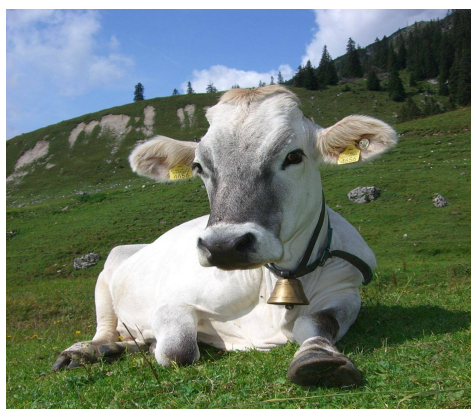




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STATE OF KNOWLEDGE OF BIODIVERSITY FOR FOOD AND AGRICULTURE

BULGARIA



REPORT - 2016

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I. ASSESSMENT AND MONITORING OF BIODIVERSITY FOR FOOD AND AGRICULTURE

1.1 General context¹

a) The role of biodiversity for food and agriculture in Bulgaria

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.

b) The list of production systems found in Bulgaria (area under production, share of smallholders, importance of the production system to the incomes, livelihoods and well-being of rural communities, etc.)

¹ Reference: questions 2, 3, 4, 5, 6 and 7 of country report guidelines.

Table 1. Production systems present in the country.

Production system	Indicate if present in the country (Y/N)	Description ¹³
Livestock grassland-based systems	Y	It is observed in small municipalities and mountain regions, where pastures belong to the municipality and the animals could freely move themselves there. In this system it is mainly grown herds (goats and sheep) that include from 10-15 or several hundred pieces. Swine, horses and cattle are also grown up there but their number is definitely smaller. Typically for Bulgaria is that the animals in this system are grown on pastures form 6 to 8 months and for the rest of the months they are indoors and with additional feeding.
Livestock landless systems	Y	This system is also advocated in Bulgaria and in our conditions it affords effective usage of resources: the transition from partial or full mechanization of all processes connected with bird and cattle breeding.
Naturally regenerated forests	Y	For the areas in this system in the reports there are no full data. It is reported that here in the areas to this system are included about 1.89 % lands that in the recent years were farmlands.
Planted forests	Y	In the period 1965- 2008 year the total forest area is enlarged from 3.612 million ha to 4.114 million ha and that is to 37.06 % from the territory of the country. After 1989 y the settlements in the country strongly decrease and reach 4-7 thousands ha per year for the plan of 12 thousand ha yearly. This decrease is definitely due to the reduced investments for settlements and giving the advantage for natural regeneration. The possibilities of the settled forest area in the future is evaluated about 300 000 ha. It is considered that there is about 100 000 ha forest areas suitable for initial settlement.
Self-recruiting capture fisheries		
Culture-based fisheries	Y	Recently in The Black Sea area there is an interest for mussels farm building (about 22pcs) for accelerated breeding of black Black sea mussel (<i>Mytilusgalloprovincialis</i>). Besides it was registered and a sea farm for brown Black sea mussels and alga breeding

Fed aquaculture	Y	In Bulgaria there are grown trout, carp, grass carp and catfish. At home this system of breeding is practiced in closed recycled systems for invasion of invasive types of fish. Also in the multiple water basins leased (concession) and in open water basins it is also done breeding of fish. Recently it is observed a high interest on the farmers and on the breeding of sturgeons. In the end of 2012 the general piece of active fish breeding farms in fresh waters in our country reaches 350 and continues to increase.
Non-fed aquaculture	Y	Fishing and mussel catch in The Black Sea. Slightly developed is the shrimps' catch. In the year of 2015 to 31.05 concerning the data of NAFA the general commercial fishing and other aquatic organisms (shells, mussels and shrimps) in The Black Sea is in the amount of 2, 635,8 tones and is about 7% less than the previous year.
Irrigated crops (rice)	Y	This culture is grown up only in the central south Bulgaria on restricted areas with altitude to 200 m. In the country the yearly yield of rice as a watered crop on the area of 10 500- 10 600 ha.
Irrigated crops (other)	Y	All moisture loving cultures: vegetables, potatoes, maize, peanuts, some vineyards areas, fruits and other plantations. The total watering area for the country is 541 800 ha
Rainfed crops	Y	This system is with the biggest part of the agricultural production in the country. It includes all grain cultures, some technical and some oilseeds. Here could be added and some parts of the perennial plantations (vines, raspberries, nuts cultures, etc.).
Mixed systems (livestock, crop, forest and/or aquatic and fisheries)		Such category exists but is difficult to find precise information that is summarizing for the whole country.

1.2. State, trends and drivers of change of biodiversity for food and agriculture

a) The main features of the state and trends of and the main drivers of change affecting plant, animal, forest and aquatic genetic resources in the country's production systems as identified in Table 1.

Livestock

1. Production deliverables in livestock breeding

In 2013, the state policy in the field of livestock breeding is directed toward establishing conditions for sustainable development of the sector, through differentiation of consolidated, economically efficient holdings, and at the same time, preservation of small and medium-sized farms. During the year, update has been made to the effective statutory base in the field of livestock breeding. The scope of the applied state support has been extended, with the purpose of providing an easier

access to financing and increasing the efficiency of the livestock holdings. In general, in 2013, stabilization of the sector is observed that the consistently applied support policy has contributed to. As of the end of 2013, the number of livestock holdings in the country has increased by 12% compared to a year earlier, up to 171.8 thousands. The most significant increase is reported for pig holdings – a total of 91.6%, mainly due to increase in the number of holdings with 1 – 2 pigs. The increase of the number of holdings with the holdings with cattle, buffalo and goats is expressed in a less pronounced manner – an increase between 2.2 and 6.6%. Only holdings raising sheep have decreased, by 2.3%. The number of most of the types of agricultural animals has also increased compared to the previous year. The highest increase is marked by the number of pigs in total – by 10.4%, cattle, with a total of 9.4%, and buffalo with a total of 8.2%. An insignificant increase has been registered with the number of sheep in total – by 0.6%, and the number of ewes increased more significantly – by 6.2%. The total number of goats has decreased by 1.5% compared to 2012, but at the same time, breeding goats have increased by 3.6%. As of the end of 2013, the total number of birds marks a decrease by 13.4% compared to the previous year, mostly due to the significant decrease of chickens bred for meat by 32.3%, while the number of hens and growing young egg-hens has increased by 4%. In 2013, the process of merger of companies continues, which is a prerequisite for achieving higher efficiency and economic stability. Compared to the previous year, the most significant increase of the average number of animals per holding is reported for the holdings, raising female buffalo – by 33.2%. The average number of animals in the holdings with breeding ewes is increasing more gradually – by 10.7% and holdings with cows – by 5%. At the same time, the average number of animals in the holdings with pigs in total decreases by 42.3% (up to 9.8 animals), which is explained with re cultivation of the holdings with 1 or 2 pigs, as during the previous year, a significant decrease has been reported for them, mostly under the influence of high prices of feed. Despite all this, the pig breeding shall remain a sector with high concentration, and 75.4% of pigs are raised in holdings with 1 000 or more animals.

During the year, specialization in the meat yield strand of livestock breeding is extended. Meat yielding cows have increased by 39% compared to the previous 2012, and breeding ewes for meat – by 4.3%.

In 2013, a total of 1 267 602 thousand liters of milk have been produced in the country, 5.2% more compared to the previous year. An increase for the yield of all types of milk is observed, and it is most significant for the sheep's milk and buffalo milk – by 8% each. The production of cow's milk has increased by 5.1% and the production of goat's milk – by 2%. The highest relative share of the total yield of milk remains cow's milk with 88%, followed by sheep's milk – 7.2%, goat's milk – 4.2%, and buffalo milk – 0.7%. The leading region in the yield of milk is the South Central Region, forming 28% of the full volume of production. South Eastern region follows with 17.9%, and the share of the remaining planning areas is between 12% and 15%. The total production of meat in the country in 2013 has decreased by 6.9% in comparison to the previous year, up to 203 475 tons, incl.: 105 088 tons – red meats, and 98 387 tons – white meats (only poultry). In the production of bee honey, an increase of 9.6% has been reported, compared to the previous year and up to 10 065 tons. The number of eggs produced in 2013 has increased, albeit slightly (by 1.7%), reaching 1 194 623 thousands.

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.

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 coppered 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.

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.

Fish resources

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. 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.

The largest shares in the catches in the Black Sea 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*, *Raja clavata* and *Gobiidae*. The average annual catch for the period 2009–2012 was 8 347.4 t, which constitutes 86% of the total catch in the country.

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*.

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.

There is over 3-fold reduction in the catches compared to previous years (2005–2006). 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* 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*.

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).

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. 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. 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%.

The largest quantities are produced from *Oncorhynchus mykiss*, *Cyprinus carpio*, and *Aristichthys nobilis* followed by *Ctenopharingodon idella*, *Hypophthalmichthys molitrix* and *Silurus glanis*. 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.

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. The sturgeon with the highest production in the sturgeon fish farms is *Acipenser gueldenstaedtii*. 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.

Crops

1. Grain production

In 2014, areas planted with cereals amount to 1 961 thousand ha, which is approximately 2% less compared to the previous year.

Under the influence of the relatively favorable agricultural climate conditions, significantly higher average yields are reported for 2014 compared to the previous year- the increase is 0.5% for wheat to 20% in maize grain.

The total production of cereals during the year amounted to 9530 thousand. tons, about 4% more than in 2013. Among the major cereals, production increases compared to 2013 was observed in maize grain, barley and triticale, and decrease - wheat, rye, oats and rice.

Wheat formed 56% of total grain production in 2014, and corn - 33 percent.

In 2014, wheat production totaled 5,347,078 tons - 2.9% below the level of 2013, resulting from a reduction in harvested area to 2%, while the average yield is reported a slight increase of 0, 5%.

Wheat

According to data from department "Agrostatistics" of MAF, in 2014, wheat production totaled 5,347,078 tons - 2.9% below the level of 2013, resulting from a reduction in harvested area to 2%, while the average yield is reported a slight increase of 0, 5%.

The area sown to wheat in 2014 amounted to 1,279,930 hectares - a decrease of 2.9% low, as they are harvested 1,267,914 ha (99.1%).

The share of areas planted with wheat during the year is the highest in the North Eastern region– 24.0% (301 194 ha). It is followed by the North Western region with 21.6% (274 290 ha), The Southeastern region with 20.5% (259 767 ha) and the Northern Central Region with 19.2% (243 620 ha).

Rye and triticale

The grain produced from rye from harvest `2014 decreased by 3.2% compared to the previous year to 28.2 thousand ton due to a reduction in harvested area to 6.6%, partially offset by an increase in average yield.

Triticale production in 2014 amounted to 60.4 thousand. Tons, marking a growth of 55.5%, due to a combination of a substantial increase in both harvested area (with 37.7%) and the average mining (13.1%).

Most harvested areas with rye and triticale in the year occur in Southeast region - respectively 3237 ha and 5594 ha.

Barley

The production of barley during the past year amounts to 852 thousand tons – 16.1% more compared to 2013, mainly as the result of the increased average yield by 7,6%. Areas planted with barley in 2014 increase by 8,7% to 217 178 ha. The highest amount of areas with barley in 2014 is in the South Eastern region – 35.3% of areas planted or 75 771 ha. The Northern central region is second, with a share of 20.1% (43 229 ha). In 2014, 67.7% of lands with barley have been planted following preceding crop wheat and barley, and 41.4% - after row crops. In the crop rotation with barley, 2.5% fallow lands have been included, and the share of other predecessors is 24.2%.

Oats

The production of oats marks an increase by 24.4% compared to 2013, which is due to the increased amount of areas planted and the average yield, respectively by 16.8 % and 9.6%. The most areas with oats have been harvested in the South Western region – 3 801 ha.

Maize for grain

As a result of the favorable agro-climate conditions in the country in 2014, a marked increase is observed in the production of maize – by 14.6%, and it amounts to 3 137 478 tons.

The areas under maize harvest 2014 are 420,470 hectares, which is 2.1% less compared to the previous year. The average yield is 7.68 t / ha or 20.2% higher compared to the harvest in 2013.

