National conference “Biodiversity and Environment” (2010), International conference “Wetlands: Functioning, Management and Restoration” (2011), VII National Botanical Conference and “40 Years of the Program “Man and the Biosphere” (MAB), UNESCO” (2012), Balkan workshop on networking on invasive alien species – EEA/Eionet Balkan Meeting on Networking Activities on Invasive Alien Species (2011), the Sixth European Congress of Hemiptera (2012), XVIII European Congress of Lepidopterology (2013), academic celebrations of the international day for biological diversity, international, national and regional workshops related to the achievement of specific research projects in the areas of biodiversity;
- Annual open-door visits in government and scientific institutions.

Bulgarian NGOs have implemented a **large number of projects and information campaigns to promote the values of biodiversity and approaches for its conservation**, e.g. “Life for Burgas Lakes” (www.burgaslakes.org/), Conservation of Imperial Eagle and Saker Falcon in key areas of Natura 2000 network in Bulgaria (www.saveraptors.org/page.php?l=Bg&cat=11&subcat=35&subsub=0&id=37); White Stork Festival; film on the occasion of 20th Anniversary of LIFE+ Programme (www.saveraptors.org/gallery.php?l=Bg&type=video&pageNum_Video_All=0&totalRows_Video_All=8&cat=3&id=1001); Conservation of the wintering population of the globally threatened Red-breasted Goose (http://bspb-redbreasts.org/?page_id=10); Bulgarian Youth Water Parliament (http://www.bsbd.org/bg/index_bg_129796.html), and many others. Related information is presented on the websites of the NGOs, e.g. Bulgarian Biodiversity Foundation (www.bbf.biodiversity.bg/), Green Balkans (www.greenbalkans.org/), Balkani Wildlife Society (www.balkani.org/), Bulgarian Society for the Protection of Birds (www.bspb.org/), Society for the Protection of Birds of Prey (<http://www.bpps.org/>), Fund for Wild Flora and Fauna (<http://www.fwff.org/>), WWF Bulgaria Danube-Carpathian Programme (<http://www.wwf.bg>) and others.

A large number of **campaigns to promote the conservation of agrobiodiversity** have been launched, e.g. campaign “BioMania 2011” funded by the RDP with 8 Fests devoted to agrobiodiversity and traditional knowledge; Organizing the fest of agroecological farmers in September funded by RDP 2007–2013 (2011); regular festivals of organic farming (www.bioselena.com/bg/bio_holidays/); National Exhibition of Livestock in Sliven; National Festival for Protection of Local Bulgarian Breeds in Kalofer; Festival of Local Breeds in Bulgaria; Spring Livestock Breeding and Agriculture Celebration in Kresna.

A number of events related to the conservation and maintenance of innovations and practices of local communities have been organized, e.g. Mildew Honey Festival – Tsarevo, Smilyan Beans Festival, Plum Festival in Troyan, Cherry Festivals – Kyustendil, Harvest Fest – Kyustendil, etc.

Case study 6:

Cooperation for the conservation of biodiversity and sustainable local development in Strandja Mts. (<http://www.bbf.biodiversity.bg/indexdetail.php?id=3>)

After 15 years of active work in the area of Strandja Nature park, in the period 2009-2012, the Bulgarian biodiversity foundation – NGO, worked after the implementation of a project aimed at conservation of biodiversity and sustainable local development. Funds for the project were provided by the Financial Mechanism of the European Economic Area (Iceland, Liechtenstein and Norway) and amounted to 519 780 euro

The project aimed to achieve a harmonious coexistence between people and nature in Strandja by demonstrating the benefits for the local people from protected areas and their active involvement in biodiversity conservation. The most important results were related to , development of environmentally sustainable businesses, as well as implementation of direct conservation measures. The project, envisaged elaboration of a proposal for designation of the first post Seville biosphere reserve in Bulgaria. Significant work was done in order to develop a joint management of the territory corresponding to the requirements of the Seville Strategy from 1995. A draft of nomination dossier for Biosphere reserve was developed but was not submitted to the Secretariat of UNESCO because the local majors did not sign the official agreement, required as part of the nomination.

The project was implemented by the BBF in partnership with the Directorate of Strandja Nature park, Bulgarian National Committee for the “Man and Biosphere” Program of UNESCO and the Department of Nature Management at the Norwegian Ministry of Environment.

The Ministry of environment and water shall proceed its efforts to declare first Biosphere reserve in Bulgaria.



Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Major national legislation, strategies, programs and plans where the biodiversity issues are integrated, as well as the approaches and measures for biodiversity conservation and sustainable use are discussed in detail in Part II of this Report. Efforts until 2020 will focus on timely and effective implementation of the objectives and planned measures and the results obtained will be included respectively in the national accounting and reporting systems.

Additionally, in the water sector, the **Management Plans for Water Basins in Bulgaria 2010–2015** envisage measures from the Rural Development Program that refer to selected watersheds of water bodies at risk as well as measures related to: fight against *Dreissena polymorpha* in certain water bodies, restrictions and banning of felling in certain watersheds of surface water bodies, restrictions and banning of activities, which are among the major threats to biodiversity (construction of small water power stations, exploitation of inert material, corrections of river beds, felling of natural riparian woods). Investment projects for restoration of wetlands, construction and reconstruction of fish passages, afforestation of river banks, monitoring and assessment of the surface and ground waters have been implemented. To mitigate the climate change impact on some water bodies measures related to use of crops that need less water for their cultivation, water-saving technologies, afforestation of watersheds have been implemented. To foster communication, education and public awareness Youth Water Parliament was established. Training programs with students from ecology and biology specializations in the universities have been conducted. Various events have been dedicated to the environment.

Measures from the **National Action Program on Sustainable Land Management and Combating Desertification in Bulgaria 2007–2013** have been implemented.

In terms of soil protection Bulgaria's efforts as a party to the UN Convention to Combat Desertification (UNCCD), aimed at sustainable land management and sustainable development in affected areas, by taking effective measures at all levels combined with agreements for international cooperation within the framework of an integrated approach and synergies between the three Rio Conventions.

A challenge for Bulgaria is the effective integration of biodiversity conservation in the national program for research. A **National Strategy of Scientific Research to 2020** has been elaborated. The Strategy outlines the objectives and measures to ensure a high quality of research and innovation, including the creation of appropriate environment for the business to invest in scientific research. The Strategy sets out three tasks and the appropriate measures to them. It introduces the priorities for research with the priority area “Health and quality of life, biotechnology and organic food”. However, biodiversity-related topics are not specifically included in the Strategy which generates considerable financial difficulties for the research community in Bulgaria.

The vision of the Bulgarian Academy of Sciences for the development of the Bulgarian Society clearly outlines the importance of biodiversity and organic farming for the

Bulgarian society (http://www.bas.bg/fce/001/0003/files/nacionalni_celi-integrated-v_6.8.pdf). Sustainable use of natural resources is envisaged in the **Strategy for Development of Research at Sofia University “St. Kliment Ohridski” (2009–2014)** (https://www.uni-sofia.bg/index.php/bul/nauka/nauchni_postizheniya_2008_2013).



Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

The Biological Diversity Act regulates the procedures for the development of management plans and development plans and projects. The law postulates that any development plans, regional development plans for forest areas, forest management plans and programs, national and regional programs developed under other laws must comply with the management plans of the protected sites from Natura 2000 network, as well as with the measures that aim at preventing deterioration of the natural habitats and habitats of species, and of the threats and the disturbance of species for the conservation of which the relevant protected sites are declared.

Plans, programs, projects and investment proposals that are not directly connected with or necessary for the management of protected areas and which individually or in combination with other plans, programs, projects and investment proposals can have a significant negative impact on the protected areas are subject to assessment of their compatibility with the object and purpose of the conservation of the protected area. In this regard, operational programs shall be subject to appropriate assessment and finally should follow recommendations to achieve the required correspondences. For instance, the environmental assessment of **OP “Regional Development 2007–2013”** shows that the measures envisaged support projects that provide implementation of: technology and know-how that does not threaten the environment; water, energy and material saving technologies; creation of green systems subordinated with the existing landscape categories; limitation of dust emission, noise and vibration; compliance with recreation norms and the status of the territory in projects related to the development of tourism and sustainable tourism is preferred, e.g. cultural tourism, ecotourism, rural tourism, spa, etc.

In the new programming period, as a result of the incurred environmental assessment, the OP **“Regions for Growth 2014–2020”**, provides a number of measures to prevent, reduce and as fully as possible compensate any significant adverse effects on the environment.

The National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022, envisages the introduction of economic mechanisms for the protection of wetlands, inventory and valuation of ecosystem services, introduction of the compensatory mechanisms for the sustainable management of Natura 2000 areas, agro-ecological and aqua-environmental measures in the operational programs for the period 2014–2020, supporting private investments by introducing mechanisms for payment for ecosystem services (direct payments “business-business” or “state-business” subsidies).

One of the main tasks of environmental NGOs in Bulgaria is to observe the compatibility of the investment incentives with biodiversity conservation in the country. In this regard, NGOs have a significant role in outlining the weaknesses and challenges that the government and the state are facing, , both in terms of gaps in environmental legislation, and in terms of implementation.



Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Two measures have been launched in the Rural Development Program 2007–2013, related to the conservation of biodiversity and sustainable production in agriculture:

- **Measure 214 “Agri-environmental payments”** was launched in 2008 and it provides financial assistance for the implementation of agricultural activities aimed at improving the environment. A gradual increase in approved applications over the years has been observed, e.g. in 2011 58% more applications were approved compared to 2008. The payments from this measure are in support of high nature value farmlands, which, according to the estimates by the European Environment Agency are 2 578 005 ha (additional information is available at the Aichi Target 7);
- **Measure 213 “Natura 2000 payments and payments linked to Directive 2000/60/EC – for agricultural land”** was launched in 2011 to assist farmers who manage agricultural land within the Natura 2000 network. The financial support is given to meet the relevant prohibitions and restrictions that farmers incur in the specific protected areas, keeping the land in good agricultural and environmental condition and comply with the legal management requirements. By the end of 2013, this measure have been supported only in protected sites under the Birds Directive 2009/147/EC (additional information is available at the Aichi Target 7).

Some weaknesses in the implementation of the measures have been registered, e.g. many farmers try their lands to become eligible for support under the measures hence they remove shrubs, trees, and in some cases completely plough valuable habitats, thus threatening biodiversity in agricultural lands. There has been a sustained reduction in grasslands, most of which are semi-natural, and in 2012 the decrease was 4.2% (72 035 ha) compared to 2009. Therefore, agroclimatic targeted measures are needed to promote the maintenance of pastures, woodlands and landscapes in lowland areas (up to 500 m alt.). In mountainous areas the reduction in livestock breeding leads to reduced grazing and mowing and the abandonment of mountain pastures and meadows. About 56% of the semi-natural grasslands are owned by the municipalities in Bulgaria. The lack of an approach that reflects the specific features of the use of these grasslands and promotes the right to common use, causes the unregulated use of grasslands, transforming them into non-agricultural or arable land. Remote grassland are often not used for grazing.

Several national strategies and plans have been developed to determine the priorities, measures and activities related to sustainable production, consumption and biodiversity conservation, e.g. National Strategy for Development of the Forestry Sector in Bulgaria 2013–2020, National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022, National Strategy for Sustainable Development of Agriculture in Bulgaria in the period 2014–2020, Strategy for the Development of Hunting in Bulgaria 2012–2027, and others (for a more detailed presentation of the documents see Part II of this report).

Significant role in the achievement of this goal is played by the NGOs in the country, through their active participation in the development of national strategic documents and through the implementation of projects and work with the local communities and businesses. For instance, since 2012 has been implemented the project “Connecting conservation with sustainable development in rural areas” (<http://bspb.org/bg/projects/preview/133.html>), which aims to link biodiversity conservation and development in rural areas with high-nature value farmlands through sustainable market

mechanisms and enhanced public participation. The project work includes support to more than 30 farms in the project area for production of quality food with high added value and to 5 local businesses using sustainable local resources. A wide participation of local communities is envisaged, including the training of over 5000 children and young people in the newly created Children's Nature Academy – a modern approach for interactive environmental education and working with children indoors and outdoors. NGOs offer guidance and provide training to local communities and businesses, for example BSPB offers guidance to farmers for agri-environment payments in maintaining the habitats of rare birds (<http://bspb.org/bg/edition.html>), Bulgarian Biodiversity Foundation contributes to the development of regional brand “Strandzha” (<http://www.bbf.biodiversity.bg/indexdetail.php?id=20>), WWF Danube-Carpathian Programme works for the development of sustainable tourism in pilot areas, supports the identification and mapping of the high nature value farmlands, works with business companies to help them to do business with no or minimal negative environmental impact (http://www.wwf.bg/what_we_do/business/), etc.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use



Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

A number of activities related to different measures in the National Biodiversity Conservation Plan 2005–2010 have been implemented, e.g. the development of the legal framework, development of plans, strategies and methodologies, monitoring. Main activities from the measure *Restoration and maintenance activities* have been conducted, such as:

- Protection of ecosystems and natural habitats and maintenance of viable populations of species in the natural environment;
- Restoration of degraded ecosystems and habitats and support for the restoration of the populations of threatened species;
- Assessment of the conditions in riparian habitats and analysis of the impact on biodiversity of the adjustments of watercourses in the lower parts of the rivers; elaboration of measures to reduce the negative impacts, etc.

Different sectors have implemented specific measures:

Forestry

The measures from the National Strategy for Sustainable Development of Forestry Sector 2006–2015 and the Strategic Plan for the Development of the Forestry Sector 2007–2011 have been implemented in the forestry sector. A new **National Strategy for the Development of the Forestry Sector in R. Bulgaria for the period 2013–2020** has been elaborated. It contains four priorities and 20 measures. In implementing the priority of *maintaining healthy, productive and multifunctional forest ecosystems, contributing to the mitigation of climate change*, are envisaged the following measures and activities aimed at the conservation and sustainable use of forest resources:

- Increase of woodlands, the tree stock and the carbon stock in forest areas – through afforestation of abandoned agricultural lands, deforested areas, eroded and threatened by erosion areas;
- Improvement of the forest management – it will help to maintain vibrant and multifunctional forest ecosystems, to increase the productivity of forests, to improve their resistance to diseases, pests, natural disasters and other biotic and abiotic factors;
- Increasing of the efficiency of forest fire prevention and combating illegal activities in the forests.

The indicator **Ratio between forest, agricultural and urban areas** will be used to assess the impact of different types of land use on biodiversity and what part of the forest and agricultural lands are consumed in the process of urbanization, and hence what changes in regional planning are required (Figs. 18 and 19). The indicator shows the relative share of forest, agricultural and urban areas in the total area of the country. The results show that the largest part corresponds to the agricultural land (about 52%), followed by forest areas (about 43%) and urban areas (5%) (Figs. 18 and 19).

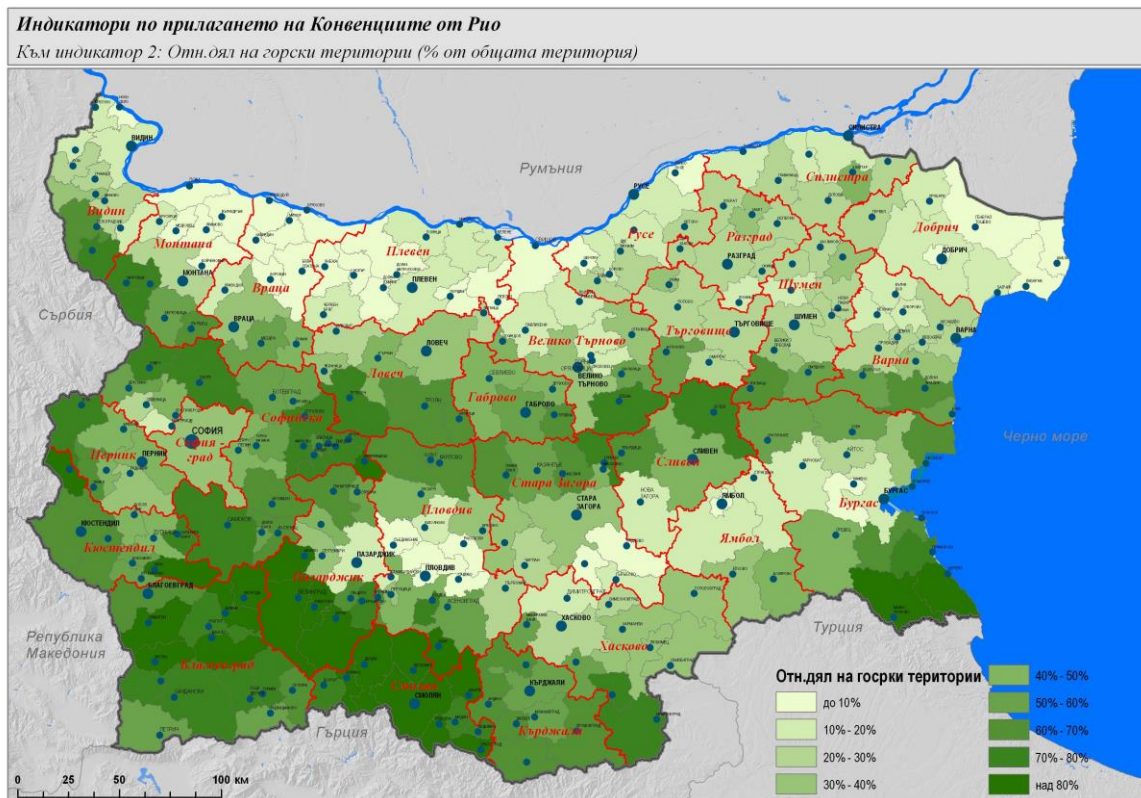


Fig. 18. Total area of the forest territories (% of the total area of the administrative unit) (Source: MRDPW).

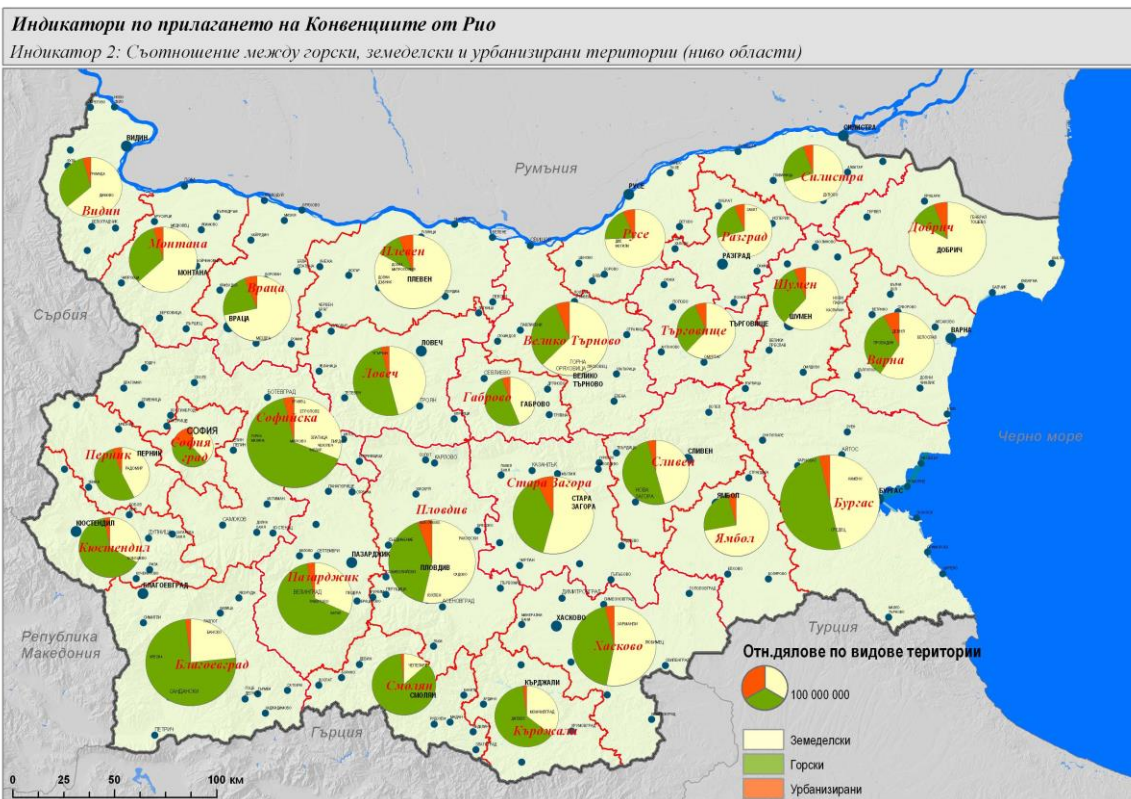


Fig. 19. Ratio between forest, agricultural and urban areas per administrative district (Source: MRDPW).

