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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

**Bern Convention Group of Experts
on Biodiversity and Climate Change**

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**Groupe d'experts de la Convention de Berne
sur la Biodiversité et le Changement climatique**

Strasbourg (1-2 October 2012)

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REPORTS AND CONTRIBUTIONS BY GOVERNMENTS
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RAPPORTS ET CONTRIBUTIONS DES GOUVERNEMENTS

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ARMENIA / ARMÉNIE

Progress in Implementing Measures on Biodiversity and Climate Change in Forest and Protected Area Management

In comparison to its relatively small territory, Armenia holds high levels of biodiversity. Armenia's forest ecosystems, comprising some 11% of the country's territory and also recognized for their high levels of biodiversity, are a global conservation priority inasmuch as they fall under the Caucasus-Anatolian-Hyrcanian Temperate Forest Ecoregion listed by WWF as a Global 200 Ecoregion and by Conservation International as a biodiversity hotspot. Fostering some 300 tree and bush species, over half of the region's floral diversity as well as endemic and rare plant species listed in the IUCN International Red Book and forming a vital eco-corridor extending through the region, the need to preserve the forest ecosystems has been identified also by the Government of the Republic of Armenia as a part of a wider effort of the Government to protect the unique biodiversity of the country. Substantive efforts have been carried out at a national level in Armenia in recent years to establish new protected areas, including in forest covered areas. Importantly, following the analyses of the National Communications of the Republic of Armenia under the UNFCCC identifying Armenia's forests as vulnerable to climate change, a strengthened need to preserve forest biodiversity to enhance forest resilience under climate change is recognized.

The UNDP/GEF Project "Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia" is addressing the main impacts of the aridizing climate of Armenia on the country's forests in order to enhance the resilience of the forest ecosystems and to enable ecosystem based adaptation of rural communities. At the first instance the adaptation activities carried out under the project target 75,000 hectares of forests identified as most vulnerable to climate change while involvement of local communities in the implementation of adaptation measures allows community members to directly benefit from the adaptation efforts. The project, which is implemented by the Ministry of Nature Protection of the Republic of Armenia with the assistance of the UNDP, began in 2009 and will be completed in 2013. The project is one of the 26 projects funded through the Strategic Priority on Adaptation (SPA) as part of the Global Environment Facility's Trust Fund indicating global significance of the activities piloted by the project.

Some of the activities related to biodiversity and climate change carried out in the country since the last reporting period are of ongoing nature.

To prevent forest fragmentation and forest degradation under climate change pressures the above mentioned project is further piloting and demonstrating forest rehabilitation options and forest regeneration strategies on four different pilot project sites. The resilience of the pilot forests to the impacts of climate change, including increasing levels of pests and occurrence of wildfires as well as direct impacts of climate change on forests, is enhanced by planting mixed forest stands with local genotypes of endemic species including wild fruit and nut trees and shrubs as well as by reducing fragmentation to maintain ecosystem functioning and to facilitate range shifts. One of the four pilots aims to identify novel regeneration strategies in the ecological restoration of open juniper woodlands, which are important ecosystems for soil and biodiversity preservation. Another approach applied by the most recently launched pilot project is to utilise local (drought tolerant) tree and shrub species untypical for forestation projects to preserve local biodiversity and the provision of ecosystem services under climate change. Monitoring and adaptive management of the pilot sites has enabled the initial identification of successful adaptation options and necessary maintenance measures on the reforestation sites under varying climate conditions as well as revision of current management practices. The lessons learned will be disseminated widely in order to up-scale adaptation options at the national level.

Forest fires are currently one of the major threats posed by climate change on Armenia's forests and are threatening forest integrity and forest biodiversity in combination with reduced regeneration success under climate variability. The activities of the project's forest fire management component are targeting both fire prevention and fire suppression capacities at the local and national level. A national cross-ministerial task force, the formation of which was initiated by the project together with other donor organizations and the work of which is supported by the project, is aiming to identify

short term and medium-long term national strategies for the improvement of wildfire management. The project also successfully campaigned for the legal prohibition of agricultural waste burning in forest adjacent areas, which as of September 2011 has been banned in Armenia according to an amendment of the RA Law “On Atmospheric Air Protection”. To improve fire suppression capacities of forest managers, the project has provided them with forest fire early response equipment first time introduced in the country and training in suppression techniques suitable for the terrain in the mountain forests. The project is also improving public awareness and advocating behavioral change in local villages to prevent wildfires. Proven efficient, corresponding ministries have replicated project activities related to the provision of forest fire suppression equipment and installation of forest fire prevention signboards. Furthermore, as a part of biodiversity protection and wildfire prevention activities, the project is also engaging with tourism sector representatives to introduce and mainstream climate change adaptation and mitigation issues as well as biodiversity protection considerations into the tourism sector’s development strategies.

Forest health monitoring and timely detection of changes in forest integrity are important for the effective application of pest control and prevention of forest degradation. Work has been done under the project in cooperation with the scientific community to identify suitable bio-indicators for forest health monitoring, to identify forest pests that will likely benefit from the changing climate conditions as well as to develop rigorous forest pest monitoring methods, including methods for long-term monitoring of changes in pest Lepidoptera community composition (including invasive species) and for monitoring of ascending pest populations for the timely application of control measures. The project has supported the development of a manual on forest pests present in Armenia, which has previously not been available in Armenian. Foresters will be trained to implement pest monitoring and control programs under the project. Together with international experts and local scientific partners, the project has also worked towards identifying suitable environmentally friendly pest control methods and is preparing to conduct a field pest control demonstration.

Through an analysis of current forest management planning, the guiding documents of forest management plans as well as the project’s concrete experiences under all of the aforementioned components, the project is working towards mainstreaming climate risk considerations into forest and protected area management planning and including climate change adaptation options in the effective 10-year forest management plans to up-scale adaptation to climate change impacts in forest ecosystems and forest management to the national level.

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“Adaptation to Climate Change Impacts in Mountain Forest
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AZERBAIJAN / AZERBAÏDJAN

Brief information about Azerbaijan Republic

The Republic of Azerbaijan located in the South Caucasus region regained its independence in 1991 and is a young developing country without access to the open sea. At present the state is going through the socio-economic challenges of the transition period.

The Republic of Azerbaijan cooperates with a number of structural bodies of the UN – UN Environment Programme (UNEP), UN Development Programme (UNDP), UN Educational, Scientific and Cultural Organization (UNESCO), World Meteorological Organization (WMO), World Health Organization (WHO), UN Industrial Development Organization (UNIDO), World Customs Organization (WCO) and others. The state is a party to the UN Sustainable Development Commission, UN Economic Commission for Europe (UNECE), UN Economic and Social Commission for Asia and the Pacific (UNESCAP) and Economic and Social Council.