In 2014, the highest share is the share of lands with maize in the North Western region - 35.6% (145 444 ha), followed by the North Eastern region – with a relative share of 30.7% (124 421 ha) and North Central Region with 27,8% (112 529 ha).

Rice

In 2014, the production of paddy rice has decreased by 3.5% and has reached 54 155 tons, which has been caused by 10.8% lower average yield of 4.90 tons / ha.

The areas planted with rice in 2014 amount to 11 636 ha, an increase of 12.9% compared to 2013.

2. Oil seed crops

The main oil seed crops, grown in the country, are sunflower and winter oil-seed rapeseed. Lands sown with sunflower in 2014 are 849,476 hectares - 3.8% less than in 2013.

Sunflower

The production of sunflower in 2014 amounts to 2 010 668 tons – 1.8% more compared to 2013, as a result of higher average yield (6.2%). Areas planted with sunflower in 2014 amount to 849 476 ha - 3.8% less than the previous year. The highest share of lands planted with sunflower during the year is the North Western region with 24.0% (202 228 ha). It is followed by the North Eastern region – 23.0% (193 980 ha), and the Northern Central region – by 20.33% (171 571 ha). According to data of BSMAEC, in 2014 88.4% of lands with sunflower have been planted after wheat or barley as the preceding crops.

Rapeseed

In 2014, the yield of rapeseed amounts to 527 912 tons, which is an increase by 56.8% compared to 2013. The average yield is 2,78 tons/ha, an increase by 11.2% compared to the previous year. The areas planted with rapeseed in 2014 are 191 572 ha, and out of them, 190 194 ha have been harvested. The highest area of lands with rapeseed harvested in 2014 have been reported in the North Western region – 51 408 ha, followed by North Central Region – 45 078 ha, and the South Eastern region - 45 029 ha.

3. Industrial crops

Fiber plants

Cotton

In 2014 is reported about areas planted with cotton up to 315 ha. That is an increase about 30.2%. The average yield of cotton increased by 13.0 percent to 1.13 t / ha. As a result, the total production of cotton during the year amounted to 326 tons or 37.8% more than in 2013.

Within 2014 not accounted for flax and hemp in the country.

Tobacco

According to information from department "Agrostatistics" of MAF, in 2014, lands planted with tobacco are 17 572 ha, with reported 20 573 ha for the previous year. By harvested areas also reported a decrease of 15.2% compared to 2013. As a result, the production of tobacco decreased by 17.7% compared to 2013, to 29 996 tons.

4. Vegetables

During the agricultural year 2014, the areas utilized for production of vegetables in professional and small holdings are 33 870 ha, a 15.7% less compared to 2013. Out of them, 39 976 ha are outdoor areas, and 894 ha – greenhouse areas. The total production of vegetables - harvest `2014 amounts to 524.1 thousand tons. Out of them 92.6 thousand tons are of greenhouse production, and 431.5 thousand tons - from outdoor areas. Compared to the previous year, the total production of vegetables in the country is decreased by 17.9% due to fall in production of field vegetables by 21.1 %. An increase by 1.0% is observed in greenhouse production. The highest production during the year is registered for potatoes – 132.7 thousand tons, tomatoes -120.5 thousand tons, cucumbers - 51.3 thousand tons and pepper– 49,9 thousand tons.

In 2014 there is a decrease of harvested area for all groups of vegetables, with the exception of strawberries. The strongest decrease in harvested areas in legume vegetables - by 42.5%; followed root and tuber - by 24.3% and fruit - by 19.9%.

The highest relative share in 2014 is the share of areas planted with potatoes – 33.8% (10,2 thousand ha), tomatoes – 10.0% (3,0 thousand ha), pepper – 9,5 % (2,9 thousand ha), areas with watermelons – 9.5% (2,9 thousand ha) and common head cabbage– 6.4.% (1,9 thousand ha).

In 2014, a significant reduction is observed of lands planted with lens - by 83.1%, mature garlic - by 80.4%, chickpeas - by 79.5%, salads and lettuce - with 62.8 percent and radishes - 54 , 5%.

The areas harvested with fruit vegetable crops (tomatoes, peppers, cucumbers, melons, etc.) In 2014 amounted to 11 857 ha. The highest share of these are areas under tomatoes (25.5 %), pepper (24.3 %) and watermelons (24.1 %).

Harvested areas with grain legumes in 2014 amounted to 2 439 ha. The largest share of the total area under these crops is beans for grain (36.1%), followed by chickpeas (22.4%) and pea-green (18.7%).

In 2014, the total area under leaf-stem vegetables are 3 269 hectares, with the highest percentage of occupied space in the group is headed cabbage (59.4%).

From areas under root and tuber vegetables with the highest share and in 2014 again are those planted with potatoes (85.9%), followed by areas with onions mature (9.4%). Compared with 2013 noted a significant increase in harvested areas with carrots - by 62.0%.

The production of fresh vegetables from open areas (excluding potatoes and legumes) in 2014 amounted to 292.1 thousand tons. The largest share of the total production of fresh vegetables were tomatoes (27.5%), pepper (16.1%), headed cabbage (14.5 %) and watermelons (11.5%).

From outdoor areas during the year produced 80.5 thousand tons of tomatoes, which is with 4.0% more than in 2013. An increase was registered in the production of carrots - by 78.1% to 9.6 thousand tons, spinach - by 82.1 % to nearly 1.7 thousand tons. Leeks - by 36.0% to 1.7 thousand tons

and broccoli - by 14.6% to 1.2 thousand tons.

Compared with the previous year, in 2014 the production of gherkins from open areas decreased by 44.3%, to 1.6 thousand tons. A significant decrease in production from open areas register with garlic mature - by 80.4%, onion sets and salads (lettuce), respectively 69.0% and 62.6%.

The total production of grain legumes in 2014 decreased by 42.5% compared to 2013 to 6881 tons. Most dramatically reduces the production of lentils - with 83.1 percent and chickpeas - by 79.5%. Increase was observed on an annual basis only in the production of beans, green - by 2.2%.

In 2014, potato production amounted to 132.7 thousand tons, 28.9% less than in the previous year.

In some of the major vegetable crops are observed higher average yields per hectare compared to 2013. Significant increase in the average yield cucumbers - 41.3%, cauliflower - 30.1%, zucchini - 27.5% and pea-green - 22.7%. A significant decline was observed in the average yield of watermelons - 43.9%, pumpkins - 26.6% and melons - 20.0 %.

Adverse weather conditions (hail, excessive moisture, etc.) during the growing season of crops - field production given its negative impact on average yields and production in some major vegetables.

Greenhouse production in the country is determined by several major vegetable crops such as tomatoes, peppers, cucumbers, gherkins, salads and lettuce. In 2014 the production of greenhouse vegetables amounted to 91.5 thousand tons, which is 2.5% less compared to the previous year. Compared to 2013, greenhouse production of cucumbers increased by 9.2% to 44,514 tons, which forms nearly 49% of the total production of greenhouse vegetables throughout the year.

The higher average yield for some of the main crops is due to compliance with the technologies for their cultivation (good agricultural equipment) by agricultural producers and the use of good quality and certified vegetable seeds.

5. Plant Genetic resources

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 59 292 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>).

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 uniqueness at the Bulgarian table.

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

b) List of national information system in place on associated biodiversity and the most frequently monitored components of associated biodiversity.

Scientific networks and information systems

Bulgaria has some national information systems but do not cover all parts of the associated biodiversity. The Scientific networks and National information systems are mainly developed and maintained on international projects.

IPGR Sadovo has no independent information system for storage in Genebank plant genetic resources but is a part of the European PGR databases: European Electronic Catalog on Plant Genetic Resources (EURISCO), <http://eurisco.ipk-gatersleben.de/>.

Bulgaria is a part to the International Convention on the conservation of the biodiversity. National genebank was nominated by the European Programme for Plant Genetic Resources (EGP/GR) as "responsible center" for Bulgaria. This is a protected right to participate in the electronic catalog on Plant Genetic Resources EURISCO (<http://eurisco.ipk-gatersleben.de/>) of all institutions in the country that can join the system by the nominee already center. IPGR Sadovo has the richest collection of plant germplasm stored in genebank for Southeastern Europe.

The database of Bulgarian collection ([BGR-National Inventory](#)) includes passport data on 63 713 accessions, including from [BGR001](#) – 59 292, from [BGR029](#) – 3857, and [BGR005](#) - 564. With Bulgarian origin in the National Collection are 13 269 samples of 238 cultural types: 33 - cereal, 34 - grain legumes, 41 – technical, 29 - vegetables, 43 – fodder crops, 19 – decorative, 39 - perennial species.

In 2009 IPGR Sadovo signed a Memorandum of understanding for the establishment of a European Genebank Integrated System (AEGIS) and the Bulgarian PGR collection is a part of the European register which is covering unique local gene plasma: <http://aegis.cgiar.org>. The other information systems are:

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 (ESENIA), <http://www.esenias.org>

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

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

c) List of associated biodiversity species that are actively managed in production systems for the provision of ecosystem services in Table 2.

Table 2. List of associated biodiversity species that are actively managed in production systems for the provision of ecosystem services.

Associated biodiversity species	Ecosystem functions and services provided by the species in the production system
Species 1- wheat (cereals) , vegetable species, beans, crop wild relatives	Pest and disease
Species 2- wild oil species from genera <i>Brassica</i> , <i>Rafanus</i> , <i>Linum</i> : <i>Sinapis arvensis</i> ; <i>Sinapis alba</i> ; <i>Brassica nigra</i> ; <i>Brassica juncea</i> ; <i>Brassica rapa var. silvestris</i> ; <i>Camelina sativa</i> ; <i>Cartamus lanatus</i>	Water purification and water cycling
Species 3- <i>Astragalus sp.</i> , <i>Medicago sp.</i> , <i>Trifolium sp.</i> ; <i>Amygdalus nana</i> ; <i>Nigela arvensis</i> ; <i>Crambe maritima</i> ; <i>Cartamus tinctorius</i> ; <i>Lanatus</i> ;; <i>Camelina sativa</i> ; <i>Brassica juncea</i> ; <i>Arctium lapa</i> ;	Soil formation and protection
Species 4- wild relatives, especially from the genera <i>Trifolium</i> , <i>Medicago</i> , <i>Vicia</i> , <i>Lathyrus</i> , <i>Festuca</i> , <i>Lolium</i> , <i>Aegilops</i> , medicinal and oil species	Nutrient cycling

Species 5- <i>Lumbricus rubellus, Eisenia fetida, Eisenia andrei</i>	Biohumus production,
Species 6- <i>Azotobacter sp.</i>	Atmospheric nitrogen fixation, provides plants nitrogen, relates to crop rotation
Species 7- <i>Pseudomonas sp.</i>	Plant growth promotion, disease suppression, biocontrol, bioremediation
Species 8- <i>Rhizobium sp.</i>	Symbiotic nitrogen fixation, improve plant nitrogen supply, important in biological agriculture and crop rotation
Species 9- <i>Bradyrhizobium sp.</i>	
Species 10- <i>Glomus sp.</i>	Mutualistic symbiosis, phosphorus absorption, soil aggregate stabilization
Species 11- <i>Trichoderma sp.</i>	Organic matter decomposition, improve soil carbon
Species 12- <i>Beauveria bassiana</i>	Biological control of insects
Species 13- <i>Metharhizium anisopliae</i>	

d) List of wild food species known to be harvested, hunted, captured or gathered for food in your country. Indicate the change in state of the species over the last 10 years (strongly increasing (2), increasing (1), stable (0), decreasing (-1), or strongly decreasing (-2), or not known (NK)).

Table 3. Wild food species used for food in the country.

Wild food species	Change in state (2,1,0,-1,-2, NK)
Species from Poaceae - Cereals	NK
Species from Fabaceae	NK
<i>Sinapis arvensis</i>	NK
<i>Sinapis alba</i>	NK
<i>Brassica nigra</i>	NK
<i>Brassica jancea</i>	NK
<i>Allium ursinum</i>	NK
<i>Rumex acetosa</i>	NK
<i>Pinus spp.</i>	NK
<i>Ceratonia siliqua</i>	NK
<i>Vaccinium spp.</i>	NK
<i>Prunus dulcis</i>	NK
<i>Urtica dioica</i>	NK
<i>Eruca sativa</i>	NK
<i>Foeniculum vulgare</i>	NK
<i>Artemisia sp.</i>	NK
<i>Fragaria vesca</i>	NK
<i>Ribes Uva Crispa</i>	NK
<i>Prunus tomentosa</i>	NK
Crop wild relatives – over 5 000 species	NK
Medicinal plants	NK

e) Information on the proportion of the population in Bulgaria that uses wild food on a regular basis for food and nutrition.