Water

A National Strategy for Development and Management of Water Sector, and management plans for the four river basins – Danube, Black Sea, East and West Aegean Sea, have been elaborated. The plans cover the period until 2015 and they set out measures to protect surface water and groundwater from depletion, pollution and deterioration in order to maintain the necessary quantity and quality of water and a healthy environment, conservation of ecosystems, landscape preservation and prevention of economic damages. Specific measures have been implemented to prevent, reduce and where possible eliminate the adverse impacts, and to ensure the functional integrity of the river basins:

- Prohibitions and restrictions on activities which constitute major threats to biodiversity in specific watersheds by building small hydroelectric power stations, extraction of aggregates, corrections of rivers, felling of natural riparian vegetation;
- Activities to ensure the continuity of the rivers and the opportunities for fish migration – restoration of river meanders and strengthening of the river banks, preventing soil erosion, investment measures for wetland restoration, construction and reconstruction of fish passages at hydropower facilities, dams and thresholds, reforestation of river banks, etc.

The indicator **Species composition, abundance and distribution of the ichthyofauna in the river basin** is used to assess the functional integrity of the river basins.

A **Program for Hydromorphological Monitoring of Surface Waters** was implemented in 2011 in relation with the assessment of the hydromorphological status of surface water bodies and a final report was prepared in 2012. The following hydromorphological quality elements have been studied: hydrological regime, morphological conditions, and currents and waves. The geographical scope of monitoring includes 82 points

of the Black Sea and Aegean basins. A further comprehensive study of the continuity of the rivers Kamchiya, Veleka, Maritsa and Struma has been performed (migration barriers, river continuum).

A Work program to update the plans for river basin management and preparation of river basin management plans for the period 2016-2021 (2012) has been implemented.

Natural phenomena such as floods can also cause degradation and fragmentation of habitats and cause adverse impact on biodiversity. Assessment and management of flood risks has been carried out for each water basin according to the Floods Directive and the Water Act. A **preliminary assessment of flood risk** has been carried out and a work program for the preparation of **Management Plans for Flood Risk in the River Basins** was elaborated in 2012.

Soil erosion is another process that causes degradation and loss of habitats and biodiversity. The combination of specific natural and economic conditions in Bulgaria is a prerequisite for a high risk of degradation processes of soil used in agriculture. The most common processes of soil degradation include: water and wind erosion, pollution, reduced stocks of organic matter (humus), compaction, acidification, salinisation, hence consequent loss of biodiversity. More than 60% of the country is affected by erosion to a different extent and 11.8% of the country's land is eroded. About 65% of the agricultural land is threatened by water erosion and about 24% by wind erosion. Application of measures against erosion and techniques for soil treatment are included in the **National Action Program on Sustainable Land Management and Combating Desertification in Bulgaria 2007–2013** and the **Third National Action Plan on Climate Change 2013–2020**. The indicator **Share of the country's territory with high risk of erosion** is used to assess the risk and the main drivers of erosion, hence the changes that are needed in the regional planning (Fig. 20 and 21). A comparison of the data shows that water erosion is a much more risky factor than the wind erosion in the country.

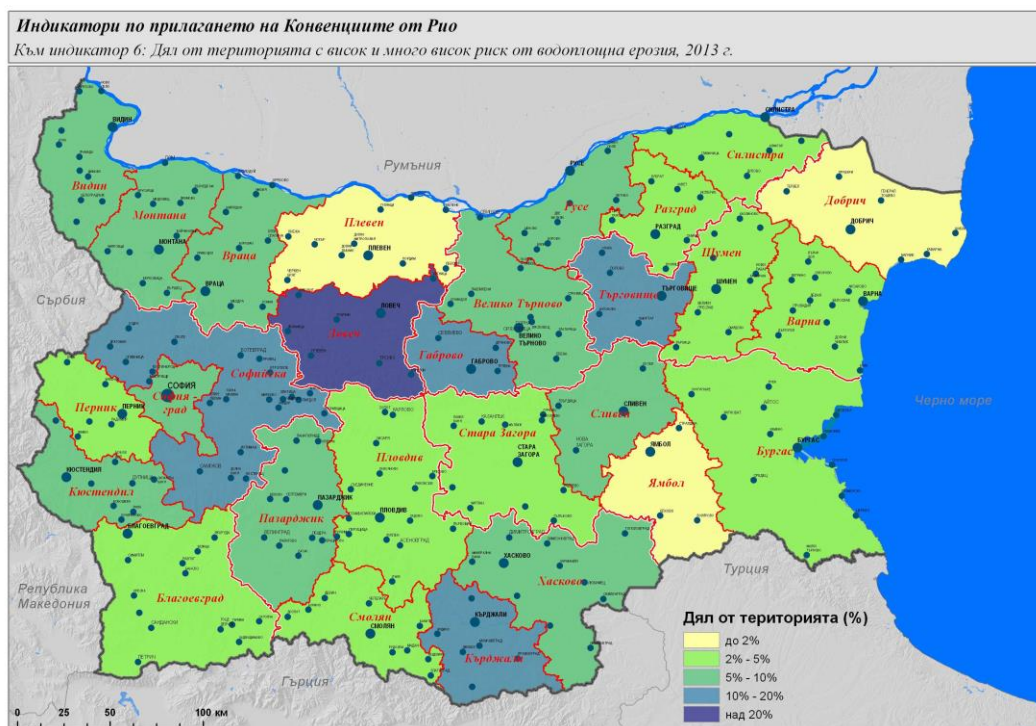


Fig. 20. Part of the territory of Bulgaria with high and very high risk of water erosion in 2013 (at district level) (Source: MPDPW).

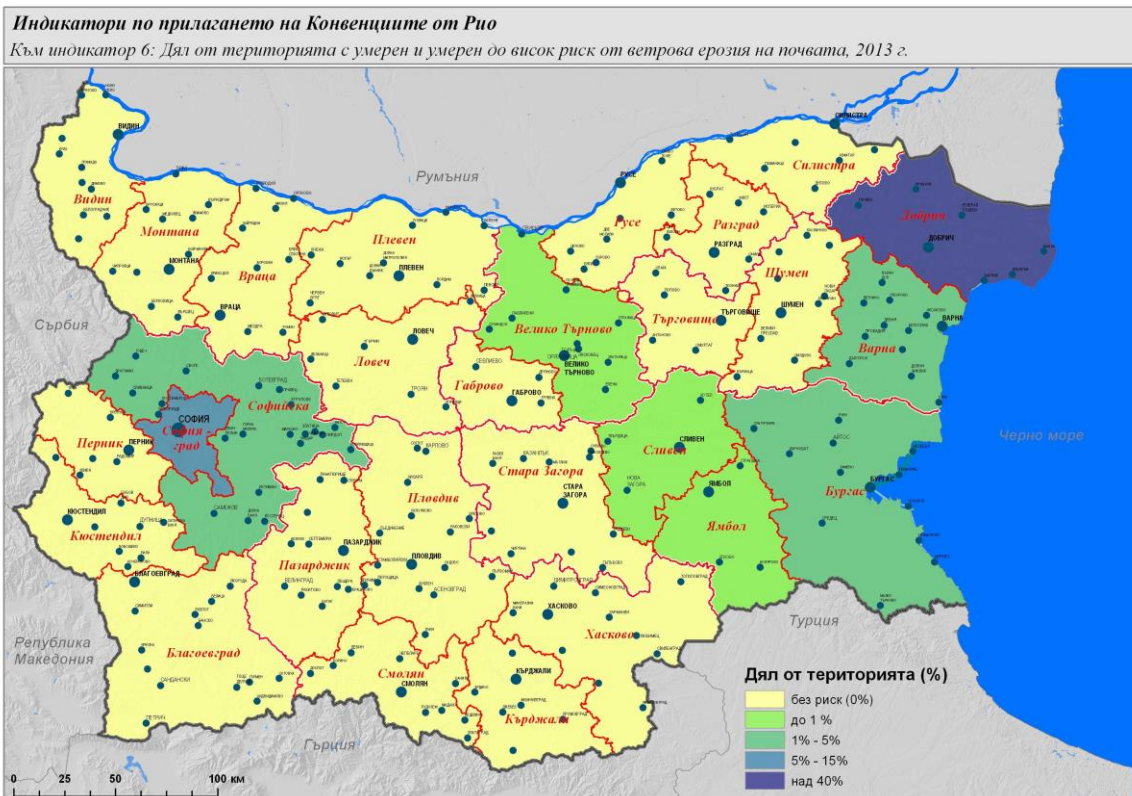


Fig. 21. Part of the territory of Bulgaria with moderate and moderate to high risk of wind erosion of the soil in 2013 (at district level) (Source: MRDPW).

The **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022** has been elaborated in order to achieve a long-term conservation and sustainable use of wetlands. The Plan covers 11 wetlands listed in the Ramsar Convention, and 25 additional wetlands that have great potential for conservation and restoration. All wetlands in the Plan are within the Natura 2000 network. The horizontal and specific measures from the Plan are expected to be implemented within 10 years.

Numerous research activities concerning threats to plants and animals and their habitats in Bulgaria have been conducted. A list of marine habitats in the Bulgarian Black Sea coast and certain habitats of European significance have been developed as a result of the implementation of research projects related to marine and coastal biodiversity. The biotic response of benthic systems (sea grasses, macroalgae and macroinvertebrates) to the impact of urbanization has been studied. The habitats of sea grasses and macroalgae in the region of Bourgas Bay have been mapped. The habitats in the shallow coastal areas in Ropotamo – Kiten area and their geological, biological and oceanographic characteristics have been also mapped.



Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

The following measures from the **National Biodiversity Conservation Plan 2005–2010** have been implemented: development of the legal framework, development of methodologies, monitoring, restoration and maintenance activities.

Measures from the programs and strategic plan in the fisheries sector have been implemented. The main strategic goal of the **National Strategic Plan for Fishery and Aquaculture 2007–2013** is the sustainable exploitation of fish resources. Measures to meet this objective include: control of fishing activities in order to prevent overfishing and the use of prohibited fishing devices; regulation of catches, fishing effort and fishing licenses; management and adaptation of the fishing effort – through modernization of the fleet and its alignment with the state of fish stocks; by introducing measures for the conservation of fish resources, including the improvement of fishing devices and methods for selectivity in order to use environmentally friendly devices, etc.

The measures from the plan are funded under the **Operative Program for Development of the Fishery Sector 2007–2013**. By 20.08.2013 the program has funded a total of 134 projects, fully paid are 92 projects with a total value of EUR 22 670 549.44 euros. Table 12 presents the measures and activities which have a direct or indirect impact on biodiversity. A total of 152 contracts have been signed.

Table 12. Measures and activities from the Operative Program for Development of the Fishery Sector 2007–2013 with direct or indirect impact on biodiversity conservation and with contracts signed by 20.08.2013.

Measures	Activities	Number of projects/ contracts	Funding (Euro)
Axis 1. Measures for adaptation of the Bulgarian fishing fleet			2 990 734
1.1. Permanent termination of fishing	Adaptation of the fishing ship for tourism activities, education or creation of artificial riffs	65	
1.3. On-board investments in fishing ships and selectivity; 06. Equipment for selective fishing	Activities related to selective fishing	6	
1.4. Small-scale coastal fishing	Activities related to reduction of fishing efforts and preservation of resources as well as promotion of the use of technological innovations which do not increase the fishing effort	None	
Axis 2. Aquaculture, inland fishing, processing and marketing of fish and aquaculture products			23 164 471.90
2.1. Production	Diversification of production by	58	

investments in aquacultures	using of new species and cultivation of species with good market potential; application of production methods that significantly reduce the negative impact and increase the positive impact on the environment; support for traditional aquaculture activities which allow preservation and development of economic and social aspects and preserve environment; equipment against wild predators and improvement of the conditions of labour and safety		
2.2. Aqua-ecological measures	Implementation of aquaculture production methods in favour of the environment and preservation of resources. Compensation payments for fish farms within Natura 2000 within 2 years after the proclamation of the protected areas	2	No payments
2.5. In-land fishing	Activities related to the reduction of the negative impact and increase of the positive impact on the environment, as well as improvement of the selectivity of fishing equipment	None	
2.6. Investments in processing and marketing of products from fishing and aquaculture	Some activities can be related to biodiversity	9	
Axis 3. Measures of common interest			931 186.34
3.1. Collective activities	Improved management of preservation of resources; promotion of the use of selective fishing equipment and methods	6	
3.2. Measures aimed at preservation and development of the water flora and fauna	Protection or development of the water flora and fauna, for instance through construction of artificial riffs	None	
3.6. Change of use of the fishing vessels	Adaptation of fishing vessels for education, and research in the field of fishery	None	
Axis 4. Sustainable development of the fishery areas			15 888 715.89
4.1. Financial support for local strategies for development and covering of operational expenses of the fishermen groups		6	

The **National Program for the Sustainable Development of Fish Resources 2008–2013** includes general measures for conservation, restoration and protection of resources and provides the basis for developing annual programs to support sustainable fish populations and research activities, ensuring effective management of fish resources. Its activities are focused in the following two directions with the corresponding results:

- The control on unregulated fishing, the use of illegal tools of fishing and illegal seizure of natural resources in water bodies is improved;
- Restocking and other activities have been conducted in order to support and maintain stable populations of fish and other aquatic organisms, that are consistent with the results from the research on their state.

In terms of fishing restrictions each year a ban on catching fish and other aquatic organisms is being imposed. The restrictions are year-round or during the breeding season of the species in the Black Sea, the Danube and the inland waters in order to protect biodiversity and create conditions for natural reproduction of the populations. A long-term ban on sturgeon fishing is introduced because its populations are in a critical condition – the fishing of the following species is forbidden in Bulgarian waters of the Danube and Black Sea: *Acipenser gueldenstaedtii*, *A. ruthenus*, *A. stellatus* and *Huso huso* for a period of 4 years from 01/01/2012 (Order, MAF, 20/01/2012).

Due to the highly reduced stocks of turbot in the Black Sea the annual catch quotas for the species identified by the Council of the EU for the period 2009–2013 have been reduced from 50 tons to 43.2 tons (in 2009 – 50 tons; 2010 – 48 tons; 2011–2013 – 43.2 tons).

Restocking activities in the Danube and other inland rivers were conducted according to the Program in the period 2009–2010 and data are shown in Table 13. After 2010 due to lack of funding the implementation of the Program has been stopped.

Table 13. Restocking of the Danube and the inland rivers until 01/02/2010 within the National Program for the Sustainable Development of Fish Resources 2008–2013 (Source: EAFA).

Species	Average single weight (grams)	Quantity (number of individuals)
<i>Acipenser gueldenstaedtii</i>	4	10 000
<i>Huso huso</i>	5	5400
<i>Cyprinus carpio</i>	30–40	750 000
<i>Cyprinus carpio</i>	500	15 000
<i>Ctenopharingodon idella</i>	70–100	60 000
<i>Hypophthalmichthys molitrix</i>	70–100	20 000
<i>Salmo trutta fario</i>	0.3–0.5	1 300 000
<i>Salvelinus fontinalis</i>	1	200 000
<i>Silurus glanis</i>	3	75 000
<i>Silurus glanis</i>	100	20 000
<i>Sander lucioperca</i>	100	22 000

A **Draft Program for Maritime Affairs and Fisheries 2014–2020** was elaborated in 2013.

The **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022** provisions a horizontal measure that should be implemented at national level:

Control of poaching. Initially, the measure was considered as a specific measure for certain areas, but because of the national dimension of the phenomenon it is finally formulated on a nationwide level.

A **number of projects** have been launched and implemented in order to collect relevant data and support the conservation and management of fish resources. Trawl photos were made in the period 2009–2010 for stock assessment of turbot along the Bulgarian coast of the Black Sea. Trawl photos and stock assessment of turbot in Black Sea Community waters (Bulgaria and Romania) were done in the period 2010–2013. A pilot study on the use of sonar method for the inventory of the resources and distribution of pelagic fish species in certain areas of the Bulgarian and the Romanian coast of the Black Sea Community waters was implemented in 2010. A stock assessment of pelagic fish in Community waters applying the same method was carried out in 2011. Biological and population parameters of economically valuable fish and non-fish resources in the Bulgarian Black Sea coast were measured in the period 2010–2013.

To support the implementation of the **Action Plan for Sturgeons in the Bulgarian Waters of the Danube River and Black Sea** (2004) was launched a project financed by the Operational Programme “Environment 2007–2013” – *Implementation of activities of the Action Plan for Sturgeons to improve the status and protect sturgeons in Bulgaria (2012–2015)*. The main objective of the project is the conservation of sturgeons in the Bulgarian section of the Danube and improvement of their conservation status by implementing direct conservation measures to strengthen their populations. Among its objectives is the improvement of the existing legal regulations and recommendations for updating the Plan. The field studies cover the real breeding habitats, providing a minimum population size for the survival of the species and restoring the natural reproduction, development of tripartite management measures to ensure the reproduction of sturgeon, creating an electronic database and online portal for sturgeon.

Bulgaria participates in the project *Joint efforts to raise awareness on the overexploitation of the sturgeons populations in the Danube in Romania and Bulgaria (2012–2015)* financed by Life+ Program. The project aims to stop the exploitation of the critically endangered sturgeon species in the Danube River in the region of Bulgaria and Romania and to ensure long-term survival of these species and preserving their natural and high economic value. Bulgaria participates in the Danube Sturgeon Task Force (DSTF) network, and in developing programs for the conservation and restoration of the sturgeon in the Danube “Sturgeon 2020” under the Strategy for the Danube Region.



Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Activities implementing some of the measures in the National Biodiversity Conservation Plan 2005–2010 have been conducted such as the development of the legal framework, development of plans, strategies and methodologies, as well as monitoring. Main activities are those of the measure *Restoration and maintenance activities*, such as:

- Establish and maintain facilities for *ex situ* conservation;
- Restoration of threatened species and reintroduction into natural habitats;
- Implementation of agri-environmental measures;
- Implementation of “measures in place” for the conservation of genetic resources and varieties, breeds and races with a particular focus on local ones;
- Identification of high nature value farmlands, which are in danger of losing biodiversity; Identification of measures to eliminate or reduce the threats;

- Identification and assessment of traditional agricultural practices and good foreign agricultural practices and possibilities for their implementation in Bulgaria.

Different sectors are subject to specific activities.

Forestry

The analysis of the implementation of the **Strategic Plan for the Development of the Forestry Sector 2007–2011** in 2012 shows that the implementation of measures and activities dedicated to the conservation of biological diversity, forest reproductive material and forest certification is at good level. Wooded area in Bulgaria has increased beyond the target of 500 ha per year set up in the Strategic Plan. To assess the implementation of the measures related to management activities various indicators have been used – forest area, tree species composition, forest regeneration, etc.

The indicator **Forest area** represents the area of forests and other wooded land, classified by forest type and possibly timber production as well as the ratio between forests (and other woodland) to the total area. It provides comprehensive information on forest resources and national policies and planning of forestry, and is a key element in the assessment of sustainable forest management. In 2012, the total forest area is 4 163 415 ha, of which 3 795 338 ha forested areas (including dwarf pine 23 953 ha), which represents 34% of the country. Coniferous forests cover an area of 1 113 789 ha (29.5%) and deciduous forest – 2 657 596 ha (70.5%) of the total forest area excl. dwarf pine. A tendency to increase the total forest area is registered in the period 2009–2012 (Table 14).

Table 14. Total forest area (in ha) according the type of woodlands for the period 2009–2012 (Source: EFA).

Year	Forested area, incl. <i>Pinus mugo</i> , ha	Non-forested area to be forested, ha	Non-timber production forest area, ha	Total forest area, ha
2009	3 749 129	73 959	307 808	4 130 892
2010	3 761 299	70 758	306 090	4 138 147
2011	3 774 778	68 308	305 028	4 148 114
2012	3 795 338	68 086	300 017	4 163 415

Some unfavorable trends have been registered, e.g. actions to improve forest protection are insufficient, hence more efforts are needed, including new methods to control the effectiveness of protection of forests and wildlife. Indicators for defoliation and forest damages are used to assess the extent of damage to forests.

The degree of **defoliation** (loss of leaves) is an indicator of the degree of forest disturbance and breach of health status. This indicator responds to many different factors, including weather conditions, weather extremes, atmospheric deposition, insect and fungal attacks. Assessment of defoliation is a valuable early warning approach for the response of forest ecosystems to various changes and stress factors. A total of 5612 sample trees (2406 coniferous and deciduous 3206) were assessed in 2012 in 159 sampling areas of the network for large-scale forest monitoring. Predominantly, the trees were assessed as strong and slightly damaged. However, in the period 2009–2012, a trend towards a higher share of trees affected by defoliation was registered (Fig. 22).