The Republic of Azerbaijan, including the Nakhchivan Autonomous Republic, covers an area of 87,000 square km on the south-eastern part of the Caucasus isthmus. The diverse landscapes of Azerbaijan encompass high mountain slopes, alpine meadows and foothills of the Lesser and Greater Caucasus Mountains, the very different Talish Mountains in the southeast, and 800 kilometres of the Caspian seashore and related wetlands. These features surround an interior that includes the major riverine corridors of the Kur and Araz River, a number of natural and artificial lakes and wetlands set in semiarid low-lying plains. Along with this diversity in habitats and altitudes comes a diversity of climatic zones. The southeast region and the north-western area of Azerbaijan along the Ganikh River have a humid subtropical climate with about 1200 to 1600 mm of rain per year. In contrast, Central Azerbaijan including the Kur-Araz lowlands has a dry subtropical climate with less only 150 to 300 mm of yearly precipitation. Mountain and foothill zones have more moderate climates with about 50 to 1000 mm of rainfall per year. Azerbaijan's geographical location has provided a biological crossroad for animal and plant distribution from all directions over time. Changing climatic regimes, land masses and connections between the Caspian Sea, Black Sea and the Mediterranean Sea followed by isolation has also influenced the species composition that remains in this country today. In Azerbaijan now, European species like red deer (*Cervus elaphus*), brown bear (*Ursus arctos*) and lynx (*Lynx lynx*) coexist with Asian species like goitered gazelle (*Gazella subgutturosa*) and up until the last century, tigers (*Panthera tigris*). Due to its isolation from other bodies of water now, the Caspian Sea also contains a mix of endemic species including the Caspian seal and a number of economical valuable sturgeon species. The resulting mix of geographic, biological and climatic conditions in Azerbaijan has led to an outstanding level of diversity in its flora and fauna today. Azerbaijan's biodiversity importance is internationally recognized, as part of the "Caucasus Ecoregion", an area that is included as one the 25 most endangered and diverse ecosystems on Earth, in global biodiversity assessments conducted collaboratively by major international conservation groups during the past decade.

Critical Ecosystem Partnership Fund (CEPF), a joint initiative of Conservation International (CI), the Global Environment Facility (GEF), the Government of Japan, the MacArthur Foundation and the World Bank (WB), is providing programmatic support for biodiversity activities in this region.

The Republic of Azerbaijan consists of six major ecological regions, with a variety of biomes. The main regions include:

- Greater and Lesser Caucasus Mountain
- Kur-Araz Valley and Floodplain
- Talish-Lankaran Zone
- Absheron Peninsula
- Caspian Coastal Lowlands
- Nakhchivan Autonomous Republic

Azerbaijan, with its varied climate, altitudinal zones, and geographic location has more species of flora and fauna than most temperate countries of the world. The biodiversity of Azerbaijan has been widely recognized as a “hotspot” in international biodiversity conservation programs and planning. Azerbaijan is part of the Caucasus Ecoregion that is identified as one of WWF’s Global 200 Ecoregions for biodiversity.

More than 400 species of plants found in the country are in need of special protection. 140 rare and endangered flora species are included into the Red Book of Azerbaijan.

18,000 fauna species were recorded on the territory of the country. The modern Azerbaijan’s fauna includes 97 species of mammals, 357 species of birds, almost 100 species of fish, 67 species and subspecies of amphibians and reptiles and almost 15,000 species of insects.

The Red Book of Azerbaijan includes 14 species of mammals, 36 species of birds, 5 species of fish, 13 species of amphibians and reptiles, 40 species and subspecies of insects. The main reason of the biological diversity is the geological history of the region and different climatic conditions.

Information on biodiversity and climate change

The average annual temperature is generally considered 14,4-14,5 degrees in the world. At present, the temperature rose by around 1 degree. In the Arctic, Greenland, even in the south of the United States, 2-3 degrees increase in temperature is observed. Which disturbances can be occurred, it is already accepted by everyone. In Azerbaijan, this number is around 0.8 degrees. However, the increase of temperature in the last 8 years more than is observed in high mountain areas. Research shows that the temperature in the high mountainous areas increased by 1,1-1,3 degrees.

Approximately 150 years ago there were the last period changes. Until the middle of the 50th century warming will reach maximum peak. Then, about a thousand years, gradually collapses. It means that, currently observed global warming will go on, average annual temperature will increase 6-7 degrees and then this process will collapse.

Increase of natural disasters, floods, typhoon and dynamics of storm harm economy and population of country. Climate change is also observed in Azerbaijan. In 2010, there was sufficiently flood in the country. But the general physical – geographical condition and climate system of Azerbaijan gives reason to obtain more successful position in comparison of other countries of the world on the development of the adaptation principles to climate change, minimize losses caused by natural disasters in the future with the optimal use of natural conditions of republic and ensure people with food supply. It is no coincidence that Azerbaijan is on the 2nd place among 132 countries for the last 10 years activity on environmental protection in the Index of Results of International Ecological Implementation.

Climate change shows itself on abnormal distribution of precipitation, delaying seasons and increasing sustainability and influences on water and forest resources and human health. For this reason ecological balance is violated. This influences to the mutual connections between person and environment, forest and agriculture, water resources and soil. It is necessary to reduce the anthropogenic effects. Azerbaijan also should strengthen climate change adaptation measures. In the country, there should be carried out measures to mitigate the impact of the climate in the process of desertification, water and agriculture. We have to adapt to climate changes. For the first time, there should be prepared management plan of risk in country and National Strategy on climate change adaptation. This point is considered in Third National Information of Azerbaijan.

Development of economy, increasing of social – cultural level of people in country, efficient use of natural resources and protection of ecological balance are in the centre of state’s attention. According to this, last years normative legal acts were adopted on ecology, nature protection and efficient use of natural resources, important practical steps have been taken in the field of protection and improvement of nature. There were established drainage systems to clean soil from salinisation, nature reserves and sanctuaries for improving and protection of flora and fauna, greenness in and around the Baku and there were created forest cover in order to avoid soil erosion.

But on this area the main problem is still going on. As a result of deforestation, the main important sanitary and hygienic functions- as soil saving, air cleaner of forests significantly

weakened. Some resources of valuable trees and bushes are endangered. The non-efficient use of pastures resulted with erosion and destruction of plants in large places. On the other hand the natural events in country seriously damage the environment. Implementing urgent measures are the great social-economical importance for protection of nature, preventing reducing biodiversity and pollution of environment.