Many plants and plant parts are eaten as food and around 2,000 plant species are cultivated for food. Many of these plant species have several distinct cultivars.

Seeds of plants are a good source of food for humans, because they contain the nutrients necessary for the plant's initial growth, including many healthful fats, such as Omega fats. In fact, the majority of foods consumed by human beings are seed-based foods. Edible seeds include cereals (corn, wheat, rice, et cetera), legumes (beans, peas, lentils, et cetera), and nuts. Oilseeds are often pressed to produce rich oils - sunflower, flaxseed, rapeseed (including canola oil), sesame, et cetera.

Seeds are typically high in unsaturated fats and, in moderation, are considered a health food, although not all seeds are edible. Large seeds, such as those from a lemon, pose a choking hazard, while seeds from cherries and apples contain cyanide which could be poisonous only if consumed in large volumes.

Fruits are the ripened ovaries of plants, including the seeds within. Many plants and animals have coevolved such that the fruits of the former are an attractive food source to the latter, because animals that eat the fruits may excrete the seeds some distance away. Fruits, therefore, make up a significant part of the diets of most cultures. Some botanical fruits, such as tomatoes, pumpkins, and eggplants, are eaten as vegetables.

Vegetables are a second type of plant matter that is commonly eaten as food. These include root vegetables (potatoes and carrots), bulbs (onion family), leaf vegetables (spinach and lettuce), stem vegetables like asparagus, and inflorescence vegetables (globe artichokes and broccoli and other vegetables such as cabbage or cauliflower).

It cannot be said precisely what is the proportion of the population in Bulgaria that uses wild food on a regular basis for food and nutrition. There are many people who turn back to nature and intend to use natural food but a little part of them uses wild plant species on regular basis. Most of them grow their food in gardens, sometimes using wild species which they have transferred in their gardens from the natural habitats.

f) The state, trends and the drivers of change affecting:

o Associated biodiversity: micro-organisms, invertebrates, vertebrates, plants

Associated biodiversity refers to soil biota, i.e. earthworms, nematodes, protozoa, fungi, bacteria, arthropods. Soil biota provides numerous ecosystem services such as decomposition of organic compounds, nutrient cycling, nutrient mobilization and turnover, biotransformation of organic pollutants, organic matter formation etc. Earthworms, ants, termites and some small mammals are ecosystem engineers, since they create habitats for smaller soil organisms by building resistant soil aggregates and pores. In this way, they also regulate the availability of resources for other soil organisms since soil structures become hotspots of microbial activities.

The great varieties of organisms that reside in the soil contribute to soil and plant health. They form the basis for human food production systems.

The activity and diversity of soil organisms are regulated by abiotic and biotic factors. The main abiotic factors are: climate, including temperature and moisture, soil texture and structure, salinity and pH. Climate influences the soil organisms, such that their activity and growth increases at higher temperatures and soil moistures. Soil texture and structure also strongly influences the activity of soil biota. Medium-textured loam and clay soils favours microbial and earthworm activity. Soil salinity may increase near the soil surface, can also cause severe stress to soil organisms, leading to their rapid desiccation. The sensitivity towards salinity differs among species, and increased salinity may sometimes have positive effects, by making more organic matter available. Changes in soil pH can affect the metabolism of species and nutrient availability, and are thereby often lethal to soil organisms.

Biodiversity has the potential to provide ecological resilience, i.e. the capacity to recover from

disruption of functions and mitigation of risks caused by disturbance. High biodiversity is significant for soil functioning. More bio diverse ecosystems show higher nutrient use efficiency, disease suppression and yield quality.

Plants can strongly influence the activity and community of microorganisms in the rhizosphere. In turn, plant growth may be limited by these soil microorganisms. The plants can influence the composition, abundance and activity of regulators and ecosystem engineers, whereas these species in turn can influence vegetation composition and productivity. Finally, soil organisms can induce plant defense responses to aboveground pests and herbivores and the aboveground interactions can feed back in a variety of ways to the biodiversity, abundance and activities of the soil organisms. Soil biota is important for plant yield soil fertility.

Intensive agriculture threatens soil organisms and their diversity. Intensive cropping systems have greatly increased the food supply by intensive input application including fertilizers and agrochemicals for pest suppression, irrigation and fossil fuels. Economic subsidies paid to modern intensive agriculture constitute a large percentage of the global value of agricultural products and have supported the overproduction of some crops and the associated overuse of agrochemicals. The environmental costs have been high in terms of pollution, loss of biodiversity in both agro ecosystems and wild lands.

Agricultural intensification is known to change the diversity of individual groups of soil biota. In some cases intensive agriculture reduces soil biodiversity, making soil food webs less diverse and composed of smaller bodied organisms. Land-use intensification results in fewer functional groups of soil biota with fewer and taxonomically more closely related species.

Soil biodiversity conservation is important for sustainable land use. Practices which enhance soil biodiversity such as reduced tilling, crop rotation and organic farming may help reduce the environmental impacts of fertilizers and improve agricultural sustainability. Organic farming can reinforce the self-regulating status of soil systems

- **Wild food resources**

The use of wild plants by the population reflects the social structure of society and therefore the social differentiations in nutrition. Along with cultural and socio-economic development, attitudes toward wild food sources are changing. For a long period after the sixties of the last century, the use of wild edible plants was considered a sign of poverty and low social status. This factor in the loss of traditional knowledge has been reported in many studies.

The influence of other cultures during different historical periods is obvious, mainly in the ways of preparing and preserving the plants, as well as in the way of cooking various meals. This is suggested by written sources mainly from the period of the Bulgarian Renaissance and reflects the strong influence of Ottoman cuisine and folk medicine. The foreign influence on techniques of preparation and the consumption of food and wild nutritive sources has led to the creation of the unique Bulgarian traditional cuisine (Markova 2011). Though it has passed through many stages of cultural influence and yet survived, today's traditional food and diet is strongly changed. Fortunately, in the last decade, there has been a return to natural food and the Bulgarian cooking culture is a part of that. The development of rural tourism has led to a revival of Bulgarian national cuisine and the use of traditional national sources of food supply, such as wild plants. Knowledge of the use of wild plants in the Bulgarian diet is original and unique in its character. At the same time, it is inseparable from the traditional culture of the Balkans and Europe.

Wild edible plants are an important part of Bulgarian patterns of culture. Bulgaria provides a good opportunity for ethnobotanical research into wild edible plants because it provides much ethnographic data, including observations on food culture and botany, plus the possibility of field observations in rural areas where wild food plants are traditionally used on a daily basis. Do not forget the great variety of wild herbs, berries (wild pears and apples, rosehips and blueberry and etc.) that are a subject to

collection, trading and processing. Significant shares of agricultural activities in the forest areas are given to the mushrooms which are collected, dried, processed or are sent for export. Unfortunately separate information about the quantity of herbs, berries and mushroom is difficult to provide. Moreover most of them are naturally organic production for they grow in ecologically clean regions.

The plains, mainly in the northeast and south parts of the country, are rich in fertile and easily arable lands. Agriculture there is more easily developed and wild plants have been replaced by cultivated ones as food. On the other hand, new meals may be a mixture between wild and cultivated plants. In this way, the diet of the Bulgarians becomes more varied and at the same time more nutritious. In the mountainous areas, there is less diversity in edible plants - mainly the fruits and seeds of some of the plants. Here, striving to ensure their nutrition, the people in a number of cases have used untypical sources of food or vegetarian species which replace other traditionally used plants (e.g. the male flowers/catkins of the hazel bush are added to bread flour).

BOX 1. In May 2015 it was published in this conjunction with the Minister of the Ministry of Environment and Water according to article 6, paragraph 1, item 2 of the Law on protection of agricultural land which prohibits the burning of stubble and, item 2 of the Law on protection of agricultural land which prohibits the burning of stubble and other plant waste.

1.3 Needs and priorities

It is necessary national and international targeted funding for biodiversity research since biodiversity is not among the priority topics of the Bulgarian Science.

It is necessary to increase of administrative and academic capacities for the implementation of biodiversity related actions.

It is necessary to make national assessments of the impact of the biodiversity loss on the ecosystem services.

It is necessary to need update the National Biodiversity Strategy and development of a new Biodiversity Action Plan.

II. SUSTAINABLE USE AND CONSERVATION OF BIODIVERSITY FOR FOOD AND AGRICULTURE

2.1 Sustainable use

Genetic plant and animal resources of Bulgaria are of great economic, cultural and biological significance. For centuries, environmental conditions and selection pressure in the Bulgarian agriculture system have favored the development of a huge variety of native and introduced plant species. Bulgaria is aboriginal generating form center of diversity for many crops, vegetables and fruit. As a result of the geographical, climatic and soil diversity, and hybridization of local with foreign varieties, the country is a secondary center of diversity for many of the introduced cultivars.

Cultural resources of plant species include local varieties of wheat, rye, oats, barley, sorghum and corn; garden and field beans, grain legumes, as well as annual and perennial forage legumes; a variety of vegetables (including tomatoes, peppers, cucumbers, pumpkins, watermelons, melons, onions and leafy crops). Tobacco, spices, pome and stone fruit trees, vines and nuts fruit trees types are also presented with local varieties. Genetic diversity of local breeds of farm animals is also so wide.

In recent decades, Bulgaria emphasis on protecting the diversity of local varieties and breeds suffered and declined as a result of socio-economic pressure and intensive agricultural development

occurring, structural changes in agriculture and the accelerated introduction of new and foreign varieties suitable for large-scale processing. Currently, when economic, cultural and ecological values of these neglected forms in time becomes more and more obvious, the society pays greater attention to opportunities for their involvement in more sustainable and environmentally friendly land use systems.

Main activities of the Agricultural Academy, which combines applied research tasks of the 26 research institutes, 16 experimental stations and two experimental facilities is keeping the plant and animal germplasm adapted to local conditions and appropriate for the development of sustainable productive systems. This resource is invaluable national capital as a source of important breeding traits and characteristics, and to global protection of biodiversity for food and agriculture. Enrichment, storage, evaluation, maintenance, targeted use and sharing of this wide plant and animal gene pool requires significant staff and financial resources.

As a result of active selection and improvement activity the Agricultural Academy supports certificates of 410 varieties of plants and 14 breeds of animals. The National Patent Office has issued a total of 80 certificates for new technologies and optimization technology solutions in agricultural production on Agricultural Academy.

a) List of management and diversity based practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Table 4. Management² and diversity based³ practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Production system	Management/ diversity based practice⁴	Trends in the application of the practice over the past ten years
Animal farming	Management of genetic resources in animal farming aimed to protect endangered and threatened local indigenous breeds, as well as maintenance and development of commercial breeds, forming national genetic resources. National genetic reserve, stored in the gene bank, guarantees sovereignty in terms of preserving species and breeds of farm animal diversity, maintaining clean a few populations, conservation of local breeds with unique genetic characteristics and high flexibility and adaptability of farming to natural environmental conditions. At the experimental facilities of scientific institutes 33 601 animals - domestic breeds for directions: cattle breeding, buffalo breeding, sheep farming, goat breeding, pig farming, poultry farming, beekeeping sector, silkworm breeding, are grown. Some of	The main focus areas over the last decades are: -Conservation and maintenance the old local breeds; - Creating technologies for various animal species feeding, depending on age and physiological state; - Development of technologies for organic animal farming.

² Annex 5 of the country report guidelines describes a list of management practices supporting the use and conservation of biodiversity for food and agriculture.

³ Annex 6 of the country report guidelines describes a list of diversity based interventions supporting the use and conservation of biodiversity for food and agriculture.

⁴ Reference: questions 52, 53 and 56 of country report guidelines.