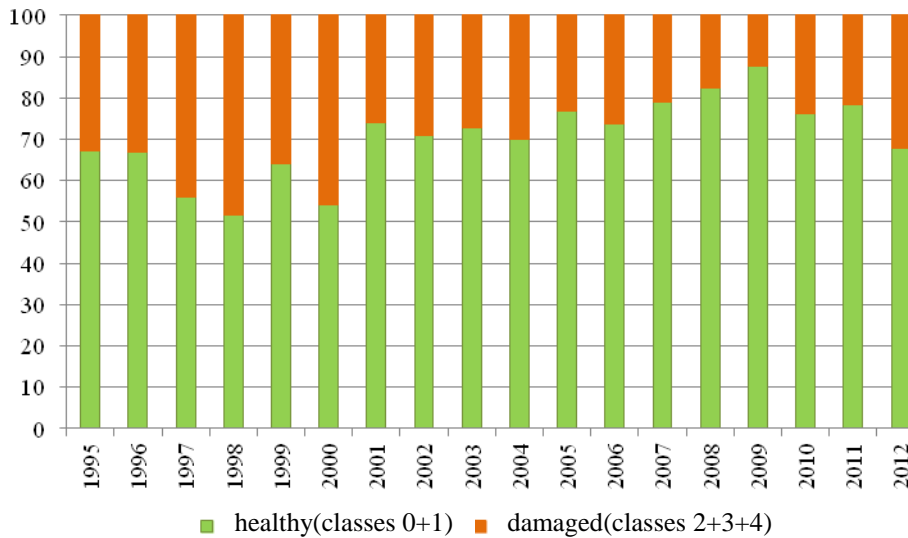


Fig. 22. Defoliation in all tree species (%) for the period 1995–2012: green colour represents healthy trees (classes 0+1) and orange colour – damaged trees (classes 2+3+4) (Source: EFA).

The indicator **Forest damage** performs forests areas where damages caused by abiotic (temperature anomalies, droughts, hurricanes, snow-breaks, landslides), biotic (insects, fungi, deer, rodents) and anthropogenic factors are being registered. Data for the period 2009–2012 show that still the largest share of damage is due to insect pests and fungal pathogens. However, the damages caused by human activities increase (Fig. 23).

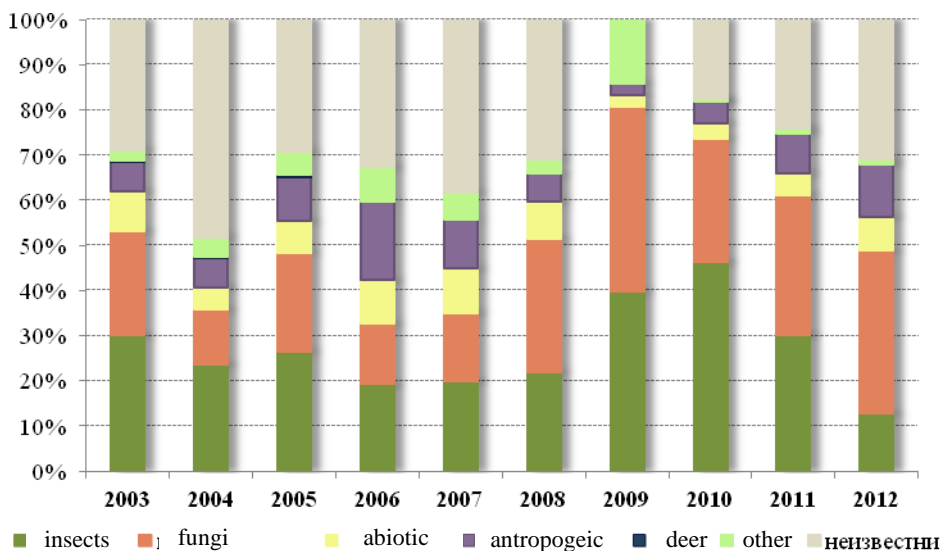


Fig. 23. Damaging factors in (%) in the period 2003–2012: dark green – insects; red – fungal pathogens; yellow – abiotic; lilac – human activities; dark blue – wild animals; pale green – other factors; gray – unknown (Source: EFA).

Forest damages caused by fires are estimated, taking into account the annual number of fires and the forest area affected by them. For example, in 2012, there were 876 fires with 12 730 ha of affected areas (Table 15). Major cause of the fires are human activities (76%) – burning of stubble, dry grass and shrubs near forest areas. In 2012, the highest percentage of

fires for the past 15 years caused by natural factors was registered (5%) (Table 15). Direct damage to forest areas and facilities therein amounted to 2 375 756 BGN. It has been concluded that for the period 2009–2012 the number of fires and burned areas has increased (Table 15 and Fig. 24).

Table 15. Statistics of the forest fires for the period 2009–2012 (Source: EFA).

Year	Total number of fires	Affected forest areas (ha)	Reasons for the fires (number of fires)		
			Human activities	Natural	Unknown
2009	314	2271	242	2	70
2010	222	6526	191	1	30
2011	635	6883	435	7	193
2012	876	12 730	669	42	165
Mean	512	7103	384	13	115

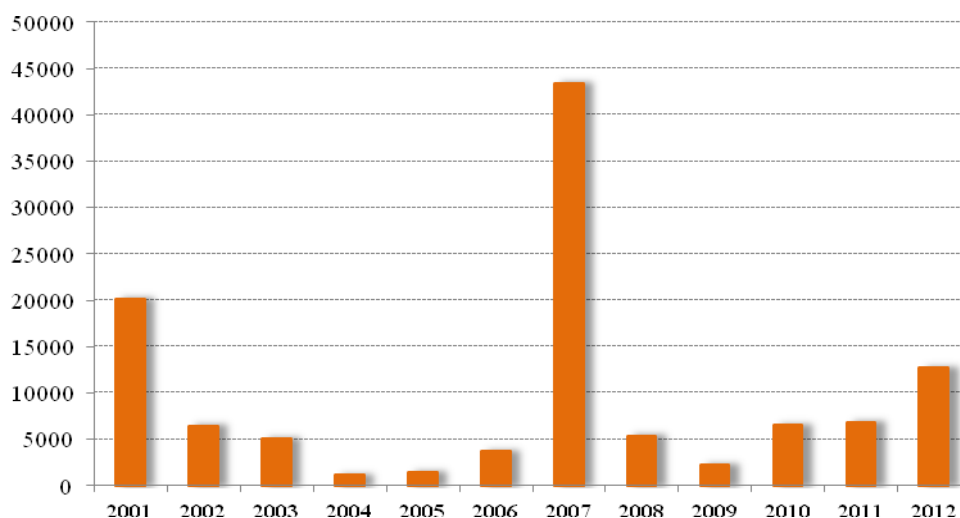


Fig. 24. Burned forest areas (ha) for the period 2001–2012 (Source: EFA).

Top priority in the **National Strategy for the Development of the Forestry Sector in Bulgaria 2013–2020** is *the preservation, restoration and maintenance of biological and landscape diversity in forest areas*. A range of measures and activities are planned: 1) To improve the system for planning and implementation of activities related to the conservation of biological and landscape diversity in forest areas; and 2) To maintain and develop a system to preserve the forest genetic resources.

Hunting

A core measure in the **National Strategy for the Development of the Forestry Sector in Bulgaria 2013–2020** is the improving and increasing populations of game and fish in support of biodiversity conservation and sustainable development of forest ecosystems. The planned activities are: to update laws and regulations in the field of hunting; to improve the capacity and coordination between all stakeholders in the field of hunting to protect, improve and increase the populations of game and fish; to increase and diversify the game and fish resources, incl. through genetic selection and introduction.

A **Strategy for the Development of Hunting in Bulgaria 2012–2027** was elaborated in 2012 in support of the implementation of the Strategic Plan for the Development of the Forestry Sector 2007–2011 and the National Strategy for the Development of the Forestry Sector in R. Bulgaria 2013–2020. The strategy includes actions to reach the estimated game resources such as: to significantly limit the negative impact of poaching; to optimize the stocks of predators; to improve the natural food for wildlife; to optimize the sex ratio and age structure in the herds of large game; to promote an effective winter feeding of wildlife; introduction of selective hunting; imposing a temporary ban on hunting of certain types of game; and to expand the specialized training in hunting.

Research is conducted to characterize the biological and genetic characteristics of the important hunting species – chamois, deer, jackal, etc.

Agriculture

A **National Strategy for Sustainable Development of Agriculture in Bulgaria 2014–2020** has been elaborated. The measures and activities in this sector are funded under the **Rural Development Programme 2007–2013** – primarily under Priority Axis 2 – Improving the environment and nature, which includes agri-environmental payments, and payments for Natura 2000 and the Water Framework Directive (for farmlands).

Measure 214 “Agri-environmental payments” was launched in 2008 and provides financial support for agricultural activities aimed at improving the environment. For 2008–2012 9292 applications were submitted of which 8084 were approved with a total value of public spending 50 926 457.14 Euro. Of these, 98.40% (50 115 307.70 Euro) were paid by 01/08/2013.

Measure 213 “Natura 2000 payments and payments linked to Directive 2000/60/EC – for agricultural land” was launched in 2011. By February 2013 the measure supported 102 protected sites under Directive 2009/147/EC for conservation of wild birds. Compensation payments for agricultural land are available in 93 sites with a total area of physical blocks 1 571 637.66 ha (14.16% of the country's area and 65% of the total area of protected sites from Natura 2000 network). The total area for which payments were requested in 2013 is 214 585.97 ha, which represents 67% of the arable land, 43% of pastures, meadows and 11% of permanent crops eligible for support in the 93 sites of Natura 2000 network.

Aquaculture

The main strategic goal of the **National Strategic Plan for Fisheries and Aquaculture (2007-2013)** and the **National Programme for Fisheries and Aquaculture (2007-2013)** is the *sustainable development of aquaculture production*. Measures that are included for the implementation of this objective in the plan are as follows:

- 1) Development of traditional aquaculture, including both cold-water (e.g. trout) and warm-water species (e.g. carp, sturgeon, etc.).
 - Basin and containment farms;
 - Sea and freshwater farms;
 - Production of stocking material, meat for consumption, processing;
 - Diversification of production with new more valuable (delicatessy) species at the expense of carp fish such as: sturgeon, catfish, pike, perch, eel, etc.;
 - Improvement of water supply and improvement of monitoring and control of water quality;
 - Introduction of new technologies (e.g. closed recirculation systems).
- 2) Development of organic aquaculture production for which is guaranteed that pesticides, fertilizers, antibiotics, hormonal preparations, GM products are not used during cultivation

and that further on the fish is not processed with preservatives, ionizing radiation, etc., and that areas and methods of cultivation, the entire production process, further processing and packaging is under the control of an independent certification body.

3) Prevention of fish diseases.

According to the amendments to the Law on Fisheries and Aquaculture (2001) from 2012 commercial fishing is prohibited in inland waters. As a result, in 2013, a significant increase in the number of registered fish farms inland was established. For example, only in the period 01/01/ – 14/05/2013, there were 103 new fish farms.

The increased interest in aquaculture production is due also to the financial support available under the **Operative Program for Development of the Fishery Sector**. Funding is provided under Priority Axis 2: Aquaculture, inland fishing, processing and marketing of fishery and aquaculture products, namely: investments in aquaculture; aqua- environmental measures; measures to protect the health of the consumer; measures to protect animal health; inland fishing; investments in processing and marketing of fishery and aquaculture.



Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

A number of activities have been implemented under the **National Biodiversity Conservation Plan 2005–2010** with priority to those related to monitoring of biodiversity:

- Identification of components of biological diversity important for its conservation and sustainable use;
- Development of a targeted monitoring programs, depending on the object of observation and spatial characteristics;
- Identification and monitoring of activities with a significant impact on biodiversity;
- Maintenance and organization of a monitoring database;
- Monitoring and biodiversity assessment in agricultural land and effectiveness of the measures in this area.

Within the framework of the **National System for Environmental Monitoring** is developed and maintained a National Biodiversity Monitoring System, monitoring of forest ecosystems and monitoring of environmental factors – air quality, surface water, land, soil, etc. Various indicators are developed to assess the integration of principles of conservation and sustainable use of biodiversity into sectoral policies of the country.

The indicator **Proportion of areas with anthropogenic impact** (infrastructure, residential areas, industrial sites) (Fig. 25) is used to assess the degree of anthropogenic pressure, causing degradation of natural habitats and accelerating biodiversity loss, and what changes in regional planning are required. The results show that the areas with anthropogenic impact are 5% of the total territory of the country.

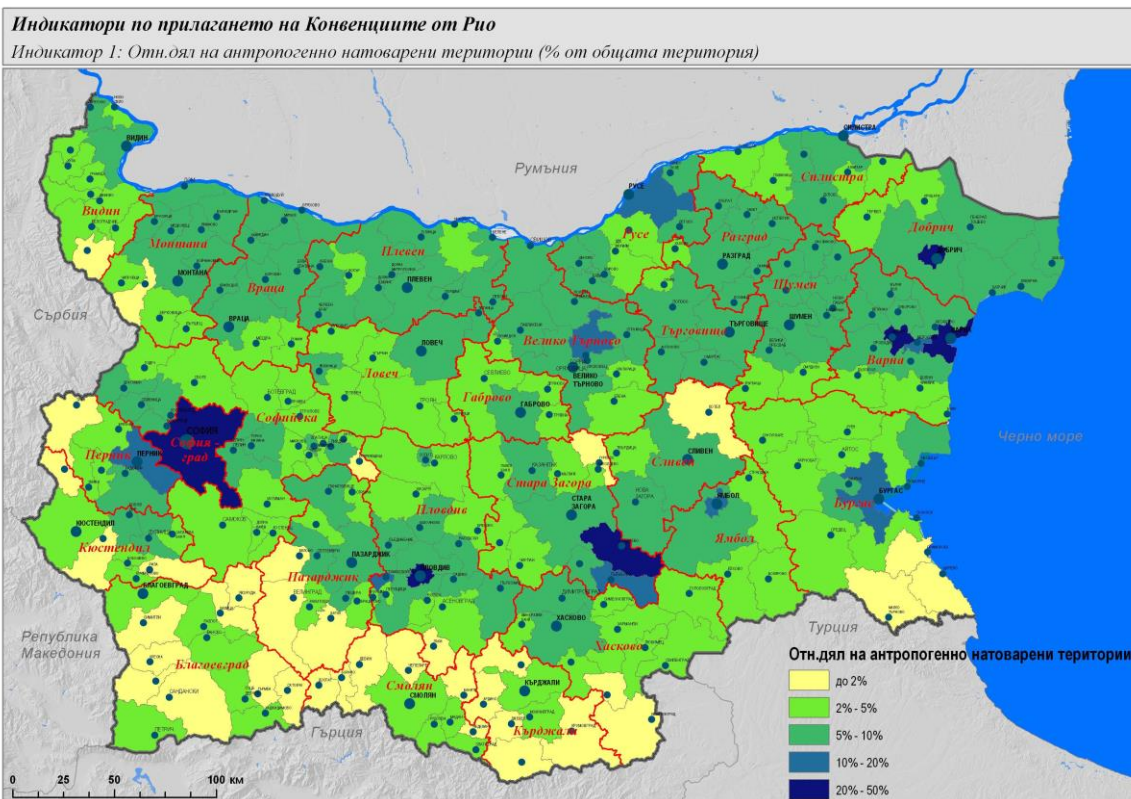


Fig. 25. Proportion of areas with anthropogenic impact (% of the total area) (Source: MRDPW).

Forests

Monitoring and evaluation of the impact of air pollution on forest ecosystems is being carried on. The indicator **Deposition of atmospheric pollutants** is used. The critical loads of acidity, sulfur and nitrogen are measured, using data about the quantity and chemical composition of atmospheric deposition, precipitation, air temperature, chemical composition of surface waters and soils. An assessment for the period 2003–2012 was performed in the three studied stations – Vitinya, Yundola and Staro Oryahovo. No extremes beyond the maximum permitted levels of acidity in the three stations were registered for the monitoring period (Fig. 26A). The values remain relatively high, indicating a good neutralizing capacity of forest soils compared to deposition of acidifying pollutants of atmospheric origin. Soils at the three stations are in stable condition and still able to take larger amounts of acidic deposition. However, emerging trend of degradation processes under the influence of the already high acidity in the soil are possible to be expected. No excession in the critical loads for sulfur and nitrogen were observed for the same period (Fig. 26B, C). The higher levels of sulfur in the last two years in Yundola station may be explained by a decrease in air pollution and consequently the deposition of sulfur coming from the rainfall. The loads of nitrogen were also within the permitted limits.

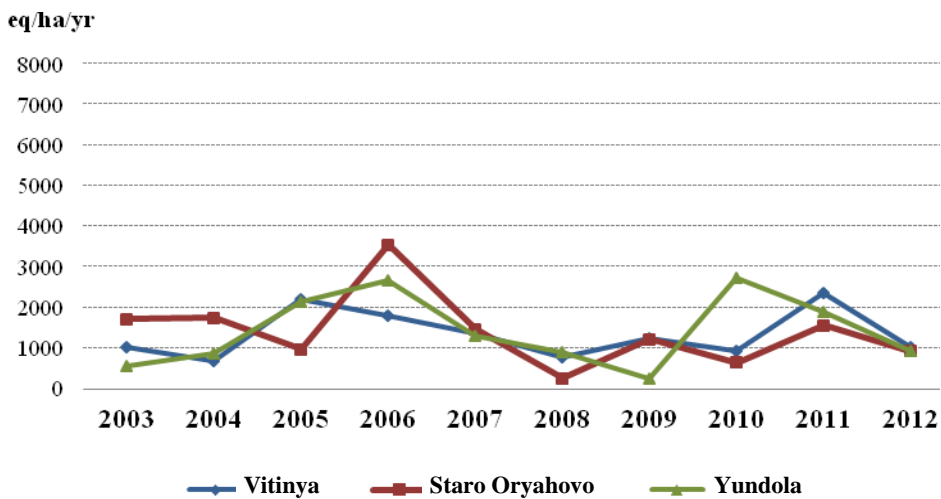
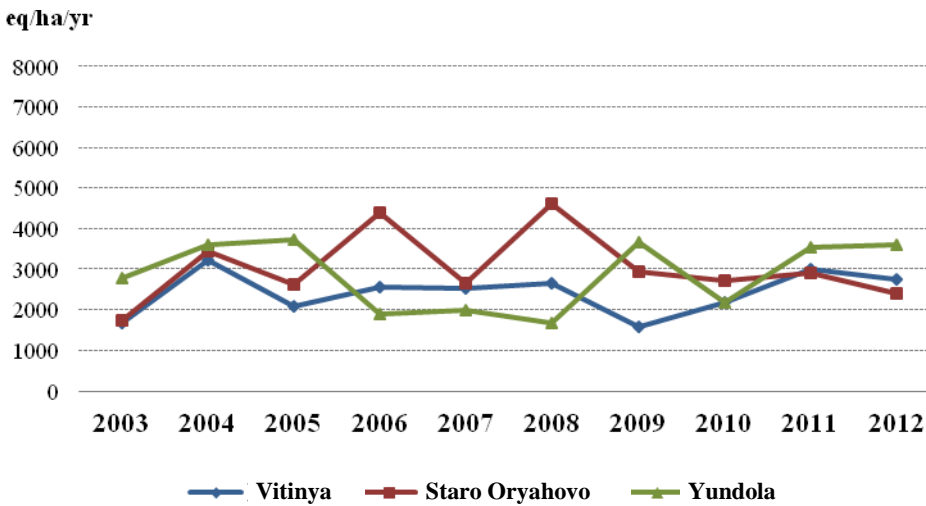
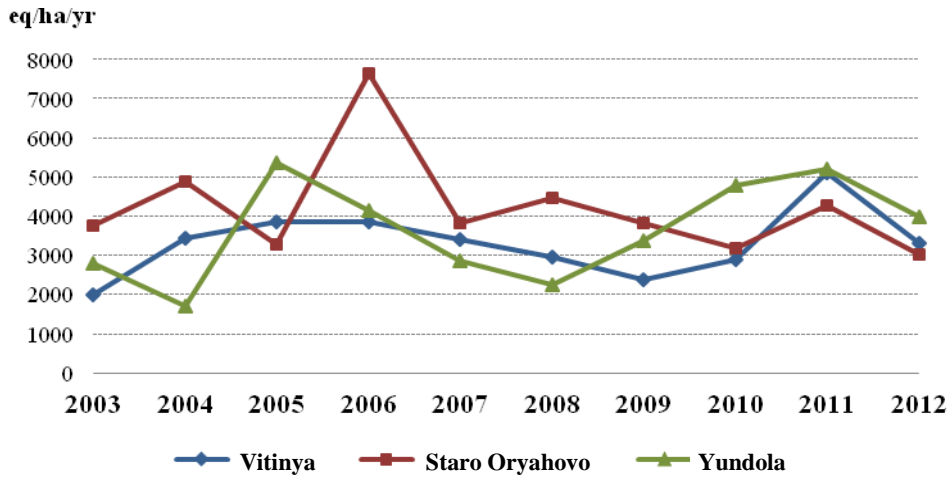


Fig. 26. Critical limits for total acidity (A), sulfur (B) and nitrogen (C) in forest ecosystems: blue – Vitinya; red – Staro Oryahovo; green – Yundola (Source: EEA).

Bulgaria is one of the 28 countries in the European network '**European Atmospheric Heavy Metals Using Mosses – UN/ECE ICP Vegetation, UK**'. The fourth sample collection of appropriate moss species was conducted in 2010–2011. Moss samples can demonstrate only the dry and wet deposition of heavy metals and toxic elements from the atmosphere. Such sample collection is conducted every five years in the European bryomonitoring within the established and functioning network of habitats (over 6500 points of sampling, of which 217 in Bulgaria).