Nowadays there are 890 thousand ha territories are under specially protected areas, also 8 national park, 12 state nature reserve and 24 state nature sanctuaries. National Parks-are the territories with the status of nature protection and scientific research, with ecology, historical, aesthetic importance. 10.3 percent of area is under the National Park and reserves. Otherwise, works on creating of specially protected nature areas are going on by Ministry of Ecology and Natural Resources. On the other hand the available areas of reserves are expanded. Generally, these reserves are considered as to protect the endangered plant and animal sorts. Reserves are also considered significant importance. Here, the scientists make observation on plants and animals and try to find to increase the count of endangered sorts.

Biodiversity- the main part of natural resources- combines the lively organism including other water ecosystems and ecological complexes in all habitats, also on the land, at the sea. At the middle of the 20th century the dangerous factors for biodiversity and ecosystem were increased, the ecosystems were damaged because of human activity, some fauna and flora sorts were reduced quickly. The loose of biodiversity requires serious measures for its protection and sustainable use.

On the last years on the biodiversity problems many things have done. The national implementation plan on environment protection, National program on sustainable social-economical development and other national programs were accepted and are implemented. The protection of biodiversity and its sustainable use is the main global problem, so its resolution is possible with world unity countries, including Azerbaijan.

Azerbaijan Republic acceded to Convention Biological Diversity of United Nations on 2000, for expanding international cooperation on biological diversity protection.

The State Commission on Conservation of genetic resources has been created by the decree № 848 of the President of the Republic of Azerbaijan dated December 21, 2002 aimed to provide the implementation of complex activities to prevent the extinction of genetic resources of microorganisms, animals and plants and to meet all the commitments taken by Azerbaijan in respect to the UN Convention on Biological Diversity.

National Strategy and Implementation Plan on protection of biological diversity and sustainable use in Azerbaijan Republic focused on implementation of efficient measures on biological diversity protection and sustainable use and achieving concrete positive results on this field.

There are populations of animal and bird species that sustainable for some illnesses, fully adapted to geographical climate and environmental condition in Azerbaijan. They were founded by nation selection under a long historical development. Decree on preparing strategically programs was signed by President on 21st December in 2001, on protecting and using of these valuable animals, plants and microorganisms.

On the basis of this decree there was held great conference in the Ministry of Agriculture on 9-10 January, 2003 on the restoration of genetic resources, protection of rare animal, bird sorts and species, in order to prepare the strategy programs. On this conference the deputy minister of Agriculture Ministry and the chief of the Head Management of cattle breeding talk about the work on the basis of the decree and obligations of scientist on the field of cattle breeding.

So, for the solution of future problems, in order to prepare the strategy program some scientists, professors like A.M.Guliyev, A.M.Ramazanov and G.G.Abdullayev of Azerbaijan State Agrarian University got information about the aboriginal animal and bird sorts on different zone and areas. They gave Strategic Program (2001-2005) information on animals and bird sorts and ways of efficient use of them and after the approval it was published in scientific council of Azerbaijan State Agrarian University.

Assessment of vulnerability to climate change and adaptation measures climate of Azerbaijan and its change projections

In the Fourth Assessment Report of Intergovernmental Panel on Climate Change, published in 2007, observations on all continents and in many of the oceans showed that many natural systems including hydrological cycle, water availability, water quality and water supply, are impacted by human-induced climate change. Air composition also changes as a result of human activities.

In parallel with naturally-occurring climate change, the rate of these changes is accelerating. The report finds that climate change in Europe, the Caucasus and Central Asia is likely to bring about high temperatures, droughts and depletion of water resources, as well as a decline in the potential of hydroenergy, summer tourism and horticulture. Economies in transition and least-developed countries are being disproportionately impacted. They are also having a hard time carrying out adaptation measures due to their relative poverty. The report calls on countries to develop a national strategy on adaptation and integration of climate change aspects into activities that engage all national stakeholders. Temperature data from the National Hydrometeorology Department of MENR for 1991-2000 showed that the mean temperature had risen by 0.410C—three times higher than that of the longer period 1961 to 1990 (+0.340C). This finding is consistent with the results derived from climate modelling. The Climate Change and Ozone Center analyzed average annual temperature and precipitation anomalies for the period 1991 to 2000 in 7 regions: Kura-Araz, Guba-Khachmaz, Shaki-Zagatala, Ganja-Gazhakh, Lankaran-Astara, Nakhchivan, Absheron. Data from 28 stations were used for the assessment of average annual temperature and rainfall anomalies. Compared to the level of 1961-90, for the past 10 years, temperature anomalies in the Kura-Araz Lowland ranged from -1.120C (Bilasuvar, 1993) to +1.910C (Mingachevir, 2000). The average temperature anomaly in Kura-Araz lowland was +0.490C.

Temperature anomalies in Guba-Khachmaz region ranged from -1.160C (Guba, 1993) to +1.720C (Guba, 2000). The average annual temperature anomaly was about +0.480C. In Shaki-Zagatala, temperature anomalies ranged from -1.260C (Maraza, 1992) to +1.630C (Oghuz, 1999), for an average of +0.480C.

Temperature anomalies in Ganja-Gazakh region ranged from -1.10C (Gadabay, 1993) to +1.840C (Ganja, 1998). The temperature difference from the norm level was about +0.740C. In the Southern region, temperature anomalies ranged from -1.080C (Astara, 1993) to +1.370C (Goytapa, 1998). The average was about +0.430 C. In Nakhchivan anomalies ranged from -2.07°C (Nakhchivan, 1993) to +1.78°C (Ordubad, 2000), for an average of +0.470 C.

An increase in the average annual temperature Azerbaijan after 1995 and a drastic increase took place in 1998-2000. The highest level was observed in 1998. for the past 10 years the average annual rainfall level was below the norm by 14.3% in Kura-Araz lowland, by 2.6% in Guba-Khachmaz region, by 6.4 % in Shaki-Zakatala region, by 17.7% in Ganja-Gazax region, by 17.1 % in Nakhchivan and by 1.2 % in Southern region.

For the past 10 years the rainfall level in the country area reduced by 9.9%.