	<p>them are indigenous breeds in danger of extinction as Local gray cattle, Karakachan sheep breed, Karnobat local breeds of sheep – for milk, meat and wool, East Balkan pig, Black Shumen chicken, etc. Breeding herds by different groups of animals (2500 cattles, 6,500 sheeps, 1300 pigs, etc.), which are protected by the Act of Biodiversity, are supports.</p>	
Fish farming	<p>Genetic material from valuable fish species, important for the development of aquaculture, is supported. There are tribal breeding centers to stimulate the production of elite quality material of thermophilic, cold-water and sturgeon varieties of fish.</p>	<p>Restoring the production potential in fish farming sector with high quality of breeding material. Assisting of farmers and processors of fish products, victims of natural disasters, accidents and others.</p>
Crop production	<p>Genetic resources of field, vegetable and perennial types are supported in 19 research institutes. In <i>ex situ</i>, <i>in situ</i>, <i>in vitro</i> and <i>on farm</i> collections are kept extremely rich variety of plant forms - 165 670 number of accessions. Existing plant gene pool includes wild species, local varieties and populations, introduced and Bulgarian breeding forms. Field crops are 107 241 samples, vegetable – 5203, perennial species – 43 500, vineyards - 9504 varieties and 87 paddings, essential oil and medicinal plants - 60 breeding forms and decorative rose - 75 variety.</p>	<p>The plant gene pool is a source of valuable breeding traits and characteristics. The global climate change in recent year's affects too favorable geographical area in which is located our country. These objectives determined the direction of the selection activities in the plant varieties creation and introduction of forms, resistant to abiotic and biotic stress - low and high temperatures, low soil and atmospheric moisture; changes in growing period, etc. Major trends for use of plant genetic resources are directed towards: Selection of high quality, resources keeping and high-yielding varieties in major crops in the country; Ensuring quality seeds to farmers; Technologies of cultivation of various crops; Technologies for agricultural and crop protective measures for different types of crops; Creation and restoration of perennials and vines; Creating conditions for sustainable development of organic farming; Measures for restoration and maintenance of pastures, Management of water resources for optimal use in agriculture.</p>

BOX 2. Describe a successful programme or project that has been undertaken in the country to support one of the practices listed in Table 4.

Local forms and varieties populations have lower yields and not all of them can be used directly in production. However, they have valuable and necessary qualities such as dry- and cold tolerance, greater adaptive capacity, resistance to diseases and pests, high dry matter content, sugars, vitamin C,

dyes, etc.

By conducted expedition mission activities in different regions of Bulgaria in recent years they have collected more than 4 000 specimens of local forms and crop wild relatives of cultivated plants in wild species of wheat, corn, beans, tomatoes, pepper, onion, fodder, medicinal, ornamental and forged types. The materials are stored at the National Genebank in IPGR Sadovo. They are documented by passport data as required by FAO and European Programme for Plant Genetic Resources.

A partial inventory of vegetable production areas and habitats of wild and endangered species is carried out.

To protect the rich local plant diversity, threatened with extinction due to the invasion of foreign varieties and reduce the cultivation of traditional and old varieties in rural areas, is necessary to continue the expeditions with the aim of collecting national gene pool over a wide spectrum.

In the program "Plant genetic resources" were created 27 varieties of different crops: winter wheat – 2, durum wheat - 1, barley - 1, rye - 1 oats – 4, chickpeas – 1, peas – 5, tomatoes – 5, eggplant - 2, garden beans – 2, salad – 1, kohlrabi – 1, pepper - 1, vigna – 1, using local gene pool as a initial material in the selection.

b) Provide examples whereby the diversity *per se*,⁵ or its lack,⁶ had a direct effect on productivity; food security and nutrition; rural livelihoods; ecosystem services; sustainability; resilience; or sustainable intensification.

As a result of activities performed in animal breeding like a selection control over local breeds, record-keeping of male breeding animals and breeding herds by national gene pool and maintenance of the national gene bank in farm animals, there are positive trends such as increasing the number of stored local breeds, increasing the number of local animals in the production systems and the increasing number of farms where they are grown.

For the effective management and long-term conservation of genetic diversity in livestock done by the Executive Agency for Selection and Reproduction in Animal Breeding (EASRAB) it was developed ten years Conservation Program for ex situ management of genetic resources in Bulgaria. It provides in the State stations for artificial insemination to do breeding of commercial and native breeds of cattle, buffalo, sheep, goats and horses of which it will be preserved genetic material.

To the date 31.12. 2014 in EASRAB it is available sperm of 265 cattle, 18 buffalo brood (males) and 4 rams, 20 breed of cattle, 3 breed of buffaloes and one breed of sheep.

The quality of the breeding stock produced, received and distributed throughout the country, controlled by EASRAB by maintaining a national registry of male breeding animals and Register of breeding herds by the National Gene Fund. In year 2014 after the annual update of the data in the Register of male breeding animals are included: 5165 bull calf, 211 buffalo bulls, 8300 rams, 1050 satyr, 983 stallions and 479 boars. In the Register of breeding herds are included 2897 herds distributed as follows: cattle - 1183, Buffalo - 168 sheep - 881, goat - 172 pig - 69 Horses - 417 birds - 7. In the records are included 53 apiary and 13 dog owners.

c) List with examples whereby the use of biodiversity for food and agriculture contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Table 5. Examples whereby the use of biodiversity for food and agriculture (BFA) contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Objective	Description
Use of BFA to adapt to and mitigate climate change ⁷	The global climate change in recent year's affects too favorable geographical area in which is located our country. These objectives determinate the direction of the selection activity in the plant selection and introduction of forms resistant to abiotic and biotic stress - low and high temperatures, low soil and atmospheric moisture; changes in growing period, etc. Local genetic resources are adapted to the climatic and soil conditions of the country. Within the different populations occurred spontaneous mutation and inheritance are many valuable qualities such as resistance to diseases and pests, which are successfully used in the plant selection
Use of BFA to manage the spread of/control invasive alien species ⁸	<p>Actions have been taken to conduct monitoring of certain alien and invasive alien species as part of a national monitoring system of biodiversity.</p> <p><i>Ambrosia artemisiifolia</i> L. Distribution in Bulgaria Distributed in the Black Sea Coast, Northeast Bulgaria, Danubian Plain, Forebalkan, Sofia Region, Znepole Region, Valley of River Struma, Rila Mts, Rhodopi Mts (Eastern), Thracian Lowland, up to about 800 m a.s.l. It occupies man-made or disturbed semi-natural and natural habitats – along roads and railways, intensively used pastures, riparian habitats, dumpsites, farmland and gardens, spaces between buildings. Ragweed competes with native species for nutrients, light and space. With massive growth it leads to a rapid exhausting of nutrients and soil depletion. It is a harmful weed in crops – in Bulgaria it has been registered in plantations of sunflowers, maize, wheat, causing reduction in crop yield and hindering mechanized harvesting. High presence of ragweed in pastures reduces their productivity (as a rule, it is not grazed by livestock). Pollen is a strong allergenic agent and causes a number of diseases such as hay fever, rhino-conjunctivitis, asthma, and sometimes contact dermatitis and urticaria.</p> <p>Control Prevention requires strict control on imports of seeds and other agricultural products, as well as control on the transfer of soil and sand from contaminated areas in Bulgaria. Small populations should be timely (immediately after their</p>

discovery) eradicated, preferably before flowering and fruiting, i.e. until about mid-August. Then for 2–3 years the localities should be consistently monitored because of accumulation of seeds in the soil (seed bank) and new plants should be uprooted before flowering and fruiting. Promotion among the public about the harmful effect of ragweed on human health would provide support from the people to eradicate the plant. For chemical control most commonly used are glyphosate and 2,4-D. Where possible, competitive plant species forming dense tufts or groups, e.g. *Lolium perenne* and *Medicago sativa*, can be used successfully for ragweed control.

2. Tomato leafminer - *Tuta absoluta* Povolny, 1994 (Insecta, Lepidoptera, Gelechiidae)

T. absoluta is one of the most economically important pest of field and greenhouse tomatoes. It is native to South America. The insect is distributed throughout the South American continent, the Middle East and Africa. *T. absoluta* was established for first time in Europe in Spain (2006). The pest was reported from some regions of the Mediterranean coast in 2007. It is found in Albania, France, Italy, Netherlands, United Kingdom, Germany, Switzerland, Hungary, Greece, Malta, Spain, Canary Islands, Portugal, Bulgaria, Kosovo, Slovenia, Lithuania and Russia.

The insect causes damages on solanaceous crops. The preferred host of *T. absoluta* is tomato - *Solanum lycopersicum*. It also infests pepper, eggplant, potato, black nightshade, jimson weed, devil's trumpet and other wild solanaceous species. It was reported that the tomato leafminer causes damage to white bean and tobacco.

The species can overwinter in the egg, pupal, or adult stage. Eggs are laid singly (rarely in batches) on all above-ground parts of the host plant. On tomato the young larva forms irregular mines on the leaves, penetrates the tender shoots, attacks the flowers but the most severe damage is found in developing (early instars) or maturing fruit (later instars). Mature larva builds a silken cocoon where the larva transforms into a pupa. At different temperatures the development of the insect lasts 29-91 days.

T. absoluta is an insect with a high rate of reproduction. In the presence of food and depending on environmental conditions it develops without falling in diapause and completes 10 to 12 generations per year. During whole vegetation the insect can complete 5 generations per year in Bulgaria.

Damage: After hatching, larvae penetrate plant tissue (leaves, shoots or flowers) and begin to feed, forming irregular mines that get longer and wider as the larvae continue to feed. The mines may later be necrotic. The larvae consume the mesophyll leaving the epidermis intact. The tomato plants with damaged stems could not develop normally. The larva usually enters the fruit under the calyx and tunnels the flesh, leaving galleries clogged with frass that cause the fruit to drop or to rot. Affected fruit lose their commercial value. Larval damage

	<p>to terminal buds in greenhouse-grown tomatoes can result in a significant reduction of fruit yield.</p> <p>Without adequate controls, infestations of <i>T. absoluta</i> can result more than 90 % loss of tomatoes yield.</p> <p>Control: A successful IPM program will consider chemical, biological, cultural and quarantine techniques to reduce pest populations.</p>
Use of BFA to prevent natural or human-made disasters and/or reduce their effects on livelihoods, food security and nutrition ⁹	<p>There is performing of targeted preservation of genetic diversity of plant and animal species in ex situ, in situ, in vitro and on farm collections. The gene pool is stored in gene banks and there is an access to genetic resources, as well as to the related scientific knowledge. A practice for fair and equitable sharing of benefits arising from their use, in accordance with agreements reached at the international level, is established. Seeds from 930 local accessions from cereals, leguminous, technical, oilseeds, vegetable and medicinal species of Bulgarian collection are Safety duplicated in Global Seed Vault in Svalbard, Norway. The goal of this activity is to protect the local genetic diversity in possible disasters.</p>

d) List and briefly describe ecosystem/landscape/seascape approaches¹⁰ that have improved the management and use of BFA in the country.¹¹

In measure 10 "Agro-environment and climate" of the Program for Rural Development 2014-2020 farmers are financial supported if grown local varieties which are listed like a traditional for the Republic of Bulgaria.

LIST OF ENDANGERED LOCAL VARIETIES, IMPORTANT FOR BULGARIAN AGRICULTURE

VARIETY NAME	MAINTENANCE OF THE VARIETY
Field crops	
Potato – <i>Solanum tuberosum L.</i>	
Iverce	Institute of Vegetable Crops Maritza Plovdiv
Nadejda 25	Institute of Vegetable Crops Maritza Plovdiv

⁹ Reference: question 43 of country report guidelines.

¹⁰ The ecosystem approach concept is generally understood to encompass the management of human activities, based on the best understanding of the ecological interactions and processes, so as to ensure that ecosystems structure and functions are sustained for the benefit of present and future generations. Ecosystem approaches include the Convention on Biological Diversity's Ecosystem Approach, Integrated Land Use Planning, Integrated Water Resource Management, Sustainable Forest Management, Code of Conduct for Responsible Fisheries, Ecosystem approach to fisheries management, etc.