Waters

Measures relating to the protection of waters against pollution, have been incorporated into the management plans of the four river basins for the period 2010–2015 – the Danube, Black Sea, East and West Aegean basins, according to the Water Framework Directive of the EU and Water Act in Bulgaria. They set out measures for protection of surface and groundwater depletion, pollution and damage to maintain the necessary quantity and quality of water and a healthy environment, conservation of ecosystems, landscape preservation and prevention of economic damage. The main measures are:

- To reduce pollutants emitted by industry through the implementation of best practices;
- To collect and purify the wastewaters;
- To prevent and reduce pollution from agriculture and ensure the application of good agricultural practices;
- To construct landfills with an insulating layer both for household and industrial waste;
- To prevent and reduce losses of priority substances;
- To recultivate polluted areas or deteriorated by other factors;
- To prevent and reduce eutrophication;
- To prevent the spread of contamination.

To implement the management plans for the river basins and the National Monitoring Program for Surface Water (EEA/MOEW) **water monitoring** is conducted. It includes programs for control and operational monitoring. The purpose of the control monitoring programs is to provide the necessary information to assess the status of water in the river basins. Operational monitoring programs should determine the conditions of water bodies at risk and assess the changes that have occurred as a result of the implementation of targeted measures and consequently to formulate new goals for conservation of waters that are not in good condition.

Physico-chemical and biological monitoring has been conducted:

Physical and chemical monitoring – includes the following physicochemical parameters – general (basic) indicators, specific pollutants such as organic pollutants and heavy metals, and priority substances (highly toxic, persistent and easily bioaccumulative substances). Water and sediment were surveyed.

Biological monitoring – covers standard biological quality elements – phytoplankton, macrophytes, phytobenthos, benthic macroinvertebrates and fish in rivers and lakes. Methodologies and protocols for biomonitoring are developed and optimized together with methodologies for assessing the ecological status/potential of water bodies. The potential referent monitoring stations have been assessed for suitability. They cover different types of rivers and lakes within the East Aegean basin. The experts from the regional laboratories and Basin Directorates of the Ministry were trained for the implementation of the approved methodologies. A *Methodical Guidance for Biological Analysis and Environmental Assessment of Surface Water Types in Bulgaria* is prepared and published. It is consistent with the methodological approaches and practices of administration activities of the Water Framework Directive in Bulgaria.

An **assessment of the chemical and ecological status/potential** of the surface and groundwater bodies in the four water basins is made as a result of the monitoring.

Monitoring results until 2012 reveal trends of improvement of the quality of surface waters. In the period 2009–2010, 80% of the observed river stations of the major river basins in Bulgaria are in the range of ‘very good – moderate condition’. There are still water bodies at risk and those bodies are prepared and measures are implemented to achieve their good environmental condition. Most indicators show a gradual improvement in the quality of groundwater. Mean concentrations of ammonia and nitrite ions, permanganate oxidation, sulphates and chlorides slightly decrease; the average general concentration of iron and manganese is substantially decreased. As indicators of surface water quality are used: the physicochemical parameters of the water – annual average concentrations of dissolved oxygen, BOD₅, COD, ammonium and nitrate nitrogen, phosphates; and changes in the number and diversity of the indicator benthic macroinvertebrates in rivers measured by biotic index.

Bulgaria participated in the **Third International Scientific Expedition on the Danube** (Joint Danube Survey 3), organized by the International Commission for the Protection of the Danube River (ICPDR) in accordance with the Water Framework Directive in the Danube River basin.

For the successful participation of Bulgaria in the intercalibration for national multimetric system to assess the ecological status of surface waters a project for *Intercalibration of Methods for Analysis of Biological Quality Elements for the Surface Water Types in Bulgaria Corresponding to Certain Common European Geographical Intercalibration Groups* is being implemented.

Monitoring of marine waters is being conducted in relation to the implementation of the objectives of the EU Marine Strategy Framework Directive. As a result of this monitoring *An Initial Assessment of the State-of-art, Determination of Criteria for Good Environmental status and Identification of the Objectives for the Marine Environment of Bulgaria* are conducted. A two-volume *Report Under Arts. 8, 9 and 10 of the EU Marine Strategy Framework Directive 2008/56/EC and Regulation for Environmental Protection in the Sea Region ‘Black Sea’* is prepared. Bulgaria participates as a partner in a number of research projects funded under the 6th and 7th Framework Programme of the European Commission, which aim to implement the ecosystem approach and optimize the system for monitoring of marine waters in relation to the implementation of the EU Marine Strategy Framework Directive.

An **Action Plan for Developing a Marine Strategy of Bulgaria** (2013) has been approved.

The **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022** includes specific measures for specific wetlands in the country, such as:

- To reduce pollution – for wetlands located near large industrial complexes (e.g. Mandra Lake dam, Vaya lake, Varna-Beloslav lake);
- To restrict in-flow of biogenic substances and eutrophication.

Conservation of environment and waters is a major strategic objective in the **National Strategic Plan for Fisheries and Aquaculture 2007–2013** and in the Operative Programme ‘Fisheries 2007–2013’. To ensure the proper management of environment all stakeholders in the sector (state and local authorities, fishermen and fish farmers and their organizations, research organizations, etc.) have to be involved in carrying out the necessary actions for:

- Prevention and control of the pollution of environment and waters;
- Monitoring of the aquatic environment and scientific monitoring;
- Management of waste and waste water originating from the industrial activities in the sector;

- Policy of protection and improvement of the aquatic environment and the areas for spawning of the aquatic species;
- Protection of the aquatic environment and the areas for spawning of the aquatic species that are of interest to the sector.



Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

To achieve this objective in the **National Biodiversity Conservation Plan 2005–2010**, the following activities are planned:

- To develop a Strategy and Action Plan for the management of species alien to the Bulgarian fauna, flora and mycota and limit their impact on natural ecosystems;
- To assess the species alien to the Bulgarian fauna, flora and mycota and propose measures to reduce their impact on natural ecosystems and native species.

A National Strategy and Action Plan for the invasive alien species in Bulgaria need to be elaborated. In the National Report on the State and Protection of the Environment (2012, ExEA) is published a list of invasive and potentially invasive plants, animals and fungi in Bulgaria, but the data are based on studies carried out until 2006. Moreover, these lists are not regularly updated. Measures to mitigate the impact of invasive species are embedded in some sectoral plans and programs.

The **Management Plans for River Basins in Bulgaria** include measures like: identification of alien invasive species and establishing measures to limit their impact on native species, ecosystems and human health; measures to combat the *Dreissena polymorpha* in certain water bodies. However, the analysis of the results from the implementation of the Management Plans for River Basins shows that by 31/12/2012 the measures to combat invasive alien species had not started yet.

The **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022** also includes a horizontal measure of inventory and assessment of the impact of invasive species, and a specific measure ‘Combating invasive species’ is proposed for selected wetlands. Actions has been taken to conduct monitoring of certain alien and invasive alien species as part of the National Biodiversity Monitoring System. For instance, developing methodologies for monitoring and evaluation of the populations of invasive species *Corbicula fluminea*, *Dreissena polymorpha*, *Trachemys scripta elegans* has started.

Three major national projects with international participation have been funded by the National Science Fund and recently implemented. Additionally, several smaller projects have been conducted.

Within the project *Biology, Ecology and Control of the Invasive Alien Species in the Bulgarian Flora* (2009–2012) were collected data on the distribution, ecological and biological characteristics of alien species in the Bulgarian flora. The impact of the most problematic aliens on native species, ecosystems and human health has been assessed. A review of international practices to control invasive plant species has been done as well as some possible measures were tested in Bulgaria. The results were published in a book *Invasive Alien Species of Vascular Plants in Bulgaria* (Petrova *et al.*, 2012), which provides information on 60 invasive and potentially invasive alien species of higher plants.

The project *Alien Terrestrial Arthropods and Their Impact on the Biodiversity of Bulgaria* (ATARTIB, 2009–2012; www.atartib.bg) was conducted. A complete inventory of the alien arthropods was made as well as data on their distribution, biology, ecology and impact (e.g. as transmitter of various deceases) were collected. Some of the results were published in the book *Alien Insects as a Threat to Biodiversity in Albania, Bulgaria and*

Macedonia (Tomov *et al.*, 2009), where a list of foreign insects and detailed descriptions of 29 species are presented.

In the project *Assessment and Management of Invasion of Mussels of the Genus Dreissena in Watersheds in Bulgaria* (2009–2012, www.dreissena.info) data were collected for invasions of freshwater mussels of the genus *Dreissena* in inland waters of Bulgaria, including ways of introduction and distribution mechanisms of the mussels. A constantly updated interactive GIS-based map was developed. The characteristics of invasive populations in relation to environmental factors were studied. The impact of mussels on native aquatic species and ecosystems was studied and the hydraulic structures of the reservoirs. A framework/model for multi-criteria analysis has been elaborated and implemented based on the risk in the management of the invasive species of *Dreissena* in Bulgaria. A *Guide with measures for monitoring and control of invasive species of Dreissena in Bulgaria* was published in 2012.

Within other projects are analyzed the role of ship ballast water and sediments to the introduction of invasive alien species in the Black Sea. The impact of one of the most successful marine invasive alien species *Rapana venosa* on the population of *Mytilus galloprovincialis* and bottom cenoses along the Bulgarian coast of the Black Sea was studied (2013).

With the active participation of Bulgaria was established the **East and South European Network on Invasive Alien Species** (ESENIA, www.esenias.org). The aim of the network is to create a single information portal to facilitate access and exchange of information, identification of new invasive species, assessment and risk management, monitoring and control of the established species, and to enhance cooperation between the institutions, and experts from Southeast Europe working in this field. So far, 12 countries have joined the network.

Within ESENIA and the International Association for Danube Research (IAD) the project *Potential Threats to Sustainable Development in the Danube and Black Sea Region: the Danube – a Corridor of Invasive Alien Species* (2012–2017) is carried out. The Bulgarian part of the river is/will be monitored each year during the project.



Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Achieving this goal is in line with the following measures from the **National Biodiversity Conservation Plan 2005–2010:**

- Assessment of threats [for biodiversity] and exploring of mechanisms to limit/eliminate their negative impact;
- Study of the effects of climate change on biodiversity and measures to mitigate them;
- Assessment of the impacts of desertification and land degradation on biodiversity and mitigation of their consequences.

Some of the most vulnerable ecosystems in Bulgaria are the wetlands, and among the ecosystem services – those related to providing, regulation and maintenance of fresh water.

The **National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022** includes a horizontal measure *Identification of national system of measures for adaptation of the management of wetlands to climate change*.

The **Management Plans for River Basins** include measures for certain water bodies aiming at species adaptation and mitigation of the impact of climate change on biodiversity – land use change and using crops requiring less water, application of water-saving technologies, reforestation of watersheds, etc.

Bulgaria participates in the project **Climate Change and Impacts on Water Supply, CC-WATERS** (2009–2012) financed by the Operational Programme for South East Europe in the EU. An assessment is carried out of the impact of forest ecosystems on the quantity and quality of water resources in the watershed of Struma River. This catchment area is among the hardest hit by climate change in Bulgaria. Recommendations are made regarding the application of appropriate silvicultural methods for forest management in the area to achieve adaptation to adverse climate change and preserve their role as the main source of water and its quality regulator.

Due to the closed nature of the Black Sea, the impact of climate change could be significant for biodiversity. Geographical isolation of the Black Sea makes it impossible or limits the natural migration of species to the north, following suitable climatic conditions. While the migration of cold-adapted organisms in depth is hindered by the presence of H₂S in the water of the Black Sea under 150–200 m. This further hampers the adaptation of species to climate warming. There is a threat to the endemic species in the Black Sea, which are of limited distribution and hence are particularly vulnerable to climate change because of the narrow range of environmental tolerance. A national research project *Research on the Black Sea Ecosystem Along the Bulgarian Coast in Terms of Climate Change* has been conducted (2010–2013). Project activities included studies of the changes in the marine ecosystem and building scientific capacities to deal with new challenges in relation to climate change.

Strategic Goal C: *To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity*



Target 11: By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.

The implementation of activities under this objective is fully in line with the operational objective of the **National Biodiversity Conservation Plan 2005–2010** ‘*Protection and restoration of species, habitats, ecosystems and landscapes*’, and objective ‘*Developing, strengthening and sustainable management of the National Ecological network (NEN), based on application of the ecosystem approach, and integration of NEN in a global ecological network by launching transboundary protected areas, zones and corridors*’ (see Part II of this report).

National Ecological Network (protected areas and Natura 2000 sites)

According to the Biological Diversity Act Bulgaria is obliged to establish a **National Ecological Network** that encompasses the **Special Areas of Conservations** (SACs, under Habitats Directive) and **Special Protection Areas** (SPAs, under Birds Directive) from the European ecological network Natura 2000 and **protected areas** that might be or might not be part of the Natura 2000 network. The National Ecological Network gives priority to CORINE sites, Ramsar sites, Important Plant Areas and Important Bird Areas.

In Bulgaria there are six categories of protected areas: reserve, national park, natural landmark, managed reserve, nature park and protected site. Until the end of 2013, 1009 protected areas have been declared, with a total area of 584 587.1 ha, which accounts for about 5.3% of the country. In Bulgaria there are 4 protected areas, which also include marine aquatory. One of them – protected area Koke Trais, with area of 760 ha, is entirely located in the sea, as other 3 protected areas, include both terrestrial and marine areas. The

protected marine aquatorries constitute 1136.4 ha.

For the period 2009–2013, the number of protected areas increased by 59, mainly as a result of the designation of new protected sites for the conservation of rare plant species, and the total area is increased by 2851.1 ha (Table 16). In 2011, for the first time in the country and in the Balkan Peninsula a protected area was declared for the protection of a bryophyte species, and so far such protected areas are designated for three species of bryophytes.

Table 16. Categories of protected areas (Source: EEA/MOEW).

Categories of protected areas	Number by the end of 2008	Number by the end of 2013	Area (ha) by 31.12. 2013
Reserves	55	55	77 064.9
Natural phenomena	345	344	16 844.2
Protected nature areas	501	561	79 353.4
National Parks	3	3	150 362.3
Nature Parks	11	11	256 441.4
Managed Reserves	35	35	4520.9
Total protected areas	950	1009	584 587.1
Share of the territory of the country	5.2%	5.3%	Increase with 2851.1 ha

The state policy is aiming at the expanding of the network of protected areas, mainly by declaring protected sites and natural landmarks. Reserves, managed reserves and national parks have not been declared since 2008. The reason is that according to the national legislation such territories are exclusive state property and for their declaring land expropriation and compensation of owners is needed. At this stage this approach is hindered by the lack of appropriate mechanisms. Designation of nature parks also encounter some difficulties due to the fact that they cover large areas, different types of ownership and a large number of landowners who need to agree their land to be included within the borders of the protected area.

The indicator **Change in the number and size of protected areas** is used to evaluate the changes over time in the number and size of the protected areas. The designation of protected areas is a direct response to the potential loss of biodiversity and therefore reflects the responsibility taken to protect biodiversity and reduce its loss (Fig. 27).

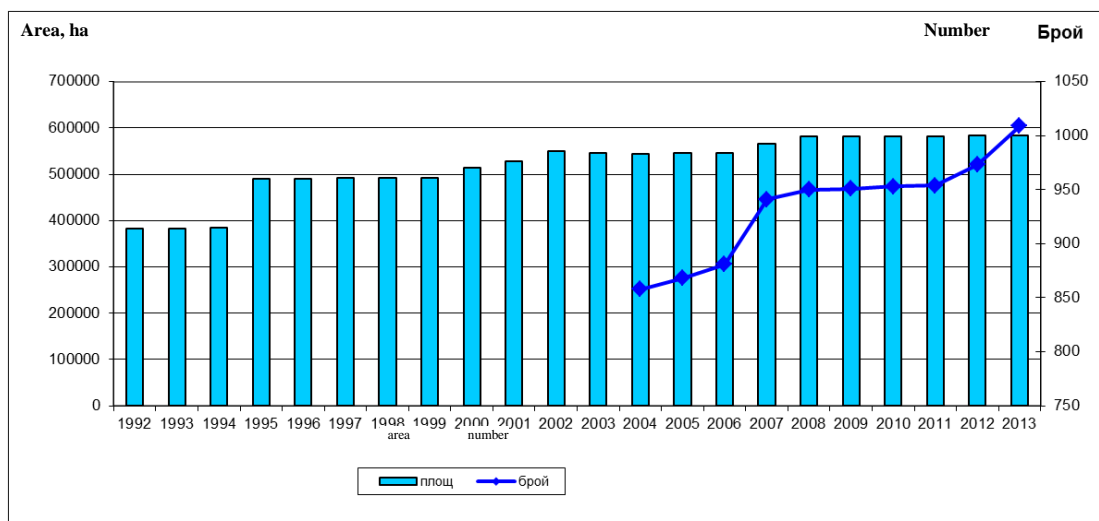


Fig. 27. Changes in the number and territory of protected areas in the period 1992–2013: light blue – surface area; dark blue – number (Source: EEA/MOEW).

At the end of December 2013 the **Natura 2000 network** covers 4 053 941.44 ha, which is about **34.4% of the territory of Bulgaria** (Fig. 28). According to this indicator the country ranks third after Slovenia (35.52%) and Croatia (34.80%) among the 28 member states of the European Union. The network includes 119 SPAs for birds (about 22.7% of the country) and 233 SACs for habitats (about 30% of the country's territory). **The total number of Natura 2000 sites is 339** (13 areas are designated under both Directives and have common borders). The majority of the protected areas in Bulgaria are included in the Natura 2000 network, which confirms their conservation significance and their contribution to biodiversity conservation.

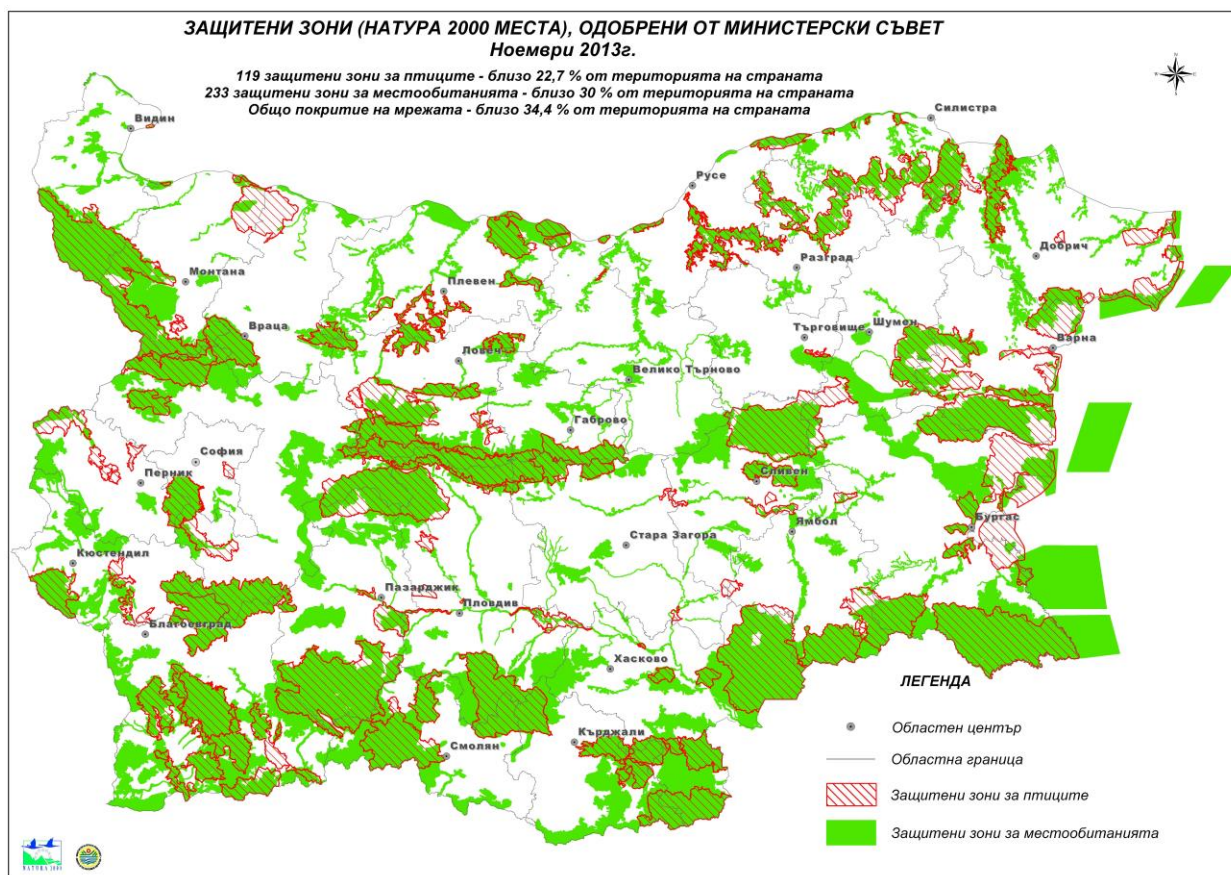


Fig. 28. Map of the sites of the Natura 2000 Network in Bulgaria, approved by the Council of Ministers on November 2013: red – SPAs; green – SACs (Source: MOEW).