Climate of the baseline 1961-1990 period and verification of the model

The verification of the model was made based on data for the period 1961-90. Due to elevation, a decrease in temperature is observed in the Greater Caucasus, Lesser Caucasus and Talish mountains. In higher mountain zones, the temperature falls to -20C and -50C. In lowlands, the temperature is 140C to 160C, which is consistent with observations. However, in some areas even higher temperature levels are observed. The verification of the model in the region was made based on CRU (Climatic Research Unit, //www.cru.uea.ac.uk/cru/data) data as recommended by Hadley Center. The difference between CRU data on Azerbaijan, and the Caucasus as a whole, varies from -0.50C to +1.50C. This means that the PRECIS model produces slightly higher temperatures than what is observed in reality within country's boundary conditions. This difference is greater on the eastern coast of the Caspian Sea (-30C- +40C). In Absheron in the East, in the Central lowland areas and in parts of Gazakh-Ganja zone, the temperature difference in comparison with modelling data is +1.50C. In other parts of the country the difference is +0.50C.

The distribution of rainfall almost matches the model data. The lowest precipitation level is observed in Absheron-Gobustan and Nakhchivan AR. Rainfall increases in mountainous and foothill regions. The maximum level of rainfall is observed in Lankaran-Astara zone and the southern slopes of the Greater Caucasus. The quantitative data for precipitation are consistent with climate data. The level of rainfall is 300mm in the Absheron-Gobustan zone. In lowland areas it varies between 300 and 600mm. In the Greater Caucasus the rainfall level is considerably higher than the norm (1500-1800mm). In Talish zone the rainfall level is very low. Rainfall in Lankaran- Astara zone was not taken into account.

In summary, the climate of the baseline period (1961-1990) was quite accurately simulated by the PRECIS model.

Climate scenario for 2021-2050

According to the PRECIS model, the average annual temperature increase in 2021-2050 will amount to 1.50C -1.60C. In the coastal zone and the western part of Nakhchivan AR, the increase will be 1.70C. The temperature increase in the first half of the century might be about 0.30C per decade. Since the actual temperature rise in Azerbaijan 1990-2000 was about 0.40, the data provided by the model are consistent with observed reality.

Average annual temperature increase in the region (difference between 2021-2050 and 1961-1990)

Rainfall in 2021-2050 will increase by 10-20% compared to the period 1961-1990. This includes increases of 0-10% in Nakhchivan AR and 20% in the eastern part of the country. No decrease in rainfall takes place in the Kura-Araz basin.

Water resources

Present status of water resources of the country

Water resources of the country amount to about 39 km³. About 29.3 km³ of these are surface waters and 8.8 km³ are groundwater. Although surface waters are now widely used for various purposes, the potential of groundwater is not widely exploited. The various lakes found in the country, the water impoundments regulating between high and low seasons, and glaciers can play an important role in the resolution of water crises likely to occur as a result of increasing demand for water and climate change effects. Their use should become part of adaptation measures.

Surface waters

Only 25-30 % of the country's surface water resources originate from within its borders. The per capita share of water resources is about 1000 m³ per year, which places Azerbaijan among countries with the lowest available water resources. Water resources play an important role in the country's economy. For agriculture alone, 10-12 km³ of water is annually drawn from the rivers. Most parts of the country experience shortages of water, largely due to uneven seasonal and geographical distribution. During the vegetation period, the flow of rivers falls by 5-20%, depending on the region. While water shortfall is observed during low water seasons, in high water seasons, inundations and flash floods often take place. In recent years the number of these disasters has increased. After 1993, a rise of groundwater (a direct result of fluctuations of the Caspian Sea level) caused flooding along the Kura River encompassing a distance of 200 km from the stream bed. The villages located along the river bank and riparian areas of Salyan, Neftchala, Sabirabad and Shirvan are subject to regular inundations. Serious damage is often caused to large industries of national importance, farming facilities, gardens and housing.

Flood of the Kura River observed in the territory of Salyan region in 2003

The Greater and Lesser Caucasus mountain systems, which occupy about half of the country's area, belong to the category of world areas with the highest incidents of flooding. Floods are most prevalent on the southern slope of the Great Caucasus and high mountainous zone of Nakhchivan AR. Flood damage estimated at 18-25 million US dollars is caused to the country's economy annually. Impending climate change could increase the recurrence rate of inundations and cause serious hardship in the future.

Glaciers

The main glacier areas in Azerbaijan are found in the Gusarchay Basin in the Greater Caucasus. Over the last 110 years the area of glaciers has decreased from 4.9 km² to 2.4 km² and their lower boundaries are 3500 m above the sea level on average.

Groundwater

Groundwater originates in foothill areas of the Greater and Lesser Caucasus and lowland areas, Nakhchivan AR and Talish zone and constitute 24 million m³ per day (8,8 km³ per year). Presently, only 5 million m³ per day or 20% of these resources are tapped, suggesting high potential for groundwater use in low water seasons.

Water resources impact assessment and adequate adaptation measures

Vulnerability of water resources to climate change, as shown in the Initial National Communication, was simulated for 2021-2050 and 2071-2100 based on the PRECIS 1.4 model and recently-updated statistical models that reflect the dependence of river flows on meteorological factors. Natural water resources are gradually diminishing, leading to more frequent water shortages, and this trend will continue. Water shortages today happen mostly through leakages in distribution systems. If these are not mitigated, the situation might be aggravated in the future. According to the simulated data, the volume of natural water resources will not change significantly. The reduction of water resources in the Araz Basin will be compensated for by an increase in flows into the Caspian Sea from rivers in the eastern part of the country. In 2071-2100, water resources will be reduced by 10%, for a total of 26.3 km³. The shortage will amount to 4.0 km³ in the first period and 10.3 km³ in the second, 1.5- 3.0 times higher than the baseline level. The growth in population by 1.5-2.0 times will significantly constrain the water supply for the population.

The increase of precipitation during 2021-2050 and 2071-2100 shown by the PRECIS 1.4 model (particularly in the East) is the cause of some doubt. Other models indicate a future 15-20% reduction of water resources, which is confirmed in analyses of long-term trends in precipitation and run-off by regional specialists.

As is the case today, in the future the categories of agriculture, hydroenergy and water supply will be the most vulnerable:

- Taking contemporary water use as a basis, scarcity will be expected in the area of 250-300 thousand hectares, and this might result in the fall of crop yields;
- Declines in river flows might reduce energy production at HESs by 20%;
- The share of water per capita will fall by 1.5 times, and pollution will aggravate the situation.

Adaptation measures

In order to mitigate adverse effects of impending climate change, the following adaptation measures are proposed:

- . reducing water leakages in water management facilities;
- . introduction of additional sources of water;
- . use of hydrologic cycle water, including groundwater;
- . regulation of flows;
- . taking protective engineering measures in stream beds of lakes and rivers against floods;
- . building small HESs on mountain rivers and construction of new water impoundments;
- . building small HESs on existing irrigation channels;
- . clean-up of river channels, etc.