- A "landscape approach" means taking both a geographical and socio-economic approach to managing the land, water and forest resources that form the foundation – the natural capital – for meeting our goals of food security and inclusive green growth. By taking into account the inter-actions between these core elements of natural capital and the ecosystem services they produce, rather than considering them in isolation from one another, we are better able to maximize productivity, improve livelihoods, and reduce negative environmental impacts.

Vegetable Crops	
Tomato – <i>Solanum lycopersicum L.</i>	
Ideal	Institute of Vegetable Crops Maritza Plovdiv
Kapry	Institute of Vegetable Crops Maritza Plovdiv
Marty	Institute of Vegetable Crops Maritza Plovdiv
Miljana	Institute of Vegetable Crops Maritza Plovdiv
Neven	Institute of Vegetable Crops Maritza Plovdiv
Solaris	Institute of Vegetable Crops Maritza Plovdiv
Stela	Institute of Vegetable Crops Maritza Plovdiv
Topaz	Institute of Vegetable Crops Maritza Plovdiv
Triumf	Institute of Vegetable Crops Maritza Plovdiv
Yana	Institute of Vegetable Crops Maritza Plovdiv
Peper – <i>Capsicum annum L.</i>	
Albena	Institute of Vegetable Crops Maritza Plovdiv
Buketen	Institute of Vegetable Crops Maritza Plovdiv
Buketen 50	Institute of Vegetable Crops Maritza Plovdiv
Bulgarian ratund	Institute of Vegetable Crops Maritza Plovdiv
White kalinkov	Institute of Vegetable Crops Maritza Plovdiv
White shipka	Institute of Vegetable Crops Maritza Plovdiv
Gorogled 6	Institute of Vegetable Crops Maritza Plovdiv
Dzulijunska shipka 1021	Institute of Vegetable Crops Maritza Plovdiv
Gold medal 7	Institute of Vegetable Crops Maritza Plovdiv
Ivailovska kapiya	Experimental Station for irrigated agriculture Pazardzhik
Kalinkov 800/7	Institute of Vegetable Crops Maritza Plovdiv
Kapiya 1300	Institute of Vegetable Crops Maritza Plovdiv
Kapiya VV (Vertus)	Institute of Vegetable Crops Maritza Plovdiv
Kozi roga	Institute of Vegetable Crops Maritza Plovdiv
Kurtovska kapiya 1619	Institute of Vegetable Crops Maritza Plovdiv
Maritsa	Institute of Vegetable Crops Maritza Plovdiv
Novoselska kapiya 379	Institute of Vegetable Crops Maritza Plovdiv
Ribki	Institute of Vegetable Crops Maritza Plovdiv
Sivriya 600	Institute of Vegetable Crops Maritza Plovdiv
Sofiyska kapiya	Institute of Vegetable Crops Maritza Plovdiv
Hebar	Institute of Vegetable Crops Maritza Plovdiv
Chereshki	Institute of Vegetable Crops Maritza Plovdiv
Chorbadzhiyski	Institute of Vegetable Crops Maritza Plovdiv
Shipki sladki	Institute of Vegetable Crops Maritza Plovdiv
Cucumber – <i>Cucumis sativus L.</i>	
Bistrenski	Institute of Vegetable Crops Maritza Plovdiv
Vihra	Institute of Vegetable Crops Maritza Plovdiv
Gergana	Institute of Vegetable Crops Maritza Plovdiv
Devora	Institute of Vegetable Crops Maritza Plovdiv
Ida	Institute of Vegetable Crops Maritza Plovdiv
Iren	Institute of Vegetable Crops Maritza Plovdiv
Kaliopa	Institute of Vegetable Crops Maritza Plovdiv
Lora	Institute of Vegetable Crops Maritza Plovdiv

Midori	Institute of Vegetable Crops Maritza Plovdiv
Mirey	Institute of Vegetable Crops Maritza Plovdiv
Pobeda	Institute of Vegetable Crops Maritza Plovdiv
Starozagorski langi	Institute of Vegetable Crops Maritza Plovdiv
Melon – <i>Cucumis melo L.</i>	
Vidinski koravtci	Institute of Vegetable Crops Maritza Plovdiv
Deserten 5	Institute of Vegetable Crops Maritza Plovdiv
Medena rosa	Institute of Vegetable Crops Maritza Plovdiv
Hybrid 1	Institute of Vegetable Crops Maritza Plovdiv
Hybrid 15	Institute of Vegetable Crops Maritza Plovdiv
Water melon – <i>Citrullus lanatus (Thunb.) Matsum. et Nakai</i>	
Bojura	Institute of Vegetable Crops Maritza Plovdiv
Zaraevski	Institute of Vegetable Crops Maritza Plovdiv
Mramorna 17	Institute of Vegetable Crops Maritza Plovdiv
Portokalka	Institute of Vegetable Crops Maritza Plovdiv
Pumpkin – <i>Cucurbita pepo L.</i>	
Gornooriahovska 1	Institute of Vegetable Crops Maritza Plovdiv
Izobilna	Institute of Vegetable Crops Maritza Plovdiv
Yantra	Institute of Vegetable Crops Maritza Plovdiv
Pumpkin – <i>Cucurbita Maxima Duchesne Gourd</i>	
Plovdivska 48/4	Institute of Vegetable Crops Maritza Plovdiv
Pumpkin – <i>Cucurbita moschata Duch.</i>	
Muskatna 51-17	Institute of Vegetable Crops Maritza Plovdiv
Garden bean – <i>Phaseolus vulgaris L.</i>	
Liovitshi	Institute of Vegetable Crops Maritza Plovdiv
Mastilen 116	Institute of Vegetable Crops Maritza Plovdiv
Nikos	Institute of Vegetable Crops Maritza Plovdiv
Oreol	Institute of Vegetable Crops Maritza Plovdiv
Perun	Institute of Vegetable Crops Maritza Plovdiv
Starozagorski cher	Institute of Vegetable Crops Maritza Plovdiv
Trakiyski	Institute of Vegetable Crops Maritza Plovdiv
Garden peas – <i>Pisum sativum L. (partim)</i>	
Viatovo	Institute of Vegetable Crops Maritza Plovdiv
Denitca	Institute of Vegetable Crops Maritza Plovdiv
Zornica	Institute of Vegetable Crops Maritza Plovdiv
Iskar	Institute of Vegetable Crops Maritza Plovdiv
Margarit - (№ 907)	Institute of Vegetable Crops Maritza Plovdiv
Mira	Institute of Vegetable Crops Maritza Plovdiv
Plovdivska perla	Institute of Vegetable Crops Maritza Plovdiv
Prometey	Institute of Vegetable Crops Maritza Plovdiv
Pulpudeva	Institute of Vegetable Crops Maritza Plovdiv
Uspeh 72	Institute of Vegetable Crops Maritza Plovdiv
Onion – <i>Allium cepa L.</i>	
Asenovgradska kaba 5	Institute of Vegetable Crops Maritza Plovdiv
Ispanski 482	Institute of Vegetable Crops Maritza Plovdiv
Konkurent	Institute of Vegetable Crops Maritza Plovdiv
Liaskovski 58	Institute of Vegetable Crops Maritza Plovdiv

Melnik	Institute of Vegetable Crops Maritza Plovdiv
Trimontsium	Institute of Vegetable Crops Maritza Plovdiv
Ubileen 50	Institute of Vegetable Crops Maritza Plovdiv
Leeks – <i>Allium porrum L.</i>	
Starozagorski 72	Institute of Vegetable Crops Maritza Plovdiv
Garlic – <i>Allium sativum L.</i>	
Zimen 14	Institute of Vegetable Crops Maritza Plovdiv
Headed white cabbage – <i>Brassica oleracea L. convar. capitata (L.) Alef. var. alba DC.</i>	
Balkan	Institute of Vegetable Crops Maritza Plovdiv
Besapara	Institute of Vegetable Crops Maritza Plovdiv
Kijose 17	Institute of Vegetable Crops Maritza Plovdiv
Maritza 48/5	Institute of Vegetable Crops Maritza Plovdiv
Headed red cabbage – <i>Brassica oleracea L. convar. capitata (L.) Alef. var. rubra DC.</i>	
Pazargjishko podobreno 16	Institute of Vegetable Crops Maritza Plovdiv
Red pazargjishko	Institute of Vegetable Crops Maritza Plovdiv
Broad beans – <i>Vicia faba L.</i>	
Local form Sevlievo	Institute of Vegetable Crops Maritza Plovdiv
Local form Markovo	Institute of Vegetable Crops Maritza Plovdiv
Sponge cucumber – <i>Luffa cylindrica M.J. Roem.</i>	
Local population	Institute of Vegetable Crops Maritza Plovdiv
Cucurbit – <i>Lagenaria siceraria (Molina) Standl.</i>	
Local population	Institute of Vegetable Crops Maritza Plovdiv
MEDICAL AND AROMATIC PLANTS	
Oil Rose – <i>Rosa Damascena Mill.</i>	
Population oil rose	Institute of Rose and Essential-oil Plants Kazanlak
Lavender – <i>Lavandula vera L.</i>	
Drouzba	Institute of Rose and Essential-oil Plants Kazanlak
Karlovo	Institute of Rose and Essential-oil Plants Kazanlak
Hebar	Institute of Rose and Essential-oil Plants Kazanlak
Hemus	Institute of Rose and Essential-oil Plants Kazanlak
Calendula - <i>Calendula L.</i>	
Local population	Institute of Rose and Essential-oil Plants Kazanlak
Marsh snowdrop – <i>Leucojum aestivum L.</i>	
Sneginka	Institute of Rose and Essential-oil Plants Kazanlak
Mint – <i>Mentha piperita L.</i>	
Local population	Institute of Rose and Essential-oil Plants Kazanlak
FRUIT CROPS	
Apple – <i>Malus Mill.</i>	
Ayvania	Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
Budinka	Institute of Agriculture Kyustendil
Buhavitsa	Institute of Agriculture Kyustendil
White apple	Research Institute of Mountain Stockbreeding and Agriculture Trojan
Vlashka	Fruit-Growing Institute Plovdiv

Gilavka	Institute of Agriculture Kyustendil
Yellow Belflor	Research Institute of Montain Stockbreeding and Agriculture Trojan
Kandile	Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
Kantarka	Fruit-Growing Institute Plovdiv
Karastoianka	Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
Kichovka	Institute of Agriculture Kyustendil
Kogesta renta	Research Institute of Montain Stockbreeding and Agriculture Trojan
Limonka	Research Institute of Montain Stockbreeding and Agriculture Trojan, Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
My apple	Research Institute of Montain Stockbreeding and Agriculture Trojan
Obiknovena petrovka	Institute of Agriculture Kyustendil
Petrovka	Research Institute of Montain Stockbreeding and Agriculture Trojan
Skrinianka	Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
Stefanka	Research Institute of Montain Stockbreeding and Agriculture Trojan
Ciganka	Institute of Agriculture Kyustendil
Red apple Marishnitsa	Research Institute of Montain Stockbreeding and Agriculture Trojan
Pear – <i>Pyrus L.</i>	
Bojadgieva	Research Institute of Montain Stockbreeding and Agriculture Trojan
Vodnik	Institute of Agriculture Kyustendil
Winter maslovka	Institute of Agriculture Kyustendil
Stambolka	Institute of Agriculture Kyustendil
Plum – <i>Prunus domestica L.</i>	
Baleeva plum	Research Institute of Montain Stockbreeding and Agriculture Trojan
Large thin plum	Research Institute of Montain Stockbreeding and Agriculture Trojan
Large-fruted Kustendilska	Research Institute of Montain Stockbreeding and Agriculture Trojan
Yellow and red dganka	Institute of Agriculture Kyustendil
Izobilie	Institute of Agriculture Kyustendil
Karadgeiska form T-K	Research Institute of Montain Stockbreeding and Agriculture Trojan
Kustendilska M	Research Institute of Montain Stockbreeding and Agriculture Trojan
Kustendilska blue plum	Institute of Agriculture Kyustendil
Early blue plum	Research Institute of Montain Stockbreeding and Agriculture Trojan
Form 1 Group Tetevianka	Research Institute of Montain Stockbreeding and Agriculture Trojan