Of the total area of Natura 2000 sites 56.47% are forests, 32.35% are agricultural land and 11.18% are other areas (Табл. 17).

Table 17. Territorial distribution of the types of ecosystems in the sites within Natura 2000 network (Source: MOEW, National PAF for Natura 2000).

Types of ecosystems	Area, ha	%
Urbanized	86 363.86	2.13
Agricultural	490 127.30	12.09
Herbaceous	545 867.68	13.47
Forests	2289 162.17	56.47
Shrubs and ericoid shrubs	226 644.02	5.59
Areas with diffuse vegetation or without vegetation	48 517.20	1.20
Inland wetlands	13 545.44	0.33
Rivers and lakes	104 404.84	2.58
Marine ecosystems	249 308.93	6.15
Total	4 053 941.44	100.01

Currently in Bulgaria 16 protected areas from Natura 2000 network are designated to protect marine habitats. Three of areas fall entirely within the Black Sea aquatory, while 6 others which already existed were expanded.

The indicator **Protected sites under the Habitats Directive and Birds Directive in Bulgaria** is used to assess the current status of implementation of the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC). The designated protected areas are a direct response to the loss of biodiversity and demonstrate the State's responsibility to protect biodiversity and reduce its loss. An **increase of the area of the Natura 2000 sites** is observed (Figs. 29 and 30).

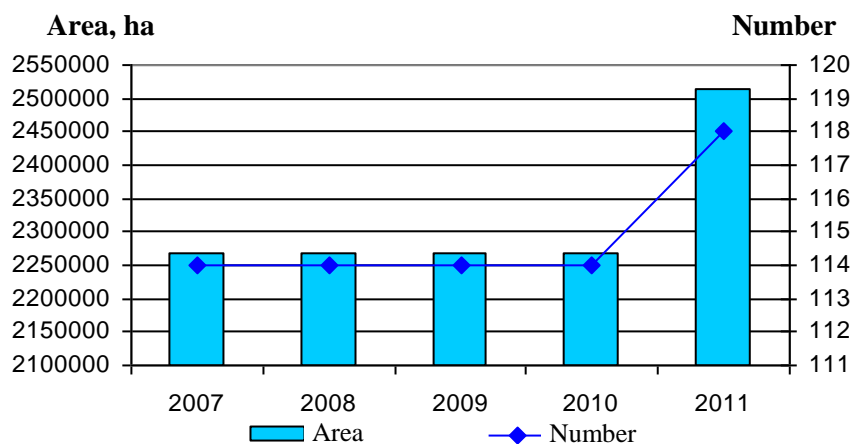


Fig. 29. Changes in the number (dark blue) and area (ha, light blue) of the sites according to the Birds Directive in the period 2007–2011 (Source: EEA).

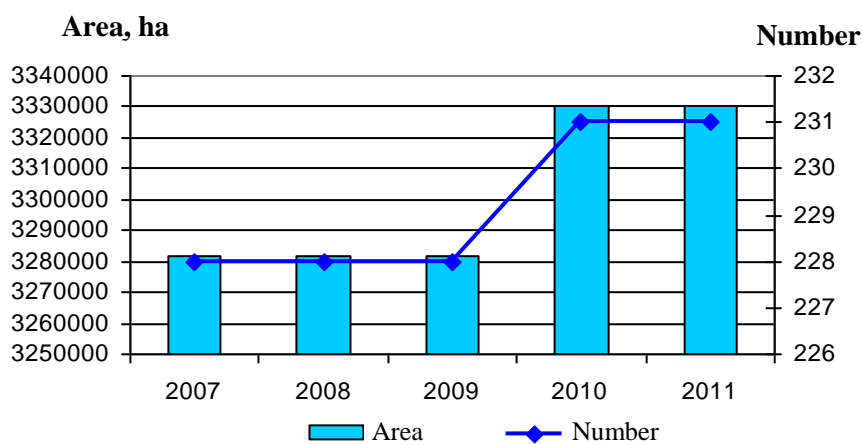


Fig. 30. Changes in the number (dark blue) and area (ha, light blue) of the sites designated according to the Habitats Directive in the period of 2007–2011 (Source: EEA).

The indicator **Sufficiency of sites designated under the EU Habitats directive** is used to measure the degree to which Natura 2000 in Bulgaria properly covers habitats and species from Annexes I and II of Directive 92/43/EEC (Table 18). The sufficiency index remains 94.3% for the period 2008–2011.

Table 18. Indicator „Sufficiency of sites designated under the EU Habitats directive“ (ИЗТОЧНИК: ИАОС).

Indicator and baseline year	Mean for the EU	Bulgaria
Sufficiency of sites designated under the EU Habitats directive – 2010 http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsdnr210&plugin=1	89%	94%

The first phase of the mapping and assessment of the conservation status of all habitats in Annex I of Directive 92/43/EEC is implemented in Natura 2000 sites in the country. This will provide information to stakeholders regarding the restricted areas and effective management of investment projects. A **National Priority Action Framework for Natura 2000 in Bulgaria for the period 2014–2020** was elaborated in 2013. It identifies the priority measures to be implemented by 2020 in order to improve the conservation status of species and habitats that are within Natura 2000 network. The document ‘Regimes for Sustainable Management of Forests in Natura 2000’ is elaborated for the forest areas. It outlines the appropriate silvicultural practices for each forest habitat in protected areas with the purpose of preservation and restoration.

Management plans of protected areas or Natura 2000 sites have been elaborated and implemented. For 2009–2013 14 management plans were elaborated: five for nature parks, two for managed reserves, two for protected sites and four for reserves.

Altogether 87 terms of references for elaboration of management plans were approved: three for national parks, three for nature parks, 25 for managed reserves, four for protected sites, four for natural landmarks, and 48 for reserves.



Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

The implementation of activities under this objective is in line with the main operational objective ‘*Protection and restoration of species, habitats, ecosystems and landscapes*’ of the **National Biodiversity Conservation Plan 2005–2010** and objectives (see Part II of this report):

- Threat Assessment and exploration of mechanisms to limit/eliminate their negative effects;
- Support programs for *ex situ* conservation of biological diversity and the application of best practices;
- Monitoring of species, habitats, ecosystems and landscapes based on standard EU indicators and methodologies and coordination of lists of species and habitats in Bulgaria that are of Community priority.

According to the Biological Diversity Act legally protected in Bulgaria are 1057 rare and endangered species – 574 species of vascular plants and 483 animal species (Table 19).

Table 19. Number of protected species and centinel trees in Bulgaria by 31/12/2013 (Source: BDA, MOEW).

Subject	Available by 31.12.2012	Newly proclaimed in 2013	Excluded in 2013	Available by 31.12.2013
Protected plant species	574			574
Protected animal species	483			483
Protected centinel trees	1728	41	18	1751

For the period 2009–2013 have been developed and approved Action Plans for the protection of seven species of seed plants (*Astragalus dasyanthus*, *A. physocalyx*, *Centaurea wagenitziana*, *Geranium aristatum*, *Matthiola odoratissima*, *Salix rosmarinifolia* and *Swertia punctata*), and 8 for animal species - 3 mammals, 4 birds (*Aquila heliaca*, *Falco cherrug*, *Neophron percnopterus* and *Pelecanus crispus*) and tortoises (<http://www.moew.government.bg/?show=top&cid=215>).

A **National Biodiversity Monitoring System** to the ExEA (<http://eea.government.bg/en/bio/nsnbr>) was established and operates in the country. The system is in the process of accumulating data. Different plant and animal species are monitored, including higher plants, fungi, invertebrates, fish, birds, bats, large mammals. Large amount of current information is gathered during the investigation and assessment of the status of species and habitats of European importance included in the Bulgarian part of the Natura 2000 network (<http://natura2000.moew.government.bg/>), and in numerous projects with scientific and environmental focus.

The localities are mapped and the conservation status has been assessed of all species in the country listed in the Annexes of Directive 92/43/EEC. The necessary measures to achieve a favorable status for them are listed in the *National Priority Action Framework for Natura 2000 Bulgaria for the period 2014-2020*.

A **GIS model of risk areas for birds** and zonation have been carried out in relation to the construction of wind farms.

Seeds from more than 90 rare and endangered species from the Bulgarian flora were collected and deposited in seed banks (Case studies 7 and 8). A **network of small protected areas** for 44 vascular plant species and three bryophyte species has been established (Case studies 7 and 8).

Case study 7:

Since 2005, a team from the Institute of Biodiversity and Ecosystem Research, BAS is a partner in the Millennium Seed Bank Project (MSBP), managed by the Royal Botanic Gardens, Kew, UK, which aim by 2010 was to protect 10% of the world's flora. This initiative grew into Millennium Seed Bank Partnership (www.kew.org/science-conservation/millennium-seed-bank). The main objectives of the initiative are: to successfully bank 25% of the wild species of world flora by 2020, to foster research to improve all aspects of seed conservation and reintroduction of species in natural habitats, to promote conservation activities around the world by facilitating access to seeds of rare and valuable species and introduction of technologies for storing seeds, to maintain and increase public interest in the conservation of plants and enhance international cooperation. Cooperation within the MSBP is further carried on by ENSCONET – joint research project under the Sixth Framework Programme of the EU. The project aims to compare the existing priorities and practices for the *ex situ* conservation of wild flora (focusing on seed banking), to elaborate a common approach with measurable objectives for the conservation

of the European wildlife. A *Seed Collecting Manual for Wild Species* (2009) was produced as well as *Curation Protocols and Recommendations* (2009). So far 630 seed collections of 598 species are collected and deposited for storage in the Millenium Seed Bank. Of them 84 species are protected by the Biological Diversity Act and are included in the Red List of Bulgarian vascular plants (2009). Priority is given to species from habitats that are of conservation importance or are under threat. Samples from the collected seeds remain in IBER – BAS for further research activities related to *ex situ* conservation and *in situ* restoration of species and habitats.

Case study 8:

Following the plant microreserves concept, a pilot network of small protected areas was built in the period 2010–2013 in Bulgaria. The aim is to conserve plant diversity in the country and especially the critically endangered and rare species the populations of which are not included in any of the existing protected areas. Fifty-eight protected areas for 44 species of vascular plants and three bryophyte species (Table 20) have been established. Action plans (2014–2023) have been elaborated and approved for all 47 species – for the protection of the national populations, and in the case of the Bulgarian endemics – for protection of the worldwide populations. For all 47 species monitoring plans have been elaborated and implemented. *In situ* activities to improve the state of the species populations and their habitats have been conducted. Seeds from 12 species have been collected and deposited in the National Seed Genebank. The project was funded by the EU Life + Program (Project Life 08/NAT/BG/000279, www.bulplantnet-bg.s-kay.com).

Table 20. Network of small protected areas for the conservation of rare species from the Bulgarian flora (2010–2013) (CR – Critically Endangered according to the national Red List; EN – Endangered, according to the national Red List; VU – Vulnerable, according to the national Red List) (Source: IBER–BAS, MOEW).

№	Taxon	Conservation status	Number of protected areas in 2010–2013	Area of protected territories, ha
Mosses				
1	<i>Mannia androgyna</i>	CR	1	11.6698
2	<i>Riccia crustata</i>	CR	2	11.6698 + 21.5785
3	<i>Trichocolea tomentella</i>	EN	2	0.88 + 6.691
Ferns and seed plants				
4	<i>Achillea ochroleuca</i>	CR, protected	1	Under designation
5	<i>Achillea thracica</i>	CR, IUCN(R), protected, Bern Convention, Bulgarian endemic	1	8.0330
6	<i>Aethionema arabicum</i>	CR, protected	1	10.1975
7	<i>Amygdalus webbii</i>	CR, protected	2	14.9486 + 46.0671
8	<i>Anthemis argyrophylla</i>	CR, IUCN(VU), protected, Bulgarian endemic	1	46.4682
9	<i>Artemisia chamaemelifolia</i>	CR, защитен	1	78.0959
10	<i>Astracantha thracica</i>	VU, protected, Balkan endemic	3	30.2430 + 14.8828 + 13.6580
11	<i>Astragalus dasyanthus</i>	CR, IUCN(R), protected	2	52.7821 + 12.6982
12	<i>Astragalus physocalyx</i>	CR, IUCN(CR), protected	1	7.8177
13	<i>Bupleurum uechritzianum</i>	Balkan endemic	1	36.5777
14	<i>Centaurea finazzi</i>	CR, protected, Balkan endemic	1	40.2121
15	<i>Centaurea trinervia</i>	CR	1	16.8712

16	<i>Centaurea wagenitziana</i>	CR, protected	1	29.9746
17	<i>Convolvulus althaeoides</i>	CR, protected	1	1.4308
18	<i>Convolvulus holosericeus</i>	CR, protected	1	10.1856
19	<i>Corynephorus divaricatus</i>	CR, protected	1	7.8177
20	<i>Ephedra fragilis</i> subsp. <i>campylopoda</i>	CR, protected	2	18.1151 + 0.6179
21	<i>Eriolobus trilobata</i>	CR, protected	2	0.2 + 2.2203
22	<i>Erodium absinthoides</i>	EN, protected	1	3.267
23	<i>Genista germanica</i>	CR, protected	1	Under designation
24	<i>Geranium aristatum</i>	CR, protected, Balkan endemic	1	12.1708
25	<i>Lathyrus pancicii</i>	CR, IUCN(R), protected, Balkan endemic	1	6.9275
26	<i>Lathyrus palustris</i>	CR	1	2.15
27	<i>Leontodon saxatilis</i>	EN	1	0.8
28	<i>Limonium bulgaricum</i>	CR, protected, Bulgarian endemic	2	3.9981 + 1.6142
29	<i>Lycopodiella inundata</i>	CR, protected	1 + 1	8.4427 + under designation
30	<i>Matthiola odoratissima</i>	CR, protected	1	19.9072
31	<i>Merendera attica</i>	CR, IUCN(R), protected, Balkan endemic	1 + 1	37.4829 + under designation
32	<i>Ophrys insectifera</i>	CR, CITES, protected	1	10.6182
33	<i>Orchis provincialis</i>	CR, protected	2	0.5566 + 7.07
34	<i>Plantago maxima</i>	CR, protected	1	6.9789
35	<i>Potentilla fruticosa</i>	VU, protected	1	Under designation
36	<i>Ranunculus stojanovii</i>	CR, protected, Bulgarian endemic	1	11.8354
37	<i>Salix rosmarinifolia</i>	CR, protected	1	18.1527
38	<i>Serratula bulgarica</i>	CR, IUCN(R), protected	1	27.60
39	<i>Spiraea crenata</i>	CR, protected	1	17.580
40	<i>Swertia punctate</i>	CR, protected	1	8.3948 (extension)
41	<i>Tragopogon floccosus</i>	CR, protected	1	Under designation
42	<i>Tulipa pirinica</i>	CR, protected, Bulgarian endemic	2	21.5785 + 41.3021
43	<i>Verbascum anisophyllum</i>	CR, protected, Balkan endemic	2	22.3570 + 9.7005
44	<i>Verbascum purpureum</i>	EN, IUCN(R), protected	2	0.5 + 11.7282
45	<i>Verbascum spathulisepalum</i>	EN, protected, Balkan endemic	1	7.974
46	<i>Verbascum tzar-borisii</i>	CR, protected, Bulgarian endemic	2	79.9779 + 7.4560
47	<i>Veronica multifida</i>	CR, protected	3	18.5758 + 35.8793 + 2.2505

In vitro cultures from plant species of high conservation value (*Astragalus physocalyx*, *Centaurea trinervia*, *C. davidovii*, *C. caliacrae*, *C. pseudaxillaris*, *C. finazzeri*, *C. immanuelis-loewii*, *Lilium rhodopaeum*, *Tulipa urumoffii*, *Ruscus aculeatus*, *R. hypoglossum*, four species of the genus *Goniolimon*, and six species of the genus *Limonium*) have been developed. The cultures are designed to be adapted in the field, to be maintained in a living collection and when needed to be reintroduced in the natural localities of the respective species. Activities related to **restoration of the habitats of 100 animal species, three plant species habitats, five populations of plant species and 3 populations of animal species** were funded by the Operational Programme ‘Environment 2007–2013’ under Priority Axis 3 ‘*Preservation and restoration of biodiversity*’ (Case study 9).

Case study 9:

Reintroduction of Balkan chamois (*Rupicapra rupicapra balcanica*) in Vitosha Nature Park – 31 animals were introduced in the period 2003–2011, 45 animals are newly born and 26 animals died. At the end of 2011 the restored chamois population in the Park consisted of 50 animals (Fig. 31) (Source: Vitosha Nature Park).

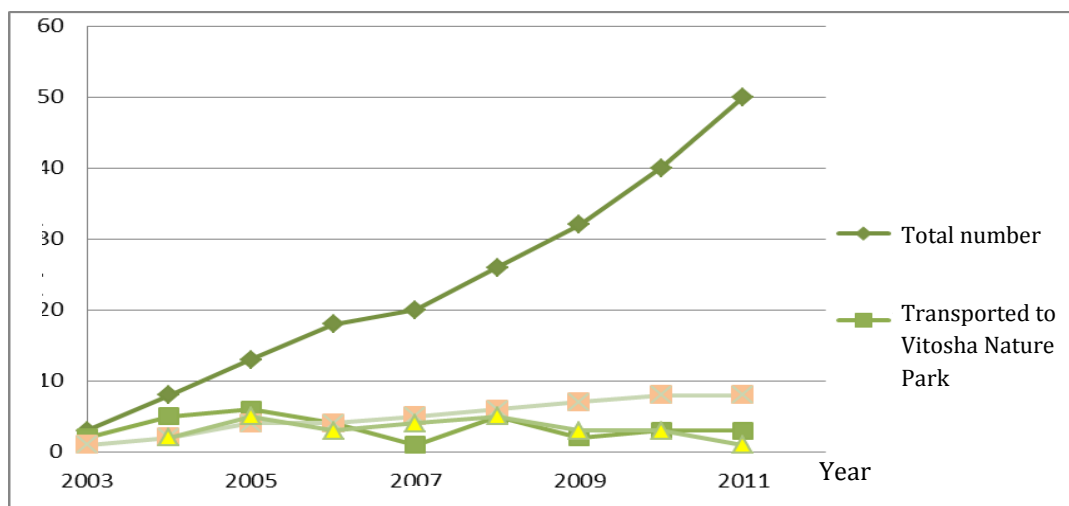


Fig. 31. Total number of Balkan chamois in Vitosha Nature Park in the period 2003–2011 (Source: Vitosha Nature Park).



Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

The implementation of activities under this objective is in line with operational objectives ‘*Maximum integration of biodiversity concerns into national and sectoral environmental legislation and national policies and programs*’ and ‘*Sustainable use of biological resources*’ of the **National Biodiversity Conservation Plan 2005–2010** (see Part II of this report).

The conservation of genetic diversity of cultivated plants and their wild relatives, including species with socio-economic and cultural value is carried out mainly by the National Seed Genebank, Institute of Plant Genetic Resources (IPGR) in Sadovo. The Genebank has developed a methodology for long-term storage ensuring the identity of the stored plant genetic resources. This technology helps to minimize the genetic erosion. The activities to protect the plant gene pool through *ex situ* conservation in the gene banks successfully combine with the maintenance of field collections of crop groups, *in vivo* collections at the Botanical Garden in IPGR – Sadovo, and *in vitro* conservation of vegetatively propagated crops.

The preservation of forest genetic resources is one of the indicators for sustainable forest management adopted at the EU level. **Conservation of forest genetic resources is legally regulated** (Section V ‘Preservation and conservation of forest genetic resources’ of Ordinance № 21 of 12/11/2012 on the terms and conditions for the determination, approval, registration and cancellation of the sources of forestry seeds, the collection and extraction of forest reproductive material, their evaluation, trade and imports). A “gene bank” is planned to be established to preserve forest genetic resources, to carry out monitoring and research, and to timely restore genetic resources that are degraded or destroyed by natural impacts. Bulgaria

is part of a European information system for forest (EUFGIS). So far six conservation units have been introduced from the country including mainly species with scattered distribution as *Acer pseudoplatanus*, *Acer platanoides*, *Sorbus torminalis*, *Pyrus pyraister*, *Fraxinus excelsior*, *Populus nigra*, etc.

Resource assessment has been made of the populations of a number of plants, e.g. *Alchemilla mollis*, *A. achtarowii*, *A. jumrukczalica*, *Gentiana lutea*, *Sideritis scardica*, *Tribulus terrestris*, and for the four species of the genus *Goniolimon* and six species of the genus *Limonium*, etc.). Promising resource material was selected for cultivation. For some species (*Artemisia alba*, *Sideritis scardica*) technologies were designed for industrial cultivation, which helps to reduce the collection from natural localities.