The variation of water flow by 30% (20 km³) between seasons should be taken into account through long-term hydrology prognoses.

Human health

The most common diseases in Azerbaijan are those that affect respiratory organs, blood circulation, and infectious and parasitic illnesses. Among diseases causing mortality, blood diseases rank first.

Climate change has potential impacts on human health and living conditions by increasing incidence of disease and causing disastrous hydro-meteorological events (inundations, flash floods, hurricanes, etc.).

Extremely hot weather and human health

In recent years, extremely hot weather in summertime in Azerbaijan has become the norm. Heat islands in Baku and other large cities exacerbate the problem for residents. In April through September of 2003-2006 it was found that a rise of temperature in Baku of 1.50C resulted in an increase in the number of calls for first aid by 21.5%.

Complaints related to blood, respiratory and neural diseases increased by 34.1%, 22.8% and 19.9%, respectively. In comparison with a number of European capitals, the general mortality rate in Baku is not high (3.4%), but this figure was higher for some diseases; deaths from myocardial infarction and stroke increased by 26% and 56%, respectively. If effective adaptation measures are not taken, the elevated rates of blood, respiratory and neural diseases is forecast to continue in 2021-2050, and in 2071-2100 they might significantly increase.

The increase in the elderly population in the future and the occurrence of urban heat islands might exacerbate the ill effects of the hotter weather.

Adaptation measures against extreme hot weather are as follows:

- . Enhancement of the emergency response capabilities of health service systems;
- . Taking account of the existing heat island effects and upcoming climate change in urban planning;
- . Greening the cities in a more rapid way and planting vegetation in large areas around the cities;
- . Installation of air conditioning systems in buildings and vehicles;
- . Compliance with construction standards related to the environment;
- . Enhancement of the extreme hot weather warning system;
- . Education of the public on proper behavior during hot weather (level of activity, nutrition, clothing, etc.) and first aid response to sunstroke by means of mass media.

Climate change impact on coastal areas

The length of the Azerbaijani coastline on the Caspian Sea is 850 km. (During an extreme rise of the sea level it constituted 738.1 km.) Presently, ten administrative regions of Azerbaijan (including the Absheron Peninsula) are situated on the coast, and according to unofficial data, 4 million people are settled there. The largest cities of Azerbaijan, Baku and Sumgayit, and more than 75% of industry are situated along the coast. Sea level fluctuations are a major cause of concern. Direct climate processes in the sea catchment area have caused fluctuations from -20.00 mBS to -34.00 mBS (absolute level) over the past 3500 years. Analysis of various long-term prognoses of sea level fluctuations has found that none of them is particularly reliable. According to instrumental observations, the sea level has fluctuated -25.00 to - 30.00 mBS since 1830.

As defining vulnerability assessment for Bern Convention species and habitats takes long time (approximately 2-3 years) we cannot provide you information on this issue. But, here is the list of fauna species in Azerbaijan for Bern Convention:

List of fauna species of Azerbaijan for Bern Convention**Mammals****INSECTOVORA***Soricidae*

Crocidura suaveolens

MICROCHIROPTERA

Rhinolophus hipposide

Rhinolophus hipposide

Rhinolophus euryale

Rhinolophus mehelyi

Rhinolophus ferrumequinum

Myotis bechsteinii

Myotis blythii

Myotis natterereri

Myotis emarginatus

Myotis mystacinus

Myotis aurascens

Myotis brandtii

Myotis daubentoni

Plecotus auritus

Plecotus macrobullaris

Barbastella barbastellus

Barbastellaleucomelas

Nyctalus noctula

Nyctalus leisleri

Pipistrellus pygmaeus

Pipistrellus nathusii

Pipistrellus kuhlii

Hypsugo savii

Vespertilio murinus

Eptesicus nilssonii

Eptesicus serotinus

Eptesicus bottae

Miniopterus schreibersii

Tadarida teniotis

Myotis mystacinus

CARNIVORA*Canidae*

Canis lupus

Ursidae

Ursus arctos

Mustelidae

Lutra lutra

Vormela purugusna

Felidae

Felis silvestris

Panthera pardus

ARTIODACTYLA*Cervidae*

Cervis elaphus

Bovidae

Capra aegagrus

Gazella subgutturosa

Rupicapra rupicapra

Birds

GAVIIFORMES

Gaviidae

Gavia stellata

Gavia arctica

PODICIPEDIFORMES

Podicipedidae

Podiceps auritus

Podiceps grisegena

Podiceps nigricollis (caspicus)

Podiceps ruficollis

PELECANIFORMES

Phalacrocoracidae

Phalacrocorax pygmaeus

Pelecanidae

Pelecanus onocrotalus

Pelecanus crispus

CICONIIFORMES

Ardeidae

Ardea purpurea

Ardeola ralloides

Botaurus stellaris

Bulbucus (Ardeola) ibis

Casmerodius albus (Egretta alba)

Egretta garzetta

Ixobrychus minutus

Nycticorax nycticorax

Ciconiidae

Ciconia ciconia

Ciconia nigra

Treskiornithidae

Platalea leucorodia

Plegadis falcinellus

Threskiornis aethiopicus

Phoenicopteridae

Phoenicopus ruber

ANSERIFORMES

Anatidae

Anser erythropus

Branta ruficollis

Cygnus cygnus

Cygnus bewickii (columbianus)

Marmaronetta (Anas) angustirostris

Mergus albellus

Oxyura leucocephala

Tadorna tadorna

Tadorna ferruginea

FALCONIFORMES

Pandionidae

Pandion haliaetus

Accipitridae

Pernis apivorus

Milvus milvus

Milvus migrans

Circus cyaneus

Circus macrourus
 Circus pygargus
 Circus aeruginosus
 Accipiter gentilis
 Accipiter nisus
 Accipiter badius
 Accipiter brevipes
 Buteo lagopus
 Buteo rufinus
 Buteo buteo
 Circaetus gallicus
 Hieraeetus pennatus
 Aquila nipalensis
 Aquila clanga
 Aquila pomarina
 Aquila heliaca
 Aquila chrysaetos
 Haliaeetus leucoryphus
 Haliaeetus albicilla
 Gypaetus barbatus
 Neophron percnopterus
 Aegypius monachus
 Gyps fulvus
Falconidae
 Falco cherrug
 Falco biarmicus
 Falco peregrinus
 Falco columbarius
 Falco subbuteo
 Falco naumanni
 Falco tinnunculus
 Erythropus (Falco) vespertinus