Form 2 Group Tetevianka	Research Institute of Mountain Stockbreeding and Agriculture Trojan
Form Kustendilska 1/18	Research Institute of Mountain Stockbreeding and Agriculture Trojan
Form Kustendilska Vlaskovsko	Research Institute of Mountain Stockbreeding and Agriculture Trojan
Plum – <i>Prunus cerasifera Ehrh.</i>	
Yellow afaska	Fruit-Growing Institute Plovdiv
Red afaska	Fruit-Growing Institute Plovdiv
Red afaska D96 (Ivelina)	Fruit-Growing Institute Plovdiv
Padding	
Aidemirska	Experimental Station for Apricot and Agriculture Silistra
Variety 4	Experimental Station for Apricot and Agriculture Silistra
Cherry – <i>Prunus avium (L.) L.</i>	
11 May	Fruit-Growing Institute Plovdiv, Institute of Agriculture Kyustendil
Boboshevski ordinary	Institute of Agriculture Kyustendil
Boboshevski large black	Institute of Agriculture Kyustendil
Bulgarian hrushtielka	Institute of Agriculture Kyustendil
Kuklenska belitca	Fruit-Growing Institute Plovdiv
Kustendilska hrushtielka	Institute of Agriculture Kyustendil
Mizia	Institute of Agriculture Kyustendil
Peresta belvitsa	Institute of Agriculture Kyustendil
Pobeda	Institute of Agriculture Kyustendil
Razdavichka belvitsa	Institute of Agriculture Kyustendil
Large black	Fruit-Growing Institute Plovdiv
Black Koniavska	Institute of Agriculture Kyustendil
Apricot – <i>Prunus armeniaca L.</i>	
Albena	Experimental Station for Apricot and Agriculture Silistra
Aleko Pasha	Experimental Station for Apricot and Agriculture Silistra
Boriana	Experimental Station for Apricot and Agriculture Silistra
Late drianovska 2	Fruit-Growing Institute Plovdiv, “Опитна станция по кайсията и земеделието – Силистра”
Iztochna	Experimental Station for Apricot and Agriculture Silistra
Late drianovska	Experimental Station for Apricot and Agriculture Silistra
Late riahovska	Experimental Station for Apricot and Agriculture Silistra
Early silistrenska	Experimental Station for Apricot and Agriculture Silistra
Roxana	Experimental Station for Apricot and Agriculture Silistra
Silistra 252	Experimental Station for Apricot and Agriculture Silistra

Silistrenska kompotna	Experimental Station for Apricot and Agriculture Silistra
Late silistrenska	Experimental Station for Apricot and Agriculture Silistra
Festivalna	Experimental Station for Apricot and Agriculture Silistra
Philipopol	Experimental Station for Apricot and Agriculture Silistra
Peach – <i>Prunus persica (L.) Batsch</i>	
Malo Konare	Fruit-Growing Institute Plovdiv
Petrichka	Fruit-Growing Institute Plovdiv
Plovdiv 2	Fruit-Growing Institute Plovdiv
Slivenska kompotna	Fruit-Growing Institute Plovdiv
Tundja 1	Fruit-Growing Institute Plovdiv
Large July	Fruit-Growing Institute Plovdiv
Quince – <i>Cydonia oblonga Mill.</i>	
Pazardzhik apple-shape	Fruit-Growing Institute Plovdiv
Walnut – <i>Juglans regia L.</i>	
Drianovski	Fruit-Growing Institute Plovdiv
Perushtenski	Fruit-Growing Institute Plovdiv
Plovdivski	Fruit-Growing Institute Plovdiv
Silistrenski	Fruit-Growing Institute Plovdiv
Slivenski	Fruit-Growing Institute Plovdiv
Almond – <i>Prunus dulcis (Mill.) D. A. Webb</i>	
Augostovski	Agriculture Experimental Station Pomorie
Asparuh	Agriculture Experimental Station Pomorie
Nassebar	Agriculture Experimental Station Pomorie
Pomorie	Agriculture Experimental Station Pomorie
Start	Agriculture Experimental Station Pomorie
Chernomorets	Agriculture Experimental Station Pomorie
Ubilei	Agriculture Experimental Station Pomorie
Fig – <i>Ficus carica L.</i>	
Ahtopolska17	Agriculture Experimental Station Pomorie
Michurinska 19	Agriculture Experimental Station Pomorie
Raspberry – <i>Rubus idaeus L.</i>	
Autumn gold	Agro Bio Institute Sofia
Ralitsa	Agro Bio Institute Sofia
Strawberry – <i>Fragaria L.</i>	
Biliana	Institute of Agriculture Kyustendil, Agro Bio Institute Sofia
Krasavitsa	Institute of Agriculture Kyustendil
Sofia	Institute of Agriculture Kyustendil
Vine - <i>Vitis L.</i>	
Boia	Institute of Viticulture and Wine production Pleven
Buket	Institute of Viticulture and Wine production Pleven
Vinenka	Institute of Viticulture and Wine production Pleven
Garvan	Institute of Viticulture and Wine production Pleven

Zarchin	Institute of Viticulture and Wine production Pleven
White zeinel	Institute of Viticulture and Wine production Pleven
Pink zeinel	Institute of Viticulture and Wine production Pleven
Keratsuda	Institute of Viticulture and Wine production Pleven
Kehlibar	Institute of Viticulture and Wine production Pleven
Kokorko	Institute of Viticulture and Wine production Pleven
Kravi cici	Institute of Viticulture and Wine production Pleven
White lisicha opashka	Institute of Viticulture and Wine production Pleven
Red lisicha opashka	Institute of Viticulture and Wine production Pleven
Orlovi nokti	Institute of Viticulture and Wine production Pleven
Black orlovi nokti	Institute of Viticulture and Wine production Pleven
Red parmak	Institute of Viticulture and Wine production Pleven
Pehlivan	Institute of Viticulture and Wine production Pleven
White razakia	Institute of Viticulture and Wine production Pleven
Razakia mirizliva	Institute of Viticulture and Wine production Pleven
Razakia pembena	Institute of Viticulture and Wine production Pleven
Razakia with one seed	Institute of Viticulture and Wine production Pleven
Razakia black	Institute of Viticulture and Wine production Pleven
Razakia black with spots	Institute of Viticulture and Wine production Pleven
Fish bladder	Institute of Viticulture and Wine production Pleven
Focha	Institute of Viticulture and Wine production Pleven
Furma	Institute of Viticulture and Wine production Pleven
Chaush	Institute of Viticulture and Wine production Pleven
Shefka	Institute of Viticulture and Wine production Pleven

c) Examples of activities undertaken to maintain and use traditional knowledge of associated biodiversity and wild foods.¹²

Einkorn (*Triticum monococcum L.*) is an ancient grain that dates back approximately a 10 000 years. It is met all over the world however as a grain it is extremely rare. Traces of einkorn in the Thracian tombs in our land are found, as well as in the Egyptian pyramids. After The II World War it began to appear impurities, while the modern wheat completely shifted the einkorn.

Today in wheat there is purposeful selection of a wide range of varieties to improve the quality and yield, and the einkorn remained unchanged with qualities for millennia. Bulgarian einkorn, unlike other varieties found contains higher than typically met nutrients.

Unfortunately until the last decade in Bulgaria no targeted studies have been conducted to understand and tame the Bulgarian variety of einkorn.

Now, using the stored genetic diversity of *Triticum monococcum L.* in the National gene bank in IPGR Sadovo, the Agricultural Academy is developing a science-based methodology for einkorn growing. The aim is to encourage farmers to increase areas under culture, inclusion it in sustainable and resource-saving production systems and the resultant yields of local forms satisfy the growing needs of the food and brewery industries. There is a tendency einkorn to become a preferred food for many users who rediscover her biological properties and health benefits.

d) Needs and priorities in terms of the sustainable use of biodiversity for food and agriculture, and in particular of associated biodiversity and wild foods.

NEEDS:

- Financial support of activities for preservation, storage, reproduction, evaluation and use of genetic resources, as well as updating the material and technical infrastructure of scientific institutes.
- Establishment a comprehensive National Information System for online access to passport, characterization and evaluation data stored *ex situ*, *in situ* and *on farm* resources.
- Development the necessary mechanisms to ensure full access to the plant genetic resources in the interests of all stakeholders.
- In support of and in addition to conservation programs *in situ* / *on farm* in scientific centers in the country is necessary to build local *ex situ* seed storage facilities for short-term conservation, micro-experimental bases, aquaculture facilities, non-industrial breeding centers and other (herbaria, aquariums, botanical gardens, farm animal zoos and agro museums). They will help to develop the overall strategy for enrichment, preservation, maintenance and use of biological resources in the country.

PRIORITIES:

- Sustainable development of competitive agriculture, based on scientific-appropriate practices.
- To protect the natural and genetic resources to mitigate the impact of global climate changes.
- Production of safety, quality and healthy agricultural products and foodstuffs.
- Improving the quality of human life in rural areas through competitive agriculture and increase farmers' incomes.
- Sustainable development of scientific potential in the agricultural sector.
- Enhancing the public interest in issues affecting agro biodiversity with the support of Agro-NPO sector to develop sustainable environmental systems in agriculture.

2.2. Conservation

a) Status of *in situ* conservation of associated biodiversity and wild food species in your country:

1. List of existing national *in situ* conservation initiative(s).

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 (http://eea.government.bg/zpo/en/index_download.jsp).

In Bulgaria there are six categories of protected areas: reserve (strictly protected area, no human activity allowed), national park (highly protected, limited human activity allowed), natural monument (protection of natural features, activity allowed), managed reserve (activities for conservation purpose allowed), Nature Park (active interaction of humans and nature in sustainable way) and protected nature areas (habitat protection and sustainable use of natural products). Until the end of 2014, 1235 protected areas have been declared, with a total area of 559267.75 ha, which accounts for about 5.3% of the country (Table 5).

Table 5. Categories of protected areas in Bulgaria

Categories of protected areas	Number by the end of 2008	Number by the end of 2013	Number by the end of 2014	Area (ha) by the end 31.12.2014	Area (ha) by 31.12.2014
Reserves	55	55	55	77 064.9	77 107.5794
Natural monument	345	344	542	16 844.2	18 162.18
Protected nature areas	501	561	589	79 353.4	75 661.4632
National Parks	3	3	3	150 362.3	107 923.7
Nature Parks	11	11	11	256 441.4	275 944.96
Managed Nature Reserves	35	35	35	4 520.9	4 467.871
Total protected areas	950.00	1009.00	1235.00	584587.10	559267.75
Share of the territory of the country				5.27%	5.04%

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. Of the total area of Natura 2000 sites 56.47% are forests, 32.35% are agricultural land and 11.18% are other areas (Table 6).

Table 6. 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

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.

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 7).

Table 7. 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 2005–2014 have been developed and approved Action Plans for the protection of fifty eight species of seed plants (*Fritillaria meleagroides*, *Laserpitium archangelica*, *Ligularia sibirica*, *Osmunda regalis*, *Viola pumila*, *Achillea ochroleuca*, *Achillea thracica*, *Aethionema arabicum*, *Amygdalus webbii*, *Anthemis argyrophylla*, *Artemisia chamaemelifolia*, *Asplenium lepidum*, *Astracantha thracica*, *Astragalus dasyanthus*, *Astragalus physocalyx*, *Bupleurum uechtritizianum*, *Centaurea finazzeri*, *Centaurea trinervata*, *Centaurea wagenitziana*, *Centhranthus kellereri*, *Convolvulus althaeoides*, *Convolvulus holosericeus*, *Corynephorus divaricatus*, *Erodium absinthoides*, *Eriolobus trilobata*, *Ephedra fragilis*, *Genista germanica*, *Geranium aristatum*, *Lathyrus palustris*, *Lathyrus pancicii*, *Leontodon saxatilis*, *Lilium rhodopaeum*, *Limonium bulgaricum*, *Lycopodiella inundata*, *Mannia androgyna*, *Merendera attica*, *Matthiola odoratissima*, *Ophrys insectifera*, *Orchis provincialis*, *Plantago maxima*, *Potentilla fruticosa*, *Ranunculus stojanovii*, *Riccia crustata*, *Salix rosmarinifolia*, *Serratula bulgarica*, *Silene alpina*, *Spiraea crenata*, *Swertia punctate*, *Tragopogon floccosus*, *Trichocolea tomentella*, *Tulipa pirinica*, *Tulipa rhodopaea*, *Verbascum anisophyllum*, *Verbascum purpureum*, *Verbascum spathulisepalum*, *Verbascum spathulisepalum*, *Verbascum tzar-borisii*, *Veronica multifida*), and 12 for animal species - 3 mammals (*Rupicapra sp.*, *Ursus arctos*, *Felis sp.*), 8 birds (*Neophron percnopterus*, *Pelecanus crispus*, *Aquila heliacal*, *Falco cherrug*, *Aythya nyroca*, *Botaurus stellaris*, *Phalacrocorax pygmeus*, *Oxyura leucocephala*) and tortoises (<http://www.moew.government.bg/?show=top&cid=203>). 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.