Regarding the animal genetic resources in the country the following is done by the **Executive Agency for Selection and Reproduction in Animal Breeding (EASRAB)**: 1) conduct monitoring of genetic resources in Bulgaria; 2) maintain a register of male animals and breeding herds; 3) manage and maintain a national gene bank of cryopreserved genetic material; 4) maintain and administer national genetic reserve that store certain quantities of deeply frozen genetic material of all species and breeds of farm animals in the country; 5) manage and maintain public stations for artificial insemination, which produce and store the cryopreserved genetic material of endangered high-yielding or autochthonous breeds; 6) manage and maintain the stations for assessment of young buffalos; 7) maintain pools of breeding animals.

A positive development is registered in tribal farming for the period 2009–2013. The number of the preserved indigenous +breeds has increased – the number of animals and the farms where they are grown. The number of animals bred by the breeding organizations in the period 2009–2013 has increased, e.g. over 5 times with horses, with 52.5% more cattle, with 22.8% more sheep, with 21.1% more buffalos and with 5.6% more pigs (Table 21). A significant decline was observed in poultry breeding and less in bee-keeping. Along with the increased number of controlled animals increases their productivity, which is a result of the implementation of the existing breeding programs.

Table 21. Dynamics of animal genetic resources in the period 2009–2013 (Source: EASRAB).

	2009	2010	2011	2012	2013	Dynamics of genetic resources 2009/2013 in %
	Number of animals	Number of animals	Number of animals	Number of animals	Number of animals	
Cattle	33 574	35 595	46 824	51 769	51 211	52.5
Incl. local breeds	2383	1925	2932	3698		
Buffalos	4306	4485	4669	4899	5215	21.1
Incl. local breeds	4306	4485	4669	4899		
Sheep	134 852	138 131	158 903	154 486	165 711	22.8
Incl. local breeds	29 824	39 705	39 959	45 601		
Goats			5022	8694	24 249	
Incl. local breeds			1368	1707		

	2009	2010	2011	2012	2013	Dynamics of genetic resources 2009/2013 in %
	Number of animals	Number of animals	Number of animals	Number of animals	Number of animals	
Pigs	33 676	31 995	33 908	35 421	35 554	5.6
Incl. local breeds	595	1269	1277	1176		
Poultry	837 848	852 616	651 742	649 676	652 352	-22.1
Bee keeping	11 434	10 858	11 625	11 019		
Incl. local breeds	11 434	10 858	11 625	11 019		
Horses	500	1243	3636	3279	3114	522.8
Incl. local breeds	0	698	1570	1525		

The registries for male breeding animals and breed herds from the national gene pool bank help to conduct annual monitoring. Thus, it is possible to clearly distinguish commercial and indigenous breeds. No reduction in the number of animals from the commercial breeds is anticipated, while a major part of the local indigenous breeds fall into the category of endangered according to the classification of FAO. By 2012, 27 indigenous breeds that are part of the national wealth of Bulgaria have been supported by EU funding. Seven new local breeds are included in the list for support by measure 214 ‘Agri-environmental payments’ from the Rural Development Program 2007–2013. These breeds are a part of the cultural heritage of the country and are specific to particular regions in Bulgaria. EASRAB has started operating an information system for monitoring of the biodiversity of farm animals – EFABIS, which is part of the global network FABISnet. The aim of the database is to collect, maintain, and update the data about the animal genetic resources that can be shared with other members of the network and the global database – DAD-IS (DAD-IS) of the Food and Agriculture Organization of the United Nations.

Two major methods have been applied for the conservation of genetic resources of livestock in Bulgaria – *in situ* and *ex situ* conservation. The *in situ* method is effective in cases when a particular species is endangered or threatened. Thus, the potential of the indigenous breeds is best preserved to survive in harsh climatic conditions, limited food resources and in the same time achieve relatively high productivity with lower overall maintenance costs. Their specific characteristics such as longevity, disease resistance, reproductive abilities are preserved as well as the traditional relationship between man and animal that are part of the local traditions. The activities related to this method are carried out by the breeding organizations approved to be part of the breeding programs.

Ex situ conservation of animal genetic resources are managed and maintained by the National Gene Bank that is based in Sofia and Sliven. In their cryopreservation stations are preserved deep-frozen semen of 288 breeding stations – 21 breeds of cattle and three buffalo breeds. In order to implement the Global Plan of Action of FAO and of the international community for keeping the European and global genetic diversity, EASRAB has taken urgent measures to reduce the loss of genetic resources in livestock by creating a **National Gene Reserve**. To achieve higher biosecurity the sperm is stored in two cryopreservation stations with 359 971 doses of frozen semen from of 41 highly valuable, endangered or threatened indigenous breeds kept in 440 breeding stations. Every year the national gene reserve is recharged, thus reducing the risk of irretrievable loss of heritage properties and genes of the Bulgarian species and breeds.

In 2012 started a 10-year **National Programme for *ex situ* – *in vitro* storage**, managed by EASRAB together with the breeding organizations. Genetic material from breeding animals of commercial and indigenous breeds will be preserved. The program aims in short term to collect and store genetic material from all Bulgarian breeds in quantity to ensure their protection and preservation for future generations. With the implementation of the Programme the National Genetic Bank of Bulgaria will be enriched with the genetic material of 13 sheep breeds, of which 11 indigenous; four goat breeds, including two native ones; seven horse breeds, of which four native, and two local pig breeds.

A 4-year Bulgarian-Swiss project *To Link Conservation with Sustainable Rural Development* started in 2012 in order to protect rare local breeds. The project will build a web-based information system of the indigenous breeds of farm animals in Bulgaria, as well as a DNA laboratory where 27 Bulgarian rare breeds will be studied. This will help to preserve the genetic purity of the local breeds and will contribute to the improvement of the existing subsidy schemes.

The third edition of the catalog '*Breeds of farm animals in Bulgaria*' (Nikolov 2011) has been published, which presents 11 animal species in 98 cultural, indigenous and primitive breeds. A catalogue with accurate descriptions of the breeds in the country, based on monitoring conducted in 2013 is under development.

Bulgaria renewed its membership, contacts and cooperation with international bodies and organizations involved in the management and conservation of the world's animal genetic resources – IKAR, EURFR and EAAP.

Strategic Goal D: *Enhance the benefits to all from biodiversity and ecosystem services*



Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

The implementation of activities under this objective is consistent with the operational objective '*Protection and restoration of species, habitats, ecosystems and landscapes*' of the **National Biodiversity Conservation Plan 2005–2010** (see Part II of this report).

So far there has been no assessment at national level of the impact of biodiversity loss on ecosystem services. ExEA has developed the project '*Improving the Bulgarian Biodiversity Information System – IBBIS*' under the Financial Mechanism of the European Economic Area 2009–2014. One of the key activities is to build a module to the Information system of NBMS through which **to map the ecosystems and ecosystem services in Bulgaria**. Exchange of information and links to external databases are envisaged in order to provide necessary information for the identification, mapping and assessment of ecosystems, for the environment components (forests, water, air), etc. This module, together with the data from the biodiversity monitoring will enable the evaluation of the state of natural resources and the economic valuation of ecosystem services in Bulgaria. This action is in support of the European biodiversity strategy 2020 and its target № 2 '*By 2020, ecosystems and their services are maintained and improved through the development of green infrastructure and restoring at least 15% of degraded ecosystems*' and activity № 5 '*Improving knowledge of ecosystems and their services in the European Union*'.



Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

The implementation of activities under this objective is in line with operational objectives ‘*Protection and restoration of species, habitats, ecosystems and landscapes*’ and ‘*Prevention or reduction of the negative impacts on biodiversity caused by climate change and adapting to them*’ of the National Biodiversity Conservation Plan 2005–2010 and especially with the objectives ‘*Study of the effects of climate change on biodiversity and measures to mitigate them*’ and ‘*Assessing the impacts of desertification and land degradation on biodiversity and limiting their consequences*’ (see Part II of this report).

The national legislation provides for improving and strengthening the role of forests as carbon stocks. The Forestry Act does not justify any reduction in the existing forest cover of the territory of Bulgaria. The primary goal is *the protection and increase of forest area*. Maintaining healthy, productive and multifunctional forest ecosystems that contribute to the mitigation of the climate change is one of the priorities of the **National Strategy for the Development of the Forestry Sector in R. Bulgaria 2013–2020**.

In accordance with the **Strategic Plan for the Development of the Forestry Sector 2007–2011** was developed and is implemented a **Program of Measures for Adaptation of Forests in Bulgaria and Reduction of the Negative Impact of Climate Change (2011)**. The program includes a total of 106 measures for forest ecosystems with varying degrees of vulnerability to climate change – 50 measures for Zone A (ecosystems with very high level of vulnerability), 26 for Zone B (high vulnerability), 19 for Zone B (moderate vulnerability) and 11 in Zone D (low vulnerability).

Developed and implemented is the **Third National Action Plan on Climate Change 2013–2020**. To achieve its objectives in the sector ‘Land use, land use change and forestry’ 16 measures were developed. They are grouped into four priority areas, bringing together several popular approaches to manage carbon balance.

The first priority axis includes measures to *increase the absorption of greenhouse gases*. The necessary measures are associated with an increase in the areas of land use categories – greenhouse gas sinks – forests, grasslands, and measures for their sustainable maintenance in order to increase the amount of biomass. Increasing green space in urban areas is also a measure of positive effect on the carbon balance. The need for additional legislative and administrative measures is underlined to regulate the change in land use in land belonging to the category ‘sinks of greenhouse gases’. The main direct measures are:

- Use of ‘treeless areas for afforestation’ in forest areas;
- Afforestation of areas of abandoned farmland, bare, eroded and threatened by erosion areas outside forest areas;
- Increase of the area of urban and rural parks and green areas;
- Restoration and sustainable management of wetlands, conservation and preservation of wetlands in forest areas, bogs, fens.

Another group of measures aims at the conservation of carbon stocks in forests. In this priority axis are envisaged activities that aim primarily at maintaining and improving the condition of forests as a carbon depot:

- Restoration and maintenance of forest belts and making new anti-erosion forestation;
- Supporting the protection and maintenance of forests with high conservation value and implementation of extensive approach to their use;
- Preservation and improvement of urban and suburban parks;
- Prevention of forest fires through the introduction of early warning systems.

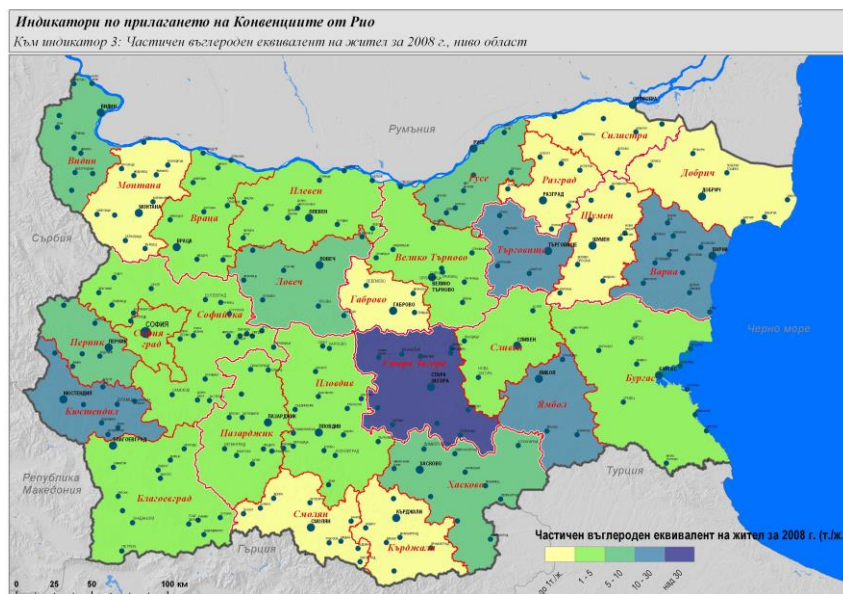
The third priority axis includes measures related to the **increase in the potential of forests for carbon sequestration**. There are administrative, regulatory and financial measures aimed at increasing the country's forest resources and improve their status and potential as a major carbon sink:

- Increase of the density of the natural and planted forest areas;
- Introduction of appropriate systems for management of forest plantations reflecting the changing weather conditions aimed at creating a highly sustainable and mixed forests;
- Increase of the share of certified forests;
- Development of best practices for creating and managing intensive plantations for biomass production and for setting standards for residues of biomass after cutting.

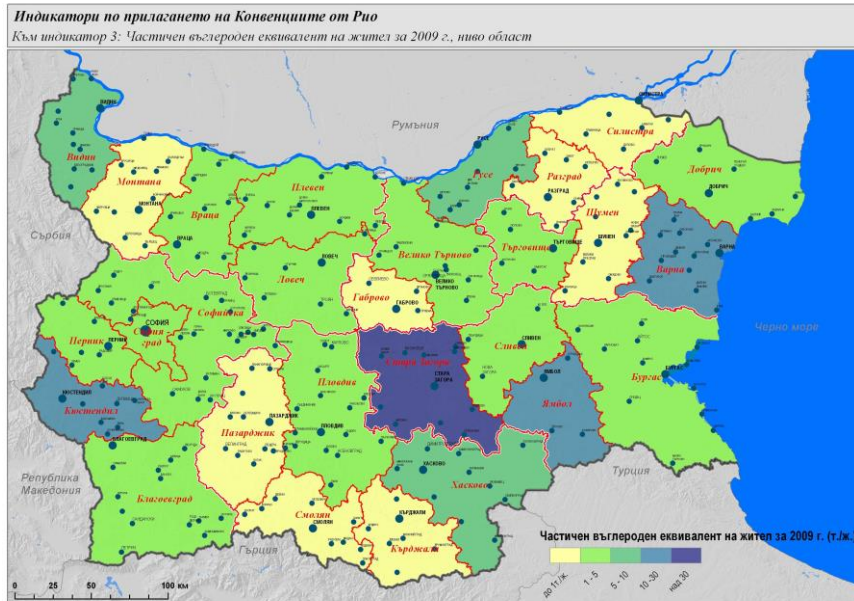
The last priority axis includes measures aimed at long-term retention of carbon in wood products through the expansion of their use at the expense of other non-renewable and carbon-rich materials. This can be achieved by raising awareness and interest of the society.

A **National Strategy for Adaptation to Climate Change** is in preparation in order to establish the necessary adaptation measures in sensitive sectors to abnormal temperatures in the region and climate zone. The presence of unusual climatic characteristics necessitates the adaptation of forests, vegetation, food crops and animal species.

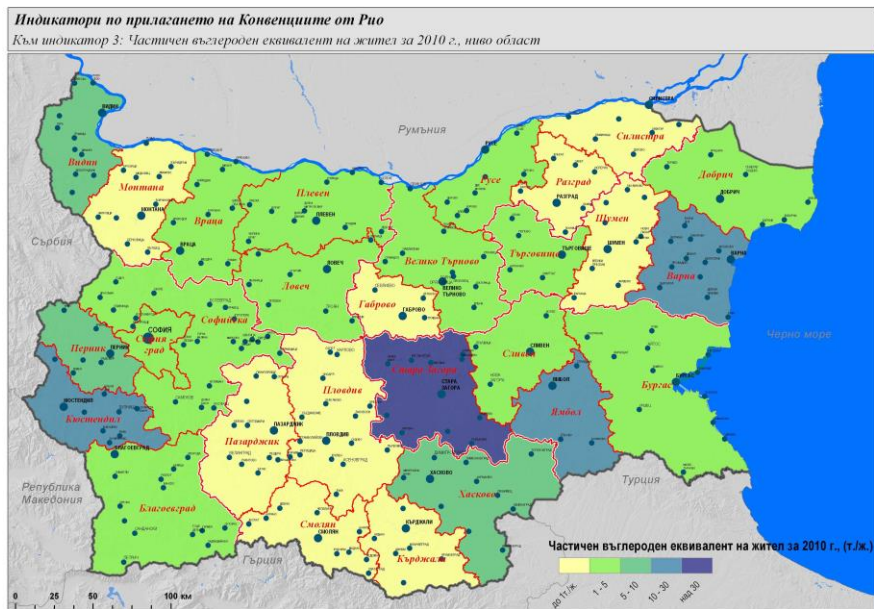
The indicator **Greenhouse gas emissions (in CO₂ equivalent) per capita** is used to assess the amount of greenhouse gases (CO₂ equivalent) emitted per capita in a given territorial unit (municipality, region, country) and what changes are needed in the regional development policies. A decrease in the partial hydrogen equivalent per capita has been registered in some municipalities for the period 2008–2010 (Fig. 32). The average value of the indicator for Bulgaria in 2009 and 2010 was lower than in 2008, while the value for 2010 was higher than the one in 2009.



A.



В.



С.

Fig. 32. Partial hydrogen equivalent per capita (district level) for 2008 (A), 2009 (B) and 2010 (C) (Source: MRDPW).

Measures of the **National Action Program on Sustainable Land Management and Combating Desertification in Bulgaria 2007–2013** are implemented.

Regarding soils Bulgaria's efforts as a country under the UN Convention to Combat Desertification (UNCCD), are directed to sustainable land management and sustainable development in affected areas by taking effective measures at all levels combined with agreements for international cooperation within the framework of an integrated approach and synergies between the three Rio Conventions – UNCCD, CBD and the UN Framework Convention on Climate Change.



Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Bulgaria fulfills its commitments to the Nagoya Protocol.

At administration level the following is implemented:

- Meetings with stakeholders in relation to the necessary coordination at national level for the implementation of subsequent obligations;
- Review of existing national legislation in the field of genetic resources;
- Participation in the first meeting of the Intergovernmental Committee for genetic resources in Montreal, 2011;
- Participation in the expert meetings of the European Union on issues related to signing, ratification and further implementation of the Protocol.

At the administrative level needs:

- To continue the consultations with all research institutes, holders of gene banks;
- To formulate the interinstitutional mechanism and to organize relevant meetings, consultations, identification and appointment of competent authorities for the implementation of the Protocol;
- To share the degree of responsibility of the relevant national institutions (MOEW, MAF, Patent Office) and their regional structures;
- To establish checkpoints and monitor the use of genetic resources;
- To amend the national legislation so that the Nagoya Protocol can be effectively implemented;
- To ratify the Nagoya Protocol and present a set of documents to the Secretariat of the CBD;
- To create an information mechanism under the Protocol to the existing Clearing House Mechanism to the Convention (<http://chm.moew.government.bg>).

At scientific level is expected:

- Inventory and cataloging of genetic resources in the country, development of methodologies and technologies for their conservation and sustainable use;
- Review and use of existing information and documentation in order to prepare new documents, certificates, contracts to support the managing authorities;
- Scientific papers, studies, databases, maps, visual and video information, environmental and biological descriptions responding to the administrative needs at different stages after the ratification;
- Development of scientific criteria for valuation of genetic resources in the country.

At the business level are expected:

- Integration of the requirements set by the Protocol in the activities and business practices associated with genetic resources;
- Financial support and participation together with the administration and scientific institutions in the assessment and valuation of genetic resources in the country;
- Integration of conservation and sustainable use of biodiversity in the corporate activities.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building



Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national

biodiversity strategy and action plan.

To achieve this target, a new National Biodiversity Conservation Strategy and the Third National Biodiversity Conservation Plan will be elaborated.



Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

The issues related to traditional knowledge and the need for conservation and sustainable use of biodiversity is still insufficiently treated in Bulgaria. It is expected that after the ratification of the Nagoya Protocol and the creation of national legislation necessary for its implementation, this issue will cause larger and focused interest in research institutions, NGOs and businesses.

Since 2004, Bulgaria joined the worldwide movement Slow Food (www.slowfood.com), the main objective of which is the preservation of local communities and their knowledge of sustainable use of agrobiodiversity. Bulgaria has established a network of local communities that provide support for the preservation of local breeds, varieties and traditional food.

In 2012 started the project ESSEDRA (<http://www.essedra.com>). The goals of this project are to analyze the obstacles of small-scale farmers and producers of traditional and artisanal food to maintain their production and sustainable farming practices. More than 20 products, breeds and varieties are included in the global catalogue *The Ark of Taste* maintained by Slow Food ([# risultato](http://www.slowfoodfoundation.com/ark)). Four traditional Bulgarian products are supported directly by the Slow Food Foundation for Biodiversity Conservation (<http://www.slowfoodfoundation.com/presidia>).

In 2010, Bulgaria initiated a regional forum Terra Madre Balkans, which has become a platform of small farmers and artisan food producers in their efforts to preserve local knowledge and livelihoods associated with it. Bulgaria hosted two editions of the forum – in 2010 and 2012.

Studies and protection of traditional knowledge and local communities become more and more attractive for the scientific community in Bulgaria – universities, BAS, ACA implement a number of projects in this field.

The topic is in the focus of interest for some protected areas in Bulgaria and the activities associated with it are included in their management plans, e.g. Central Balkan National Park (www.visitcentralbalkan.net/), Rila National Park (www.rilanationalpark.bg/), some of the nature parks in Bulgaria (<http://www.bg-parks.net/main.php?act>), etc.



Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

The development strategies of research institutions in Bulgaria are consistent with the key global, European and national targets for investigation, conservation and sustainable of biodiversity.

Agricultural Academy (AA) (<http://www.agriacad.bg>) operates within the framework of the state agrarian policy. In its 27 research institutes, 19 experimental stations and two experimental facilities are carried out:

- Fundamental strategic and applied research in the field of agricultural sciences and food, ecology and environmental protection;
- Preservation, enrichment and reproduction of plant and animal gene pool of the country;
- Providing seed selection, planting and breeding material to the producers.

Agricultural Academy also provides consultancy and training. The total number of employees of AA is 2742, of which 678 are researchers – 369 senior scientists and 309 research assistants (annual report 2008). The Academy holds multiple certificates for plant varieties and animal breeds and patents. The Annual Report for the activities of the Academy for 2012 is published at http://www.agriacad.bg/obiavi/drugi/GO_SSA_12_1editorVAR.pdf.

Data on agrarian vocational and higher education institutions in 2013 in Bulgaria are as follows:

- Vocational schools in the field of agriculture, veterinary medicine, forestry and food technology – 76 in the system of MAF and 16 managed by the municipalities;
- Vocational training centers for licensed professions and specializations in the same areas – over 880.

Research and academic activities in the field of agriculture, forestry and food technology are carried out mainly in:

- Agricultural University, Plovdiv;
- Thracian University, Stara Zagora;
- Forestry University;
- University of Food Technologies, Plovdiv;
- University of Ruse, Ruse.

Units for consultation and dissemination of scientific knowledge and the results of scientific and applied activities of teachers and researchers operate in these universities.

In the forestry sector specific research is carried out by three specialized units at the Executive Forest Agency:

- Experimental Station of oak forests, Bourgas;
- National research station in hunting, biology and diseases of the game, Sofia;
- Experimental Station for fast-growing tree species, Svishtov.

The **Rural Development Programme 2014–2020** envisages the measure ‘*Knowledge transfer and activities to increase knowledge and improve the skills of farmers and forest owners and employees in their holdings*’. The measure is expected to contribute to the development of cooperation and exchange of knowledge between farmers and scientific research institutes and universities.

The Forestry Act includes a chapter that is aimed at supporting the training and qualification of owners, employees, and workers in the forestry sector. It is clearly stipulated that EFA stimulates, coordinates and controls the implementation of vocational training in the field of forestry.

The mission of the **Bulgarian Academy of Sciences (BAS)** (<http://www.bas.bg>) is to contribute to the development of the world science in accordance with human values, national traditions and interests and contribute to the accumulation of the spiritual and material values of the nation. The activities implemented in relation to the exploration, conservation and sustainable use of biodiversity are reflected in the annual reports of the Academy.

- Report for 2009 – <http://www.bas.bg/fce/001/0003/files/Otchet-BAN-2009.pdf>
- Report for 2010 – http://www.bas.bg/fce/001/0079/files/OTCET_BAN_2010.pdf
- Report for 2011 – http://www.bas.bg/fce/001/0003/files/BAN_OTCHET_2011.pdf
- Report for 2012 – http://www.bas.bg/fce/001/0003/files/BAS_otchet_2012.pdf

A **specific research field ‘Biodiversity, Bioresources and Ecology’** is established in BAS with the following institutes:

- Institute of Biodiversity and Ecosystem Research (<http://www.iber.bas.bg>);
- Institute for Forestry (<http://www.bas.bg/fribas/>);
- Institute of Plant Physiology and Genetics (<http://www.bio21.bas.bg/ippg/bg/>);
- National Museum of Natural History (http://www.nmnh.com/index_bg.php);
- Botanical Garden of the Academy of Sciences (<http://www.cu.bas.bg/garden/>).

Specialized education in biology, ecology and the environment is available in:

- Sofia University ‘St. Kliment Ohridski’ – in Biology Faculty (https://www.uni-sofia.bg/index.php/bul/universitet_t/fakulteti/biologicheski_fakultet2), Geology and Geography Faculty (https://www.uni-sofia.bg/index.php/bul/universitet_t/fakulteti/geologo_geografski_fakultet);
- Plovdiv University ‘Paisij Hilendarski’ – Department of Biology (<https://uni-plovdiv.bg/pages/index/36/>);
- Southwest University – in Mathematics and Natural Sciences Faculty (<http://www.swu.bg/university-profile/faculties-and-colleges/mathematics-and-natural-sciences.aspx>).

Sustainable use of natural resources is included in the Strategy for Development of Research at Sofia University ‘St. Kliment Ohridski’ (2009–2014) (https://www.uni-sofia.bg/index.php/bul/nauka/nauchni_postizheniya_2008_2013).

A **National Strategy of Scientific Research to 2020** has been elaborated. The Strategy sets objectives and measures to ensure a high quality of research and innovation, including the creation of appropriate environment and encouraging businesses to invest in scientific research. The Strategy sets out and runs three tasks with appropriate measures to them. It introduces the priorities for research, formulating priority area ‘*Health and quality of life, biotechnology and organic food*’. Biodiversity is not explicitly mentioned among the priority areas of the Strategy that generates considerable difficulties for the research community in this field.

During the reporting period the following **major activities** have been implemented:

1. A specialized research unit was created after the merging of three research institutes for natural sciences – Institute of Biodiversity and Ecosystem Research, BAS (IBER – BAS) – it is a consolidated centre of national experts in the field of biodiversity.
2. After 2008 30 students successfully defended their Ph.D. thesis and work in the field of biodiversity. Another 40 Ph.D. are in training in this field.
3. A project funded by the Operational Programme ‘Development of Human Resources’ was implemented. Its title is ‘*Development of Scientific Potential in the Field of Faunistic Diversity and Environmental Protection*’, implemented jointly by IBER – BAS, National Museum of Natural History (NMNH – BAS) and Sofia University. The project is part of the Program ‘Support for the development of doctoral students, graduate students and young scientists’. Thirty young scientists in the field of biodiversity were trained within this project.
4. A project ‘*Development of National Centre of Excellence in Biodiversity and Ecosystem Research – CEBDER*’ (2009–2013) was implemented. CEBDER is a consortium of seven organizations: IBER–BAS, Institute for Forestry – BAS, NMNH – BAS, Institute of Oceanology – BAS, Sofia University ‘St. Kliment Ohridski’ (Faculty of Biology), Agricultural University – Plovdiv and Thracian University – Stara Zagora. The following was achieved:
 - Several laboratories have been designed and developed – molecular biology research laboratory, laboratory for heavy metals analysis, TEM – microscope

laboratory, laboratory of taxonomy and phylogeny of invertebrates, laboratories for arachnology, entomology and zootcoenology, laboratory for animal taxonomy and others.

- The infrastructure of the scientific collections was substantially improved – Herbarium (SO) of Sofia University and the herbarium (SOA) of the Agricultural University – Plovdiv and the zoological collections in NMNH, IBER – BAS;
 - Two field stations for the study of forest ecosystems were further developed;
 - Thirteen fellowships abroad mostly for young scientists were provided for building and maintaining a collection of samples of biodiversity, but also in the field of molecular methods in taxonomy and phylogeny;
 - Trainings in the field of molecular methods in biodiversity stides were organized.
5. The project ‘*Enhancing Research Potential by Strengthening a Local Network of Laboratories for Studying of Wetland Ecosystems, Their Functioning, Restoration and Management – WETLANET*’ (2009–2012) was implemented. The main results achieved during the three years of the project are:
- 23 short-term (1 month), 13 mid-term (3 months) and one long-term (6 months) fellowships for young scientists in international research centers were organized;
 - 25 short-term and two mid-term visits to IBER – BAS of foreign scientists and experts were ogranized;
 - The scientific and IT equipment of IBER – BAS and field stations were updated;
 - One international conference and 4 international workshops were organized;
 - six training courses on various subjects with a total of 146 participants were organized;
 - 24 scientists participated in 17 international scientific and educational events.
6. As a result of the implementation of research projects during the reporting period a number of books have been published, e.g. *Atlas of Gobies (Gobiidae) in Bulgaria*, *Atlas of Aquatic and Wetland Plants in Bulgaria*, *Ecosystems of Srebarna Lake*, *Mesta River: Biological Indicators for Quality and Environmental Conditions*, etc.



Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

For the period 2009–2013, Bulgaria implemented policies to increase financial flows and co-financing for projects pertaining to the conservation and sustainable use of biological diversity. The main financial mechanisms used are OPs, Life+ Programme of the EU, 7th Framework Programme of the EU, the Norwegian Programme, UNDP, FM EEA, Scientific Research Fund, Environmental Protection Fund, etc.

Bulgaria voted in 2010 in Nagoya a Strategy for resource mobilization. The country reported twice about the progress in its implementation, for the periods 2010–2011 and 2012–2013.

The following **financial resources** are reported now:

- The **state budget** (includes information from primary and secondary authorizing officer, who responded to the questionnaire):

Period of reporting	2010–2011	2012–2013	Total:
Amount in Euro	18 972 602*	51 683 912	70 656 514

*Although there is a constant tendency to increase financial flows from the state budget, in this case the significant difference between the values derives from the different methodology for collection of data. For the period 2010–2011 are reported only the expenses directly related to the activities for conservation and sustainable use of biodiversity costs, while the amount for 2012–2013 reflects also costs associated with activities indirectly contributing to conservation and sustainable use of biodiversity.

- NGOs and private donors have reported 538 395 Euro spent for the period 2012–2013.

Although Bulgaria is not a member of the **Organisation for Economic Co-operation and Development (OECD)**, the country financially supports the development of countries external to the EU. For the period 2010–2011 ca. 40 000 Euro were provided, while for the period 2012–2013 – 20 000 Euro in total.

9. Main weaknesses and challenges

Bulgaria has a well developed legal framework for the implementation of the objectives of the Strategic Plan for Biodiversity 2011–2020. The necessary laws relating to the conservation and use of biodiversity in the country have been adopted – Environment Protection Act, Biological Diversity Act, Protected Areas Act, Medicinal Plants Act, Genetically Modified Organisms Act, Forestry Act, Law on Hunting and Game Protection, Law on Fisheries and Aquaculture, Law on the Protection of New Plant Varieties and Animal Breeds and others. These laws are harmonized with the EU legislation. A large number of secondary legal regulations have been elaborated. The proposals have been summarized and changes in the legislation related to the Nagoya Protocol are envisaged.

A large number of national strategies, programs and action plans have been elaborated that are relevant to biodiversity. The National Biodiversity Conservation Strategy and the related National Biodiversity Conservation Plan 2005–2010 need to be updated according to the Aichi Targets.

Many of the objectives, measures and actions related to biodiversity are integrated in different sectors – forestry, water, agriculture, fisheries and aquaculture, etc., e.g.:

- National Strategy for Environment and Action Plan 2009–2018;
- National Strategic Plan for Agricultural and Rural Development and Rural Development Program 2007–2013;
- National Strategy for Sustainable Development of Forestry Sector 2006–2015;
- Strategic Plan for the Development of the Forestry Sector 2007–2011;
- Management Plans for River Basins in Bulgaria 2010–2015;
- National Program for Fishery and Aquaculture 2007–2013;
- National Strategic Plan for Fishery and Aquaculture 2007–2013;
- National Program for the Sustainable Development of Fish Resources 2008–2013;
- National Program for Waste Management 2009–2013.

The following new documents have been elaborated and their implementation will start in a very short term:

- National Strategy for Sustainable Development of Agriculture in Bulgaria in the period 2014–2020;
- National Strategy for the Development of the Forestry Sector in R. Bulgaria 2013–2020;
- Program of Measures for Adaptation of Forests in Bulgaria and Reduction of the Negative Impact of Climate Change (2011);
- Strategy for the Development of Hunting in Bulgaria 2012–2027;
- National Strategy for Development and Management of Water Sector (2012);
- The Third National Action Plan on Climate Change 2013–2020;

- National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022;

In a process of elaboration are:

- Management Plans for River Basins in Bulgaria 2016–2021;
- Flood Risk Management Plans for the river basins;
- Marine Strategy of Bulgaria;
- National Strategy for Adaptation to Climate Change.

Activities related to biodiversity are **financially supported** mainly by the operational programs of the EU. Main measures have been implemented within three operational programs: OP ‘Environment 2007–2013’, Rural Development Program and OP ‘Fisheries’. Additional measures are supported by OP ‘Regional Development’ and OP ‘Transport’.

The national funding for the reporting period is very limited, due largely to the global economic crisis. Due to shortage of funds, OP ‘Environment’ funded mainly activities related to the designation of Natura 2000 network in Bulgaria. The national capacity is significantly improved in terms of human resources and skills (e.g. through structural and organizational changes in the Ministry of Environment and Water and its regional structures, municipal authorities, scientific organizations). However, substantial efforts are still required in this direction, mostly associated with the qualification of experts and the improvement of the organization of work.

The main weaknesses and challenges in order to achieve the global, European and regional targets related to biodiversity are:

- A large number of national strategic and program documents on biodiversity have been elaborated. Further coordination is needed to improve the performance of the related activities. It is necessary to update the **National Biodiversity Conservation Strategy and the National Biodiversity Conservation Plan**, to prioritize and coordinate all projects and activities at the national level, and create opportunities to increase the efficiency of the investments;
- In some cases, there are **inconsistencies between the existing regulations**. For instance in the water sector there is a wide sectoral distribution of functions and responsibilities between ministries and municipalities (especially in the management of the various infrastructure systems in the entire water sector) and the companies – water operators. Hence, the existing coordination and synergy do not ensure integrated management of the sector. Seven ministries, municipalities and water operators are competent in the field, which sometimes leads to a blurring of responsibilities between organizations. In practice, the water management linked to specific water body is regulated by law, but is not fully guaranteed by the establishment of appropriate mechanisms for cooperation between the basin councils, basin directorates and ministries with functions of water management in various aspects. The division of responsibilities between key ministries has led to the establishment of separate subsystems of the regulations for each industry law, but the legislation has not provided the unified mechanisms that effectively will ensure synergy in the water sector;
- There is no effective control over the introduction and distribution of invasive alien species. Therefore it is necessary to develop and implement a **National Strategy and Action Plan for Invasive Alien Species**. This will support the implementation of the global and European standards and regulations to prevent and control the introduction and spread of these species, including the achievement of the Aichi Target 9;
- **The shortage of funds**, including the global financial crisis, has led to the termination or failure of some national program documents, e.g. the National Programme for

Fisheries and Aquaculture 2007–2013 is barely operating and the National Program for the Sustainable Development of Fish Resources 2008–2013 had been implemented only until 2010. The financial constraints have caused a **shortages of qualified experts** in various sectors;

- It is necessary to **expand the circle of beneficiaries** of the program Operational Programme ‘Environment’, e.g. by including research organizations, **educational campaigns** to improve the capacity of municipalities to implement projects in the field of biodiversity and **simplification of the assessment procedures** for applications and payments;
- More and better developed **mechanisms for financial support** of producers to implement nature-friendly production practices and support to compensate private land owners for lost profits;
- A more efficient use of the existing international programs and initiatives, e.g. **Man and the Biosphere (MAB) Program of UNESCO** to develop and demonstrate successful models of harmonious coexistence of man and nature based on wise use and conservation of biological diversity and the equitable sharing of benefits. It is necessary to **revise the national network of biosphere reserves**, to stimulate local economic and social development and participation of local communities in the sustainable use and conservation of biodiversity;
- It is **expected that the remuneration of highly qualified experts** both in the government departments and scientific organizations **will increase**.

Perspectives and challenges for Bulgaria specifically related to some of the Aichi Targets:

The main challenge in the implementation of **Target 5** is the accomplishment of the large number of investment plans in the Management Plans for River Basins (MPRBs) in Bulgaria – restoration of habitats associated with aquatic ecosystems and imposing strict control on the compliance with the prohibitions and restrictions introduced by the Water Act and the MPRBs. It is necessary to regulate the standards for design and construction of fish passages and the definition of the water levels of the rivers ecological minimum. It is necessary to run some measures such as afforestation, improvement of hydrological regime and reducing eutrophication in wetlands; technical and environmental measures for effective artificial barriers to fish migration, construction of fish passages; restoration of river basins affected by aggregate extraction and others.

To achieve **Target 6** and to successfully implement OP ‘Fisheries 2007–2013’ it is concluded that to improve the competitiveness of the Fisheries sector and to achieve the objectives of environmental protection and efficient use of resources, it is necessary to extend some of the measures in accordance with the EU Regulations in the future. Measures are also needed to support the following areas: innovation (fisheries, aquaculture), consultancy services, partnerships between scientists and fishermen, promotion of human capital and social dialogue, diversification of jobs, innovation related to the conservation of marine biological resources, limitation of the impact of fishing on the marine environment and adaption of fishing to species conservation, aquaculture providing environmental services, etc.

To achieve **Target 7 in Forestry** it is necessary to improve the protection of forests and wildlife by introducing new methods of control. Insufficient contribution of science in the development of the forest sector is registered. The reason is the low funding for research and development, innovation and practical results. Research in the sector is mainly funded by the state. The relationship between science and forestry business, innovation and technology transfer in the forestry sector are poorly developed. The need of direct cooperation between research organizations and enterprises and increasing the share of private funding emerge as

major issues. In terms of **livestock breeding** the following challenges can be recognized: breeding associations cannot assume responsibility for selection and reproduction in certain sectors and this may terminate the breeding of certain breeds. There is a lack of stimuli for the farmers to conduct breeding activities. There is a reduction of the scope of artificial insemination, which compromise the implementation of the set targets. Uncontrolled export and extinction of endangered breeds is observed, that causes the reduction in the genetic diversity. A focus on local and economically valuable species is needed in aquaculture, which requires further awareness and training of employees in aquaculture production.

Very important is the **integration of biodiversity into sectoral policies**. Assignment of duties and responsibilities by economic sectors must reduce threats, increase the impact of efforts to protect nature and ultimately to bring real results for restoration and maintenance of ecosystems, ensuring their stability and increase their role for the welfare of people.

To achieve **Target 8**, especially in the water sector it is necessary to identify the cases of poor or very poor ecological status of biodiversity, and to provide measures in the next MPRBs. In order to increase biodiversity it is needed to stimulate green technologies, e.g. constructed wetlands.

To achieve **Target 9** is required the development of a **National Strategy and Action Plan for Invasive Alien Species** with the necessary measures for prevention, early detection and rapid eradication of new invasions, as well as control measures for the already established invasive species.

To achieve **Target 11** measures for sustainable and effective management of protected areas are needed. One of the most important achievements of Bulgaria is the designation of the network of protected areas and the ecological network Natura 2000. These areas include some of the most significant spots of Bulgarian nature – ecosystems, species habitats, landscapes and natural objects with which our country is proud and with which Bulgaria contributes to the protecting of the natural heritage of Europe and of the world. Management plans for national and nature parks, reserves and managed reserves that are currently in force and those that will be developed and adopted within the OPE projects by the end of 2015, will provide coverage and protection of biodiversity on an area of 488 389.5 ha, which accounts for approximately 95% of the total area of protected areas in Bulgaria .

To achieve **Target 12** efforts in the following areas are needed: updating of the assessment of the conservation significance of the major taxonomic groups (including species that have not been assessed so far); development and complete implementation of the Action Plans for critically endangered species; announcement of small protected areas for critically endangered species (especially plants) in areas with strong anthropogenic pressure; regular monitoring of the species in the national biodiversity monitoring system and taking immediate action if necessary; implementation of activities for *ex situ* and *in situ* conservation of species of high conservation value.

Mapping and assessment of ecosystem types in the country is needed to achieve **Target 14**.

To achieve **Target 15** concrete measures and actions are needed to be included in the updated National Biodiversity Conservation Strategy and National Biodiversity Conservation Plan in order to **enhance the role of biodiversity in the accumulation of carbon stocks and minimize the impacts of climate change** and for combating desertification. A national plan for participation of Bulgaria in the European trading scheme for greenhouse gas emissions is needed, national scheme for international trade in greenhouse gas emissions, and to build administrative unit responsible for the climate change policy.