GRUIFORMES

Gruidae
 Grus grus
 Grus leucogeranus
 Anthropoides virgo
Rallidae
 Crex crex
 Porphyrio porphyrio
 Porzana porzana
 Porzana pusilla
 Porzana parva
Otididae
 Otis tarda
 Tetrax tetrax
 Chlamydotis undulata

CHARADRIIFORMES

Charadriidae
 Arenaria interpres
 Charadrius alexandrinus
 Charadrius dubius
 Charadrius hiaticula
 Charadrius leschenaultii
 Eudromias morinellus
Scolopacidae

Calidris alba
Calidris alpina
Calidris ferruginea
Calidris minuta
 Calidris temminckii
 Gallinago media
 Limicola falcinellus
Numenius tenuirostris
Tringa cinerea
Tringa glareola
 Tringa hypoleucos
 Tringa ochropus
 Tringa stagnatilis
Recurvirostridae
 Himantopus himantopus
 Recurvirostra avosetta
Phalaropodidae
 Phalaropus lobatus
Burhinidae
 Burhinus oedicnemus
Glareolidae
 Cursorius cursor
 Glareola partincola
 Glareola nordmanni
Laridae
 Chlidonias hybrida
 Chlidonias leucopterus
 Chlidonias niger
 Gelocheidon nilotica
 Hydroprogne caspia
 Larus genei
 Larus melanocephalus
 Larus minutus
 Sterna albifrons
 Sterna hirundo
 Sterna sandvicensis

COLUMBIFORMES

Pteroclididae
Pterocles orientalis
Pterocles alchata
Syrhaptes paradoxus

STRIGIFORMES

Strigidae
Bubo bubo
Asio otus
Asio flammeus
Otus scops
Athene noctua
Strix aluco

CAPRIMULGIFORMES

Caprimulgidae
Caprimulgus europaeus

APODIFORMES

Apodidae
Apus melba

CORACIIFORMES

Alcednidae

Alcedo atthis

Halcyon smyrnensis

Meropidae

Merops apiaster

Coraciidae

Coracias garrulus

Upopidae

Upopa epops

PICIFORMES

Picidae

Junx torquilla

Picus viridis

Dryocopus martius

Dendrocopos major

Dendrocopos syriacus

Dendrocopos medius

Dendrocopos leucotos

Dendrocopos minor

PASSERIFORMES

Alaudidae

Calandrella brachydactyla

Calandrella rufescens

Eremophila alpestris

Melanocorypha bimaculata

Melanocorypha calandra

Melanocorypha leucoptera

Melanocorypha yeltoniensis

Hirundinidae

Riparia riparia

Ptyonoprogne rupestris

Hirundo rustica

Delichon urbica

Motacillidae

Anthus campestris

Anthus trivialis

Anthus pratensis

Anthus cervinus

Anthus spinoletta

Motacilla flava

Motacilla feldegg

Motacilla lutea

Motacilla citreola

Motacilla cinerea

Motacilla alba

Laniida

Lanius cristatus

Lanius collurio

Lanius senator

Lanius minor

Lanius exubitor

Bombycillidae

Bombycilla garrulus

Cinclidae

Cinclus cinclus

Troglodytidae

Troglodytides troglodytides

Prunellidae

Prunella collaris

Prunella ocularis

Prunella modularis

Turdinae

Cercotrichas galactotes

Erithacus rubecula

Irania gutturalis

Luscinia luscinia

Luscinia megarhynchos

Luscinia (Cyanosylvia) svecica

Monticola saxatilis

Monticola solitarius

Oenanthe finischii

Oenanthe hispanica

 Oenanthe isabellina

 Oenanthe oenanthe

 Oenanthe pleschanka (leucomela)

 Phoenicurus orcruros

 Phoenicurus phoenicurus

 Saxicola rubetra

 Saxicola torquata

 Turdus torquatus

Sylviinae

Cettia cetti

Locustella luscinioides

Locustella fluviatilis

Locustella naevia

Lusciniola melanopogon

Acrocephalus arundinaceus

 Acrocephalus palustris

 Acrocephalus schoenobaenus

 Acrocephalus scirpaceus

 Hippolais caligata

 Hippolais icterina

 Hippolais languida

 Hippolais pallida

 Sylvia nisoria

 Sylvia hortensis

 Sylvia atricapilla

 Sylvia borin

 Sylvia communis

 Sylvia curruca

 Sylvia mystacea

 Sylvia nana

 Sylvia alchata

 Phylloscopus throchilus

 Phylloscopus collybita

 Phylloscopus lorenzi

 Phylloscopus sibilartix

 Phylloscopus nitidus

 Scotocerca inguieta

Regulinae

Regulus regulus

Muscicapinae

Ficedula hypoleuca
 Ficedula albicollis
 Ficedula parva
 Muscicapa striata

Timaliinae

Panurus biarmicus

Paridae

Remiz pendulinus
 Remiz macronyx
 Parus hyrcanus
 Parus cristatus
 Parus ater
 Parus caeruleus
 Parus major

Sittidae

Sitta europaea
 Sitta neumayer
 Sitta tephronota
 Tichodroma muraria

Certhiidae

Certhia familiaris
 Certhia brachydactyla

Emberizidae

Emberiza cia
 Emberiza citrinella
 Emberiza melanocephala
 Emberiza schoeniclus

Fringillidae

Carduelis cannabina
 Carduelis carduelis
 Carduelis chloris
 Carduelis flavirostris
 Carduelis spinus
 Carpodacus erythrinus
 Coccothraustes coccothraustes
 Loxia curvirostra
 Rhodopechys githaginea
 Serinus pusillus

Passeridae

Montrifringilla nivalis
 Petronia petronia

Sturnidae

Sturnus roseus

Orolidae

Oriolus oriolus

Corvidae

Pyrrhocorax graculus
 Pyrrhocorax pyrrhocorax

Reptiles**TESTUDINES***Testudinidae*

Testudo graeca

Emydidae

Emys orbicularis
 Mauremys caspica

Lacertidae

- Lacerta parva
- Lacerta trilineata - Lacerta media
- Ophisops elegans

Anguidae

- Ophisaurus apodus

OPHIDIA

Colubridae

- Coluber jugularis
- Coluber najadum
- Coronella austriaca
- Elaphe quatorlineata
- Natrix megalcephala
- Natrix tessellata
- Telescopus fallax