2. *In situ* conservation of species/groups of species and objective(s).

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 9) 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 9. 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
1	<i>Mannia androgyna</i>	CR	1	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
4	<i>Achillea ochroleuca</i>	CR, protected	1	Under designation
5	<i>Achillea thracica</i>	CR, IUCN(R), protected, Bern Convention, Bulgarian	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), Bulgarian endemic	1	46.4682
9	<i>Artemisia chamaemelifolia</i>	CR, protected	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 finazzeri</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 + 1.614228
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	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 stajanovii</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 punctata</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>	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'.

b) The status of *ex situ* conservation¹³ of associated biodiversity and wild food species in your country:

1. List and describe any existing national *ex situ* conservation initiative(s).

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 vegetative propagated crops.

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

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

¹³ Reference: questions 30 (Table 12) and 36 (Table 16) of country report guidelines.

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.

2. *Ex situ* conservation of species/groups of species and objective(s).

The National seed genebank of Bulgaria is built in 1984 and carry out a scientific program for long-term preservation of germplasm with seeds under controlled conditions in accordance with the standards, developed by FAO (1980/1994/2014). The genebank facilities are designed both for long-term storage and medium-term storage. There are maintained three collections: base collection, active collection and collection for free exchange.

The base collection is for long-term conservation where the seeds are stored at 3–7% moisture (depending upon species) and at subzero temperatures (–18 °C) in hermetically closed containers (glass jars or three laminated aluminum foil packets). Under these conditions the plant germplasm could be preserved with minimal changes over decades or hundred and more years. The safety storage time of existing plant species varies from 19.65 years (*Pisum sativum*) to 1521.6 years (*Medicago sativa*). On the basis of control tests is determined the safety storage time for most of the preserved in the genebank plant species (Stoyanova, 2005, 2007).

The active collection is for medium-term conservation where seeds are stored at 6-7 °C, air relative humidity 40-45%, and free access of air (paper bags). Under these conditions the mean seed longevity varies between 2 and 10 years. These collections are used for regeneration, distribution and characterization/evaluation.

The collection for free exchange is for medium-term conservation where seeds are stored at +60C but in hermetically closed glass jars.

In the National Seed Genebank of Bulgaria are preserved 59 292 seed samples, where 72% under long-term storage conditions (42 699 accessions) according to preferred Genebank standards. The structure of base collection is presented in six groups (Fig. 1):

- Cereals – 26 568 accessions;
- Legumes – 6 698 accessions;
- Forage grasses – 1 432 accessions;
- Vegetables – 4 118 accessions;
- Oil and industrial crops – 3 455 accessions;
- Ornamental and medicinal species – 428 accessions.

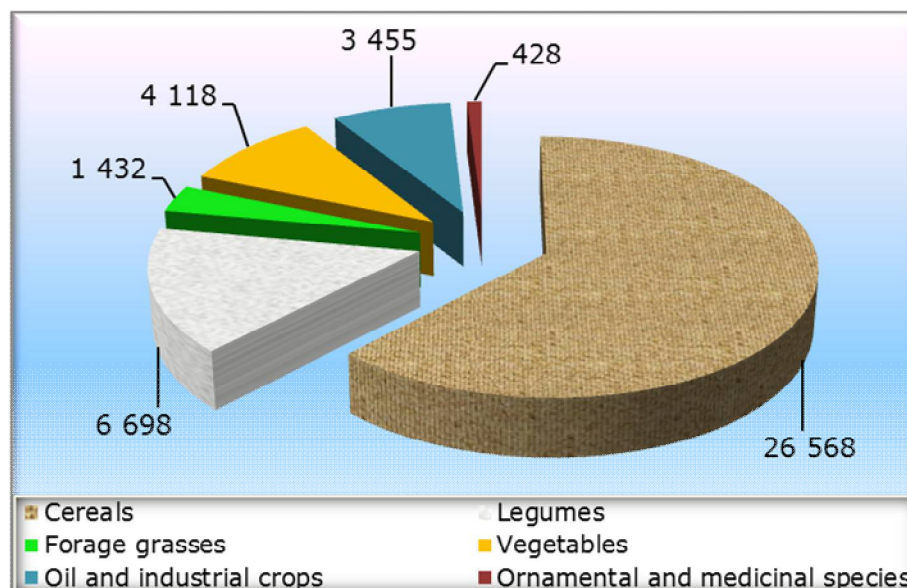


Fig. 1. Status of the base collection maintains in the National Seed Genebank of Bulgaria

These accessions are presented from 469 genera, 1 544 plant species and 2 517 subspecies.

Total 8 137 of the accessions originated from Bulgaria. From them 3 800 accessions are landraces and 4 337 are breeding materials (primitive varieties, breeding lines or modern varieties). The accessions received abroad originated from more than 100 countries.

Described by continents the pattern of origin is as follow: Europe – 22 489 accessions; Asia – 3253 accessions; North and South America – 3 165 accessions from 20 countries; Africa – 480 accessions from 7 countries; Australia – 113 accessions from 3 countries and Unknown origin – 13 199 accessions.

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.

The National Bank for Industrial Microorganisms and Cell Cultures (NBIMCC) was established in 1984 as State scientific budget organization, successor to the Bulgarian Type Culture Collection (BTCC), founded in 1950. Since August 2011, the NBIMCC is transformed in a specialized institute with the same name in the structure of the University of Chemical Technology and Metallurgy. NBIMCC Management

system is certified according to the quality standard ISO 9001:2008 for preservation, supply, import and export of microorganisms and cell cultures. NBIMCC maintains over 7400 strains including bacteria, actinomycetes, yeasts, fungi, plasmid-bearing microorganisms, animal and plant viruses, and animal cell cultures. They belong to more than 900 species from 250 genera and most of them could be found only in NBIMCC. The preserved strains are useful and applicable in health services, industry, agriculture, education and research investigations.

c) Needs and priorities in terms of the conservation of biodiversity for food and agriculture, and in particular of associated biodiversity and wild food species.

- It is necessary to disclose targeted funding for the National Seed Gene Bank to modernize equipment and facilities and ensuring safety storage of collections according corresponding Genebank standard (2014).
- It is necessary to include the National Seed Gene Bank in the lists of strategic sites to ensure the sustainability and conservation of plant genetic resources in the country.
- It is necessary funds for training of people working with genetic resources through courses concerning different issues of PGR such as inventorying, collecting, conservation (on farm, in situ, ex situ), characterization and documentation.
- Due to the lack of unified national information system for biodiversity is necessary to develop modern electronic registry with the corresponding Internet applications for the needs of science and practice. Unifying of available information to ensure effective service activities related to the protection of national gene pool, dissemination of results, increasing visibility of the responsible institutions in society and improves their communication with international organizations related to the conservation of biodiversity.
- It is necessary to extend the measures related to informing the community in order to prevent loss of genetic resources.

2.3 Access and exchange

According to the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Standard Material Transfer Agreement (SMTA) and the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture, The National seed genebank of Bulgaria is partner in the system for free exchange. We meet the obligations of the Convention on Biological Diversity to facilitate information exchange and material transfer regarding the conservation and sustainable use of biological diversity that contributes to the Pan-European Biological and Landscape Diversity Strategy.

The exchange collection contains 2 984 accessions from 84 plant species.

During 2001-2014 the total number of accessions placed at disposal amount to 10 061, where: 7 397 accessions were sent to about 100 addresses in the world and 2 664 accessions were given to 46 institutions in Bulgaria (Fig. 2).

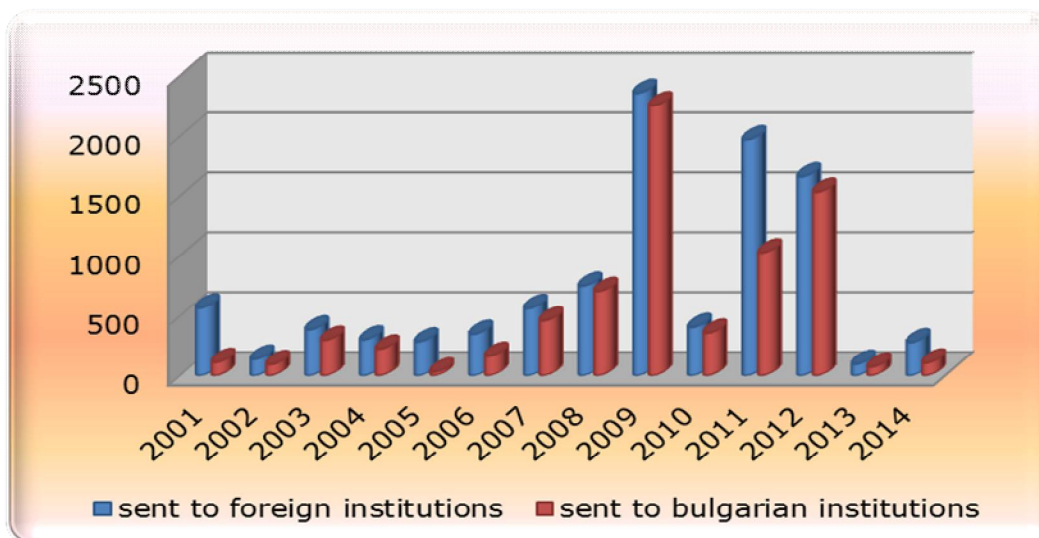


Fig. 2 Number of accessions sent to different addresses in the world from 2001 to 2014

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 pyrastrer*, *Fraxinus excelsior*, *Populus nigra*, etc.

a) The main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture (BFA).

Table 6. Description of the main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture (BFA).¹⁴

Components of BFA	Description of measures governing access to BFA	Description of measures regulating the fair and equitable sharing of benefits arising from the utilization of BFA
<i>Genetic resources</i>	Bulgaria's experience is based on membership in a number of international agreements and networks the area of exchange of genetic resources: International Treaty on Plant Genetic Resources for Food and Agriculture;	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; discussions with the various target groups and interested parties have been addressed and intersectoral working group has been established.
PGRFA		
AnGR		
FGR		
AqGR		
<i>Associated biodiversity</i>		
Micro-organisms		
Invertebrates		
Vertebrates		
Plants		

¹⁴ Measures facilitating access to the different components of biodiversity for food and agriculture usually vary according to the intended use of the resource (e.g. any use, research and development, commercial use). Examples of possible measures consist of the need to obtain prior informed consent (PIC), sharing benefits based on mutually agreed terms (MAT), having special considerations in place for access to resources held by indigenous peoples and local communities, etc.

Wild foods	Animal Genetic Resources for Food and Agriculture AnGRFA); Core Material Transfer Agreement for the supply of samples of biological material from the public collection (ECCO core MTA, 2009); Patent Cooperation Treaty (2013); European Patent Convention (2010); International Plant Exchange Network,(2012); World Federation of microbial collections; European organization of microbial collections and more.	
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b) Identify possible needs and priorities in terms of the policies and regulations governing the access to and ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture, and in particular of associated biodiversity.

Bulgaria has signed the Nagoya Protocol on June 23, 2011. The Protocol is not only an act of enforcement of the common EU foreign policy in this area, but also an additional tool to protect the rich biodiversity of our country. It is expected that the Protocol of Nagoya be ratifications in 2016. Its implementation would increase the benefits of the use of genetic resources and strengthening research and technological development and innovation in this field and allow more efficient use of public funds allocated for gene banks, botanical gardens, academic and applied research. Overall development of technologies and innovations based on genetic resources should contribute to the development of economic activities and sectors in which our country has experience and tradition (Pharmaceutical, food, cosmetic industry). The successful implementation of the Nagoya Protocol is necessary to establish a comprehensive policy of our country in terms of storage, protection, use and disclosure of genetic resources and traditional knowledge for them given the large number of institutions and centers, having competences in this field, and providing the necessary technical infrastructure and administrative capacity campaigning public awareness and ensure financial resources for this purpose.