To achieve **Target 19** and in order to fill the gaps in the knowledge and efficiency of research as a basis for national policies and activities in the field of biodiversity the following measures are needed:

- To add a *priority axis 'Biodiversity, Bioresources and Ecosystem Research'* in the National Strategy of Scientific Research to 2020, and respectively, as a priority of the Scientific Research Fund;
- Bulgaria to join the the *Global Biodiversity Information Facility (GBIF)*. This will be a continuation of Bulgaria's participation as an observer in GBIF for 10 years. To provide an annual subsidy (30 000–50 000 BGN) for filling-in information about biodiversity from Bulgaria;
- *Development of the research capacity in the field of biodiversity and ecology*. A significant improvement of the equipment and capacity of experts was achieved in the period of 2009–2013 in the framework of several projects for the development of research infrastructure. However, this is only the first step in this direction. Further upgrading of facilities and training of experts in all areas related to biodiversity is expected with funding from the OP 'Education and Science for Smart Growth 2013–2020);
- *Development of a system for Long-Term Ecological Research – LTER – Bulgaria*. Funding is required in order to avoid interruption of data collection. Priority funding is needed for the LTER-points in Bulgaria where standardized data have been collected for decades, e.g. Bay of Burgas /Sozopol, Srebarna Lake, Mesta river and others;
- *Development of a National Information Infrastructure on Biodiversity*. In order to improve the information basis for research and practical activities, it is needed to further develop the existing database with new electronic databases for: species diversity of Bulgaria, the natural habitats of Bulgaria and creation of a Bulgarian Biodiversity Heritage Library. Targeted funding is needed for the preparation and printing of *major works on Bulgarian biodiversity*, e.g. '*Fauna of Bulgaria*', '*Catalogues of the Bulgarian fauna*', '*Flora of the Republic of Bulgaria*', '*Fungi in Bulgaria*', etc.;
- Financing of the Bulgarian scientific periodicals in the field of biodiversity – journals *Acta Zoologica Bulgarica*, *Phytologia Balcanica*, etc.;
- *Opportunities for additional funding for small research projects* of young scientists, Ph.D. students, post-doctoral and graduate students focusing on the biodiversity of Bulgaria. This action would ensure sustainability and increase in the research capacity.

To achieve **Target 20** is necessary to overcome the limitations that are imposed by different financial mechanisms. For instance, to reduce the administrative burden and simplify the implementation of projects funded by the Operational Programmes: improvement of the management, control, internal rules and documents for the management of the operational programs; improvement of the administrative capacity to implement the programs, improvement of the capacity of beneficiaries for the implementation of the funded projects. Similar are the needs regarding the cross-border programs (Romania – Bulgaria, Greece – Bulgaria, Bulgaria – Serbia, Bulgaria – Turkey and Bulgaria – FYR Macedonia). A major difficulty in the preparation and implementation of projects under the Life+ Program of the EU is the need of co-funding provided by the beneficiaries. A possible step to increase the use of this funding opportunity is to simplify the requirements for co-funding and to ensure technical assistance in the preparation of the proposals for the local governments. In terms of support measures under the Norwegian Programme, UNDP, FM EEA, Scientific Research Fund, Environmental Protection Fund and others there is a need to strengthen the capacity of beneficiaries for project implementation through training and technical support, as well as improving the monitoring and control of the implementation of the various programs.

10. Progress in the implementation of the 2015 targets of the Millennium Development Goals

Bulgaria has signed the **United Nations Millennium Declaration**, according to which all Member States of the United Nations have pledged by 2015 to make global efforts to reduce poverty, respect human rights, promote peace, strengthen democracy, and ensure environmental sustainability. A report on the achievements of the **goals of the Millennium Declarations (2009–2013)** is under preparation by the Ministry of Foreign Affairs of Bulgaria. The country performs as a new donor of aids for development and offers its rich experience gained during the transition period to a market economy and democracy. Bulgaria will contribute more actively to the achievement of the global development agenda.

Today Bulgaria has reasons for optimism for its efforts to achieve the Millennium Development Goals. The upcoming report reviews the progress of Bulgaria as an EU member state towards achieving the objectives of the Millennium Declaration and redefines some of the Bulgarian objectives and indicators.

The measures and actions taken to implement the Convention on Biological Diversity have contributed to the implementation of **Goal 7 of the Millennium Development, i.e. to ensure environmental sustainability**. Bulgaria is among the countries in Europe which have the greatest biodiversity and well preserved natural habitats. Information is presented in detail in Part I of the present report. Adaptation and preparation at national level have been observed in order to meet the target *Halting the loss of biodiversity by 2010* and to implement the Aichi Targets from the Strategic Plan for Biodiversity 2011–2020. The greatest progress is reported in the expansion of the National Ecological Network (information is available in the report to Aichi Target 11, Part III of this report) performed by an increase in the number and area of protected areas and the development of the European ecological network Natura 2000 (Table 16 & 17; Figs. 27, 29 & 30).

An indicator that shows the percentage of renewable energy sources in the national energetics has been developed in order to adequately monitor and evaluate the integration of the principles of sustainable development into national policies and programs. One of the major opportunities for significantly increasing the share of electricity produced from renewable sources without reduction in the domestic consumption in the coming years is the large-scale use of biomass in all its forms and varieties. Bulgaria's policy in the field of climate change is based on two main aspects – on the one hand these are the international commitments of the country deriving from the ratification of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, and on the other – the European legislation in this area (package 'Climate and Energy'). Figure 33 presents the total emissions by sector for 1988–2011, in Gg CO₂-eq. The quantities of absorbed CO₂ from the forests, which leads to a reduction in emissions, are also included.

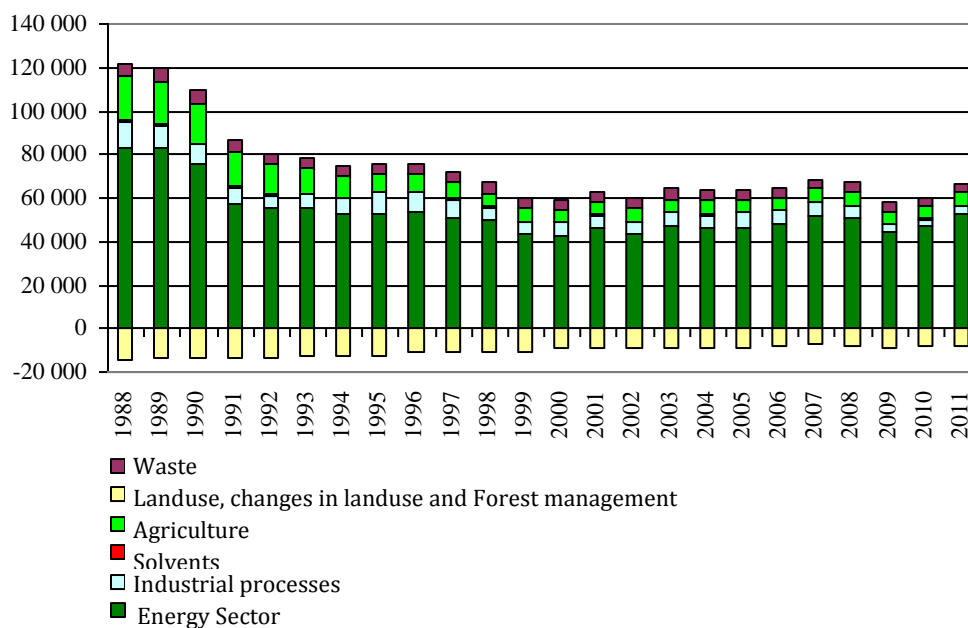


Fig. 33. Total greenhouse gas emissions by sectors (1988–2011), Gg CO₂-eq. (Source: EEA, National report on the inventory of the emissions of greenhouse gases for 2011).

The lowest values for the GHG emissions for the entire period were registered in 2009 and they were below 60 000 Gg CO₂-eq. (57 803.99 Gg CO₂-eq.). The analysis shows that the industrial sector ‘Energy’ has the largest share of total GHG emissions in 2011 – 78.9%. Second is agriculture – 9.3% and third is the sector ‘Industrial Processes’ by 6.0%.

The greenhouse gases per capita is the main indicator for assessing the greenhouse gas emissions internationally (Fig. 34).

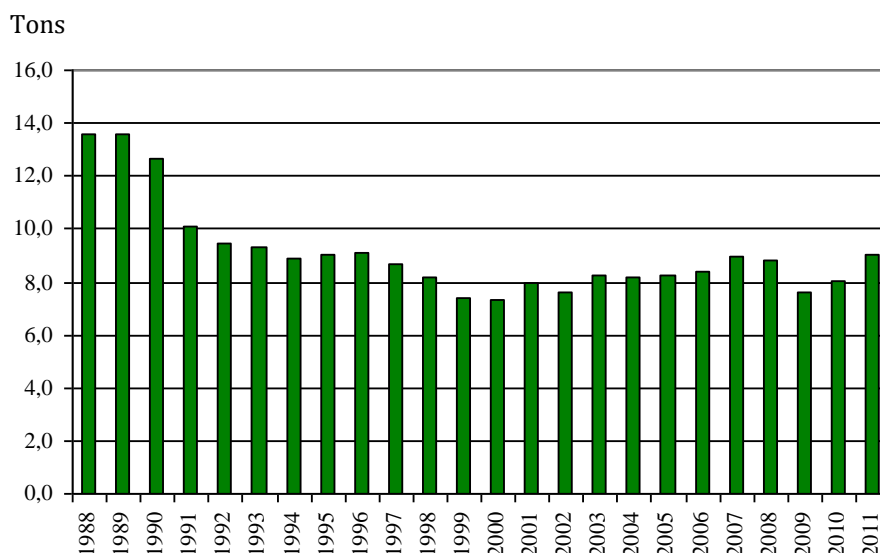


Fig. 34. Annual emissions of greenhouse gases per capita, tons CO₂ - eq. (Source: EEA).

Greenhouse gas emissions per capita decreased from 13.6 t CO₂-eq. in 1988 to 9 tons of CO₂-eq. in 2011. The lowest levels were in 2000 – 7.3 t CO₂-eq. According to this indicator Bulgaria is close to the average for the European Union (EU) – 9.4 t CO₂-eq.

Greenhouse gas emissions are closely linked to economic growth, as with the increase of the economic activity increases the consumption of energy and natural resources. The

reduction of this ration is a sign of sustainable development, hence the annual greenhouse gas emissions per unit of gross domestic product (GDP) is an important indicator.

The analysis of the data from the national inventories until 2011 compared to the Kyoto target shows that greenhouse gas emissions are significantly lower compared to the base year 1988 and now Bulgaria has the reserve that ensures the implementation of the commitments to the Kyoto Protocol.

Bulgaria has successfully made the transition from an economy in transition (according to the Montreal Protocol on *Substances that Deplete the Ozone Layer*), towards an advanced country strictly fulfilling its obligations under the accelerated program for phasing out the use of ozone-depleting substances.

The indicators that characterize the reduction of the proportion of people *without access to safe drinking water and proper sanitation* have been re-defined.

Bulgaria is among the most developed countries in the world in providing the population with a sufficient amount of water, moreover, water with good quality – 98.9% of Bulgarians are connected to a central water supply system. For comparison, in neighboring Romania, this indicator is only 54%. The number of people with water supply regime is being reduced – from 22% in 2000 to 1% in 2010. Only in 2011 there was an increase to 3% due to shortage of water.

However, the water loss from the national sewage system is very high – over 60%. The reason for this is the high degree of depreciation of infrastructure for water supply.

For the period 2000–2011 the average annual fresh water consumption used to be 6.3 billion m³ (Fig. 35). In 2011, the quantities (6.4 billion m³) are above the average for the period, mainly due to the increased demand for water for irrigation and energy. Cooling water in the energy sector constitutes between 53–67% of the overall abstraction or an annual average rate – about 60%. However, the quantity is preserved since after its use the water usually returns back into the water source. Sustainable downward trend is registered in the manufacturing and mining industries.

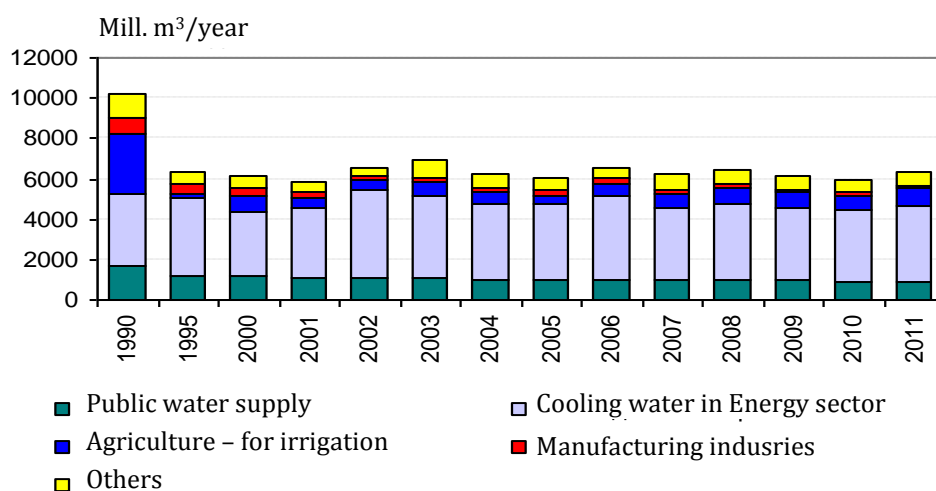


Fig. 35. Water consumption per economic sector in Bulgaria, mill. m³/year (*Source: MOEW*).

Public water supply has a relatively small share of abstraction (average 16% of the fresh water abstractions, 2000–2011), but focuses the attention as it provides drinking water to 99% of the population. For the period 2000–2011, the water abstracted for drinking gradually decreased and in 2011 reached its lowest level (917 million m³) or about 22% less than in 2000.

Groundwater supplies an average of 48% of the necessary resources. Relatively slow rates are in progress in the construction of water treatment plants for waste water (Fig. 36). percentage

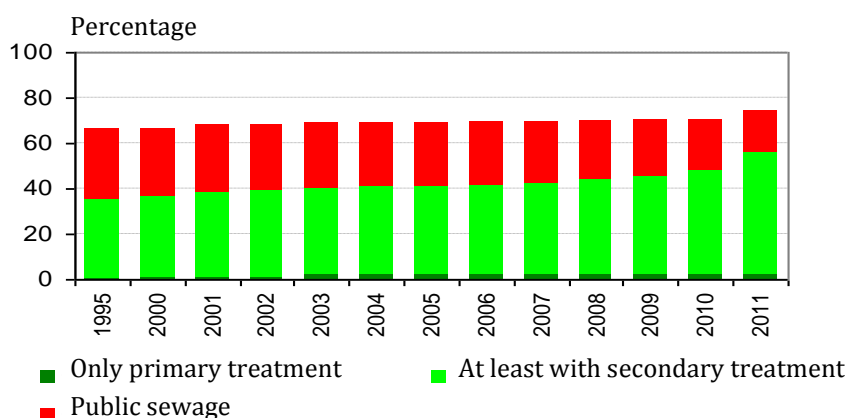


Fig. 36. Percentage of the population linked to public sewage system (*Source: MOEW*).

Despite the progress in recent years, Bulgaria is among the countries with a relatively low share of population connected to public sewage system. Renovation of sewage and construction of modern sewage treatment plants require high investments and time needed to build the facilities. For the period 2005–2011, the investment and running costs for collection and treatment of wastewater are 2057 million BGN or total for the period – 271 BGN per capita.

There have been serious intra-regional disparities related to access to quality services that ensure transport and treatment of household wastewater safe for the environment and human health. Approximately 70.5% of the towns and cities have sewerage, while in villages this percentage is only 2.1%.

The most significant internal contrasts are observed in the indicators related to the construction of environmental infrastructure. In cities organized collection covers almost 100% of the population, while in rural areas it is below 40%.

The achievement of Goal 7 is a challenge especially for the good governance. The environment is an arena for some of the most violent clashes between NGOs and business. Therefore, policies affecting the environment are vulnerable to corruption, both at local and central level.

In conclusion, approaching the economic, educational and health standards of the EU, Bulgarian citizens and European institutions will increasingly insist on better governance.

Bulgarian MDGs are largely intertwined. In the strongly competitive environment of the European Union, high incomes are impossible without quality and competitive education. Economic progress needs good health. An important prerequisite is the workforce to be productive and available in the long-term. Also, higher incomes and employment, higher access to education, lower infant and maternal mortality, more care for socially sensitive diseases, more environmentally responsible society are needed.

Bulgaria considers the rational and responsible use of the resources as an instrument not only for the improvement and protection of the environment but also for the accomplishment of sustainable economic growth, for the improvement of the competitiveness of the Bulgarian economy. In this context Bulgaria is working toward the integration of the different environmental issues incl. the biodiversity policies in the sectoral policies. This approach will enable us to find the correct strategy to deal with the present biodiversity

conservation challenges, with consideration to the impact of the restoration of the natural habitats and ecosystems on the eradication of the poverty and also of the three pillars of the sustainable development namely the ecological, economic and social development.

However, behind the overall national achievements, there are dramatic differences. In all public areas – income, education and health – there are significant contrasts. They jeopardize the sustainability of growth because they create internal conflict on the socio-economic, regional or ethnic grounds. In addition, Bulgaria is part of the global community and global poverty is not something that Bulgarian citizens can ignore.

Bulgaria's achievements towards the Millennium Development Goals, as well as the shortcomings or slow pace in the implementation of certain decisions continue with the identification of policies and measures that can accelerate the progress of the country and draw it closer to the targets set for 2015 and beyond.

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Date of submission	June 2014

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Institutions and organizations

Ministry of Environment and Water (MOEW); <http://www.moew.government.bg>

Ministry of Foreign Affairs (MFA); <http://www.mfa.bg>

Ministry of Health (MH); <http://www.mh.government.bg>

Ministry of Investment Planning (MIP); <http://www.mip.government.bg>

Ministry of Defense of Republic of Bulgaria (MD); <http://www.md.government.bg>

Ministry of Regional Development; <http://www.mrrb.government.bg>

Bulgarian Food Safety Agency (BFSA); <http://www.babh.government.bg>

Executive Environment Agency (ExEA); <http://eea.government.bg>

Executive Forest Agency, Ministry of Agriculture and Foods (EFA-MAF); <http://www.iag.bg>

Executive Agency for Selection and Reproduction in Animal Breeding; <http://www.iasrj.eu>

Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (IBER-BAS); <http://www.iber.bas.bg>

Institute of Oceanology, BAS; <http://www.io-bas.bg>

Institute of Fish Resources – Varna, Agricultural Academy; http://www.ifrvarna.com/site/?page_id=307

Institute of Plant Genetic Resources "K. Malkov"; <http://www.ipgrbg.com>

Sofia University "St. Kliment Ohridski", Biological Faculty; <https://www.uni-sofia.bg>

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Annex 2: Additional sources of information

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Constitution of the Republic of Bulgaria (1991)

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Protected Areas Act (1998)

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Organizations

Governmental organization

The Central Balkan National Park; <http://visitcentralbalkan.net>

The Rila National Park; <http://rilanationalpark.bg>

The Pirin National Park; <http://pirin.bg>

Parks in Bulgaria; <http://www.bg-parks.net>

NGOs

Bulgarian Society for Protection of Birds (BSPB); <http://bspb.org/>

Birds of Prey Protection Society (BPPS); <http://www.bpps.org>

Fund for Wild Flora and Fauna; <http://www.fwff.org>

Green Balkans: Federation of Nature Conservation NGOs; <http://www.greenbalkans.org>

Balkani Wildlife Society; <http://www.balkani.org>

Bulgarian Brown Bear Research and Conservation Website; <http://www.bearbg.com>

WWF Bulgaria Danube-Carpathian Programme; <http://www.wwf.bg>

Bulgarian Biodiversity Foundation; <http://www.bbf.biodiversity.bg>

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Project “Implementation of Measures in the National Sturgeon Action Plan in Order to Improve the Status and Conservation of Sturgeons in Bulgaria” OPE 2007-2013; http://www.wwf.bg/what_we_do/rivers/sturgeons

Project “Field studies on species distribution/ assessment of the status of species and habitats on the territory of Bulgaria – I phase” OPE 2007-2013; <http://eea.government.bg>

LIFE+ projects

LIFE+ project "Conservation and Restoration of 11 Natura 2000 Riparian and Wetland Habitats in 10 Sites in Bulgarian Forests"; http://www.wwf.bg/what_we_do/protected_areas/10parks

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LIFE+ project “Recovery of the Populations of Large European Vultures in Bulgaria” (LIFE08 NAT/BG/000278); <http://www.greenbalkans.org/birdsofprey/life/>

Project LIFE11 NAT/BG/363 LIFE for KRESNA GORGE: Conservation of Birds of Prey in Kresna Gorge, Bulgaria; <http://www.fwff.org/lifeforkresnagorge/>

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Project: “Linking Nature Protection and Sustainable Rural Development”, Swiss Agency for Development and Cooperation; http://www.swiss-contribution.admin.ch/bulgaria/en/Home/Projects/Project_Detail?projectinfoID=214077

Projects within the Bulgarian-Swiss Cooperation Programme; <http://www.swissbgcooperation.bg>

EU Framework Programmes

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Scientific networks and information systems

National Information System for the Monitoring of Biological Diversity (ExEA);

<http://eea.government.bg/en/bio/nsnbr>

Information System for Natura 2000 Protected Areas; <http://natura2000.moew.government.bg>

Bulgarian Biodiversity Portal; <http://chm.moew.government.bg>

European Information System on Forest Genetic Resources (EUFGIS); <http://www.eufgis.org>

East and South European Network on Invasive Alien Species (ESENIAS);

<http://www.esenias.org>

Danube Sturgeon Task Force (DSTF); <http://www.dstf.eu>

Slow Food Organization; <http://www.slowfood.com>

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