Viperidae

- Vipera lebetina
- Vipera ursinii

Amphibians/Amphibiens

CAUDATA

Salamandridae

- Triturus karelinii

INSECTA

Ephemeroptera

- Palingenia longicauda

Odonata

- Aeshna viridis
- Lindenia tetraphylla
- Stylurus flavipes
- Calopteryx syriaca
- Coenagrion mercuriale
- Leucorrhinia pectoralis
- Lindenia tetraphylla
- Stylurus (=Gomphus) flavipes

Coleoptera

- Lucanus cervus
- Dytictus latissimus
- Rosalia alpine

Orthoptera

- Saga pedo

Lepidoptera

- Hypodryas maturna
- Lycaena dispar
- Papilio alexanor
- Parnassius apollo
- Parnassius mnemosyne
- Zerynthia polyxena

Birds

Birds have received more recent attention than any other taxa in Azerbaijan, due to conservation efforts of NGOs and especially the Azerbaijan Ornithological Society (AOS) and its international partner, Birdlife International and the international birdwatchers that visit this country. At least 392 species of birds have been recorded in Azerbaijan, including at least 200 migratory species. Azerbaijan is an important migratory path for many species traveling from Europe and Russia and south to Africa and Asia. The lakes and wetlands of Azerbaijan attract many waterfowl species that migrate through or winter here. Many hawks, vultures and other raptors, including a number of IUCN

Red List endangered species like the lesser kestrel (*Falco naumanni*) and the imperial eagle (*Aquila heliaca*) also inhabit the forests, steppes and slopes of Azerbaijan. Three endemic bird species for Caucasus, the Caucasian snowcock (*Tetraogallus caucasicus*), the Caucasian black grouse (*Tetrao mlokosiewiczzi*) and the Caucasian chiffchaff (*Phylloscopus lorenzi*) are found only in Azerbaijan and neighboring areas in the Greater Caucasus Mountains. Azerbaijan holds important populations of a number of southern European species with restricted distributions, such as Ferruginous duck (*Aythya nyroca*), and Marbled teal (*Marmaronetta angustirostri*). During migrations and wintering periods, high numbers of wildfowl species, including the Lesser white-fronted goose (*Anser erythropus*), White-Headed duck (*Oxyura leucocephala*), a globally declining species and other waterfowl inhabit the wetlands too. The steppes of Azerbaijan also play seasonal host to thousands of wintering Little bustards (*Otis tetrax*), providing them with an important wintering ground.

Reptiles and Amphibians

Reptiles and amphibians in Azerbaijan, unlike fish, have little economic value and unlike birds and mammals, there are relatively few enthusiasts that study them. Recent efforts are now underway, funded by the German Technical Corporation (GTZ) to qualify the reptile species and later medicinal plants and fish in Azerbaijan.

In current draft documents by GTZ, based on Soviet era documents, Azerbaijan has been found to have two species of tortoise and one species of pond turtle, 26 lizards and 23 snakes. Amphibians are less studied but ten species of frogs and toads, two species of newts and a number of salamanders are recorded here too. The Talish area and the mountain forests of the Greater and Lesser Caucasus provide the best amphibian habitats in the country.

Fish

According to recent unofficial information from a scientist at the Azerbaijan Institute of Fish Economy, there are more than 120 species and subspecies of fish, in 17 families and 53 genera in Azerbaijan. Many of these are endemics to the Caspian Sea Basin, due to its long period of isolation from other water bodies. With the exception of a few species of herring, sprat and goby most Caspian Sea fish are also found in the rivers and inflows in the rest of the country. Six species of sturgeon are found in Azerbaijan waters and five of these are listed as Threatened in the most recent IUCN Red Data Book. Only one species of sturgeon is listed in the Red List for Azerbaijan. In addition to the native fish species, there are twelve introduced species, of which the Crucian carp (*Carasius carasius*) has become most common.

Invertebrates

Over 10,000 species of invertebrates have been recorded in Azerbaijan. Groups including many of the parasitic worm and flukes have been well studied, as have earthworms and some of the key insect groups – such as Lepidoptera (butterflies) and Coleoptera (beetles). The Coleoptera (with almost 5000 recorded species) along with Diptera (flies) and Hymenoptera (wasps and bees) show high species richness among the groups studied to date. According to a 2000 report by the Government of Azerbaijan to the Council of Europe, there are 14,000 species of insects and 11,000 species of arachnids (spiders) in the country.

Plants

The diversity of ecosystems in Azerbaijan and the long term isolation of specific habitats have led to an exceptionally high rate of endemism in plant species. Azerbaijan has more than 4,500 higher plant species, of which more than 800 are endemic species found only in Azerbaijan and adjacent habitats in the Greater and Lesser Caucasus Mountains or in the Talish-Lenkeran zone that continues on into Iran. Current botanical work in Hirkan National Park in this zone has already located 56 plant species that are sufficiently rare and in a small geographic distribution that they should be included in Azerbaijan Red Data Book updates, whenever these become official. As with neighboring Georgia and the rest of the wider Caucasus region, Azerbaijan is considered to be a center of origin for a number of globally important food crops. Azerbaijan is especially noted for fruit and nut trees, and the forests of the Greater and Lesser Caucasus Mountains and the Talish Mountains contain wild ancestors of apples, persimmons, walnuts, chestnuts, pistachios and many other species that have

been widely domesticated into many different varieties and strains. From an agrobiodiversity standpoint, a number of grains, particularly wheat, have also been developed here, but some are being lost due to changing agricultural practices in the country.

Vulnerability assessment of two flora species was defined in Azerbaijan for Bern Convention:

- *Ophrys oestrifera* Bieb. EN B1ab(iii)+2ab(iii)
- *Stevaniella satyrioides* (Stev.) Schlechter. VU A2c+3cd

Protected Areas

Protected areas system

Description of status, location and scope of protected areas

Pursuant to legislation of Azerbaijan Republic, protected areas and sites are national wealth of Azerbaijan Republic and cover natural complexes having specific ecologic, scientific and aesthetic value.

Protected areas of Azerbaijan Republic differed in conservation goals and usage features are assigned the following status:

- state nature reserves, including biosphere reserves
- national and natural parks
- ecological parks
- natural monuments
- state nature sanctuaries
- zoological parks
- botanical and dendrological parks
- sanatoria and resorts.

Activity of the existing protected areas necessitates execution of the scientific, conservative and tourism designated functions that it constitutes basis of activity of the same areas and their institutional commitments.