Needed are: Changes in special legislation, Designation of competent authorities, Determination of sanctions, Determination in regulations of rules and procedures for access to genetic resources.

III. POLICIES, INSTITUTIONS AND CAPACITY

3.1 Policies, programmes, institutions and other stakeholders

a) Policies and programmes adopted and implementing to support the conservation and sustainable use of biodiversity for food and agriculture

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 indifferent 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.

b) 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 and 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.

3.2 Capacity

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.

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.unisofia.bg/index.php/bul/universitet_t/fakulteti/biologicheski_fakultet2), Geology and Geography Faculty (https://www.unisofia.bg/index.php/bul/universitet_t/fakulteti/geologo_geografski_fakultet);
- Plovdiv University 'Paisij Hilendarski' – Department of Biology (<https://uniplovdiv.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.unisofia.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 studies 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 organized;

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.

IV. REGIONAL COOPERATION

4.1 Regional initiatives the country is involved in to conserve and use biodiversity for food and agriculture

The Convention on Biological Diversity – (CBD) belongs to the most important international agreements concerning environment. It is an important milestone in the area of environment and development, because its approach to the conservation of Earth biodiversity and sustainable use of biological resources is for the first time complex, not sectorial.

Bulgaria implements Strategic Plan for Biodiversity 2011–2020 and Aichi targets, the European Biodiversity Strategy 2020 and the Global Strategy for Plant Conservation. Bulgaria fulfills its commitments to the Nagoya Protocol.

The geographic location and demographic specificity of Bulgaria predetermines its good chances of intensive development in the future. In this respect, one of the priorities of the foreign policy of country is the implementation of international infrastructure projects, which would facilitate Bulgaria's contacts along the east-west axis and communication between countries to the North and South of Bulgaria.

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 agro biodiversity. 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 (<http://www.slowfoodfoundation.com/ark#risultati>). Four traditional Bulgarian products are supported

directly by the Slow Food Foundation for Biodiversity Conservation (<http://www.slowfoodfoundation.com/presidia>).

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;
- **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 .

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.

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>).

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/>).

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. 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.

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.

Bulgaria is the part of the European Programme for Plant Genetic Resources (ECPGR). Institute of plant genetic Resources „Konstantin Malkov“-Sadovo is the National Coordinator of the National Programme for Plant Genetic Resources as a part of the ECPGR (<http://www.ecpgr.cgiar.org/>). The National Programme on Conservation and Utilization of Plant Genetic Resources and Agro-biodiversity is based on the applicable international documents, principles and methodologies that are stated in, e.g. the FAO Global Plan of Action, International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Standard Material Transfer Agreement (SMTA), European Cooperative Programme for Plant Genetic Resources Networks (ECPGR), or generally in the Convention on Biological Diversity (CBD). It is also based on relevant recommendations of the international organizations, e.g. Bioversity International and Global Crop Diversity Trust.

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).

With the active participation of Bulgaria was established the **East and South European Network on Invasive Alien Species** (ESENIAS, 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 ESENIAS 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.

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. 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.

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.

4.2 Needs and priorities

a) Needs and priorities in terms of embedding biodiversity for food and agriculture, and in particular associated biodiversity, wild foods and ecosystem services into regional and international initiatives

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

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), consult agency 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 adaptation 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 107 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.

V. SYNTHESIS OF NEEDS AND PRIORITIES AND THE POSSIBLE WAY FORWARD

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.

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.

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.

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.

To overcome these difficulties needs to introduce 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, the Ministries must to implement a series of reforms 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.

The public concern and involvement in biodiversity conservation and sustainable management are important prerequisites for the success of the implemented actions- 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; promotion of the national policy aspects related to biodiversity issues.

Increase of administrative and academic capacity for the implementation of biodiversity related actions.

To reduce the direct pressure on biodiversity and promoting its sustainable use, the following measures and activities from the National Biodiversity Action Plan must to be implementing: development of the legal framework, elaboration of plans, strategies and methodologies, conduction biodiversity monitoring, actions from the relevant sectors like forestry, waters, agriculture, fishery, aquaculture, etc.

To reduce the loss and fragmentation of natural habitats, incl. forests, the following measures must to conduct: 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 reduce the impact of invasive species need to be developed National Strategy and Action Plan on invasive alien species.

To enhancement of the benefits to all from biodiversity and ecosystem services need to be made national assessments on the impact of the biodiversity loss on the ecosystem services.

To enhance implementation through participatory planning, knowledge management and capacity building urgent there are need to update of the National Biodiversity Strategy and development of a new Biodiversity Action Plan.

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**.
- It is necessary to **disclose targeted funding for the National Seed Gene Bank** to modernize equipment and facilities and ensuring safety storage of collections according corresponding Genebank standard (2014).
- It is necessary **to include the National Seed Gene Bank in the lists of strategic sites** to ensure the sustainability and conservation of plant genetic resources in the country.
- It is necessary **funds for training of people** working with genetic resources through courses concerning different issues of GR such as inventorying, collecting, conservation (on farm, in situ, ex situ), characterization and documentation.
- Due to the lack of unified national information system for biodiversity is necessary to develop modern electronic registry with the corresponding Internet applications for the needs of science and practice. Unifying of available information to ensure effective service activities related to the protection of national gene pool, dissemination of results, increasing visibility of the responsible institutions in society and improves their communication with international organizations related to the conservation of biodiversity.

VI. SOURCES OF INFORMATION

Bulgarian legislation related to biodiversity

Environment Protection Act (2002)
The Biological Diversity Act (2002)
Protected Areas Act (1998)
Plant Protection Act (1997)
Medicinal Plants Act (2000)
Forestry Act (2011)
Law on Fisheries and Aquaculture (2001)
Animal Protection Act (2008)
Law on Hunting and Game Protection (2000)
Live Stock Breeding Act (2000)
Law on the Protection of New Plant Varieties and Animal Breeds (1997)
Genetically Modified Organisms Act (2005)

European and international instruments

Convention on Biological Diversity (CBD); <http://www.cbd.int>
Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets;
<https://www.cbd.int/sp>
The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity;
<http://www.cbd.int/abs>
EU 2020 Biodiversity Strategy;
<http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>
Birds Directive - Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version of Directive 79/409/EEC as amended);
http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
The Habitats Directive 92/43/EEC - Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
EU Water Framework Directive - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy;
http://ec.europa.eu/environment/water/water-framework/index_en.html

National strategies, plans, programs, projects

National Development Programme: Bulgaria 2020 (2012);
<http://www.eufunds.bg/bg/page/809>
National Plan for Development of the R. Bulgaria 2007–2013; www.eufunds.bg/document/89
National Reform Programme; <http://www.minfin.bg/bg/page/573>
National Strategy for Environment and Action Plan 2009–2018;
<http://www.moew.government.bg>
National Biodiversity Conservation Strategy;
<http://www.strategy.bg/FileHandler.ashx?fileId=1285>
National Biodiversity Conservation Plan 2005-2010;
http://chm.moew.government.bg/nnps/files/NPlan_bioraznoobrazie.doc
National strategy for regional development 2012–2022;
<http://www.mrrb.government.bg/?controller=articles&id=350>
National Strategic Plan for Agricultural and Rural Development (2007-2013);

<http://www.eufunds.bg/document/81>
National Strategy for Sustainable Development of Agriculture in Bulgaria in the period 2014-2020;
www.noa.bg/Files/Docs/Natzionalna_strategija_za_ustoihiwo_raz133.pdf
National Strategy for Development and Management of Water Sector (2012);
<http://www.strategy.bg/FileHandler.ashx?fileId=4243>
River Basin Management Plans in Bulgaria 2010-2015; Work Program for upgrading of the River Basin
Management Plans in Bulgaria and Preparation of RBMPs for the second Period 2016-2021 (2012); Work
Program for the Elaboration of Flood risk Management Plans (2012); <http://www.bd-dunav.org/content/upravlenie-na-vodite/plan-za-upravlenie-narechniia-baseyn/>
http://www.bsbd.org/bg/index_bg_4671000.html
http://earbd.org/indexdetails.php?menu_id=364
http://www.wabd.bg/bg/index.php?option=com_content&task=view&id=16&Itemid=32
National Plan for the Protection of the Most Important Wetlands in Bulgaria 2013–2022
(2012); <http://www.bbf.biodiversity.bg/files/doc/Wetlands-plan-final.pdf>
National Strategy for Sustainable Development of Forestry Sector 2006–2015;
<http://www.iag.bg>
Strategic Plan for the Development of the Forestry Sector 2007–2011; <http://www.iag.bg>
National Strategy for the Development of the Forestry Sector in R. Bulgaria 2013-2020;
<http://www.iag.bg>
Program of Measures for Adaptation of Forests in Bulgaria and Reduction of the Negative
Impact of Climate Change; <http://www.iag.bg>
Sustainable Development of Forests within the Natura 2000 Protected Areas (2011);
<http://www.moew.government.bg/?show=top&cid=262>
Strategy for the Development of Hunting in Bulgaria 2012-2027; <http://www.iag.bg>
National Program for Fishery and Aquaculture 2007-2013; <http://iara.government.bg>
National Strategic Plan for Fishery and Aquaculture 2007-2013; <http://iara.government.bg>
National Program for the Sustainable Development of Fish Resources 2008-2013;
<http://iara.government.bg>
The Third National Action Plan on Climate Change 2013-2020;
[http://www3.moew.government.bg/files/file/Climate/Climate_Change_Policy_Directorate/Tr
eti_nacionalen_plan_za_deistvie_po_izmenenie_na_klimata.pdf](http://www3.moew.government.bg/files/file/Climate/Climate_Change_Policy_Directorate/Tr_eti_nacionalen_plan_za_deistvie_po_izmenenie_na_klimata.pdf)
National Action Program on Sustainable Land Management and Combating Desertification in
Bulgaria 2007-2013;
http://www.moew.government.bg/files/file/Soil/Programi/NAP_2008.pdf
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STATE OF KNOWLEDGE OF BIODIVERSITY FOR FOOD AND AGRICULTURE

BULGARIA – REPORT – 2016

RESUME

Despite its relatively small territory, 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 about 34 % of the national territory – one of the largest in Europe.

STATUS OF BIODIVERSITY

More than 3100 algae from about 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 about 4100 species. 270 are Balkan and 174 are Bulgarian endemics.

In the Bulgarian red list are 801 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, about 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 about 34%.

Animals in Bulgaria amount to about 30 359 species from 28 types and 75 classes. About 1200 animal species are endemic (790 Bulgarian and 410 Balkan endemics). 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. 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 trends in the populations of some species are informative for the rate of biodiversity state/loss or the sustainable management of agricultural land.

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.

Bulgaria is rich with 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.

According to the Executive Agency for Fisheries and Aquaculture, in 2014 the total catch of fish and other aquatic organisms of commercial fishing in the country amounted to 8 689.5 tons. The 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.**
2. **Overexploitation of biological resources and loss of genetic resources.**
3. **Pollution of air, soil and water.**
4. **Invasive alien species.**
5. **Climate changes.**

Assessing implementation of National strategy and action plan for biological diversity and progress in mainstreaming of biodiversity

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**
- **Mobilization of the financial resources relative to BD**
- **Effective use of the resources of the new Operational Programme (OP) Environment of Bulgaria**

Implementation of the strategic plan for biodiversity and progress towards Aichi targets

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

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.

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 public concern and involvement in biodiversity conservation and sustainable management are important prerequisites for the success of the implemented actions.

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.

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

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. 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.

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.).

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.

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 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. There is a trend towards improvement of water quality in some of the indicators. 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.

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 about 5.3% of country's territory).

Natura 2000 network in Bulgaria covers 4 053 941.44 ha that is about 34.4% of the country's territory. The network includes 119 Special Protection Areas and 233 Special Areas of Conservation.

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.

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.

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.

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 intersectoral 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.

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 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 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 about 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 dedicate 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.**