According to the Law №840/IG dated March 14, 2000 “On protected areas and sites” of Azerbaijan Republic:

State nature reserves - areas having status of nature conservative and scientific-research institutions, which established for the purpose of preservation of typical and exotic natural complexes and sites in natural condition and study of progress of natural processes and occurrences. Functions of the state nature reserves are as follows:

- to carry out conservation of natural areas in order to preserve natural condition of genebank, biological diversity, ecological systems, natural complexes and sites;
- to organize and conduct scientific researches and to compile “Nature chronicle”;
- to implement ecological monitoring within the framework of state monitoring of the environment and natural resources;
- to participate in state ecological expertise of location designs and schemes of farming areas and other facilities;
- to assist in training of scientific personnel and specialists on environmental protection and nature conservation.

National parks - areas having status of nature conservative and scientific-research institutions where natural complexes of preferential ecological, historical, aesthetic and likewise importance located on and, used for nature conservative, enlightenment, scientific, cultural and other purposes. Functions of the national parks are as follows:

- to preserve natural complexes, exotic and standard natural zones, historical-cultural sites;
- to create opportunities for tourism and rest (recreation);
- to develop and apply scientific methods of nature conservation and ecological enlightenment;

- to enlighten the population from ecological standpoint;
- to implement ecological enlightenment;
- to restore the damaged natural and historical-cultural complexes and sites.

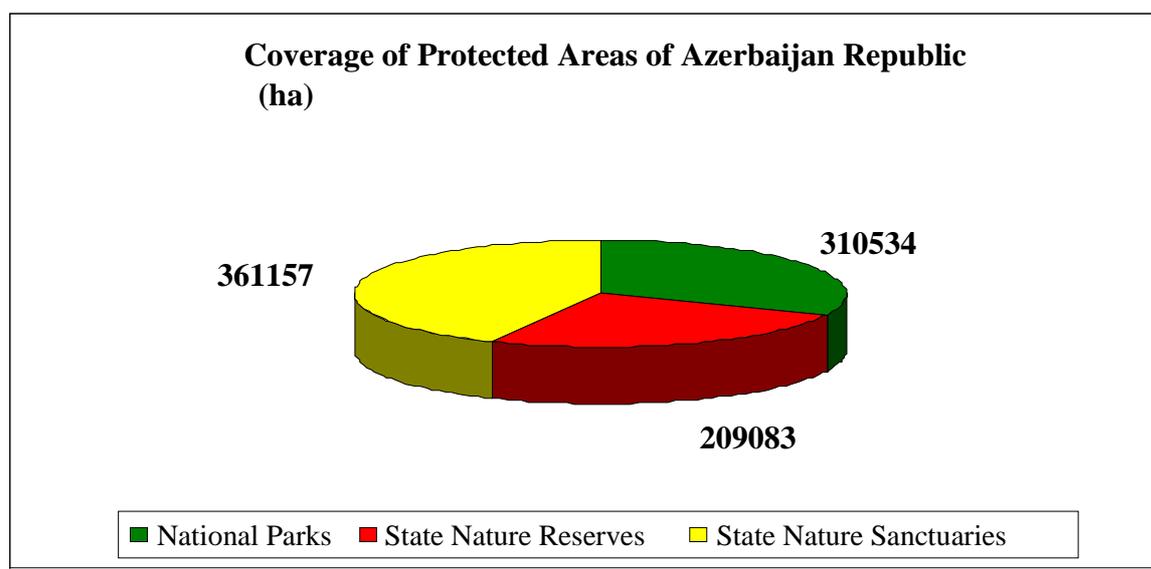
State natural sanctuaries - areas of particular importance for protection or restoration of natural complexes and or their components as well as for maintenance of ecological balance. State natural sanctuaries can be organized in land plots of owners, users and tenants without disappropriation of them in a manner provided by the legislation. Functions of the state natural sanctuaries are as follows:

- to protect or restore natural complexes and or their components;
- to maintain ecological balance;
- to ensure adherence to restrictions set in farming activity of land owners, users and tenants depending on establishment profile (objective);
- to implement scientific, cultural, educational and limited farming activities.

First preservations, i.e. Goygol, Zagatala and Gizilaghaj state nature reserves were established in 30th years of the last century in order to protect charming nature of Azerbaijan. Adoption of “Law on Azerbaijan Nature Conservation” in 1969 caused a rise in number and growth of the reserves in our country. As a result, additional 6 other protected areas - Shirvan, Basitchay, Garayazi, Aghgol, Ismayilly, Iisu and Altiaghaj state nature reserves were established.

It should be noted that there existed 14 state nature reserves and 20 state nature sanctuaries with total area of 478000 ha in the territory of our country till 2001.

For conformity with up-to-date requirements of protected areas system in the Republic, conservation of all necessary ecosystems and key species and creation of buffers and protective zones, departments and administrations at status of National Park have been established since 2003 for the first time in the country history through more sustainable actions within the last years. Actions carried on enhancement and expansion of Protected Areas since 2003 were continued according to “Towards effective protected areas system - A guide for action on implementation of PAs Work Programme of Convention of Biological Diversity” and presently, there exist protected areas at total 880774.04 ha, including 8 National Parks, 11 state nature reserves and 24 state nature sanctuaries in our country.



Moreover, Gobustan state nature reserve and Baku Seaside National Park (area of 80 ha) are functioning, there exist 2083 centennial trees, 37 geological and paleontological sites and 15 thousand ha endemic and valuable forest lands.

While speaking on countrywide protected areas and their potential it should be noted regretfully that Basitchay and Gara-gol state nature reserves, Dashalty, Lachin, Gubadly, Arazboyu state nature sanctuaries and a number of valuable and exotic natural monuments left uncared in the territories of our republic, are at present outside the control of the Azerbaijani authorities. These areas include hundreds of centennial trees, 13197.5 ha valuable forestries, 6 geological sites in the conserved regions with total area of 44.3 thousand ha.

About 10.2% of the territory of Azerbaijan is covered by protected areas including eight national parks (3.6%), 11 state nature reserves and 24 sanctuaries. Three state reserves (Besitchay, Korchay and Qaragol) are at present outside the control of the Azerbaijani authorities. By definition, strict nature reserves in Azerbaijan are closed to visitors, except for scientists with a personal letter of permission from the Minister of the MENR.

Shirvan National Park

Established at 54373.5 ha in administrative areas of Garadagh district of Baku, Salyan and Neftchala regions on July 5, 2003. Shirvan National Park is located at 54373.5 ha of protected area overall 65580.0 ha in south-eastern Shirvan plain of Kura-Araz lowland, Shirvan State Nature Reserve at 4657.0 ha and Bandovan State Nature Sanctuary at 4930.0 ha.

Key objective in establishment of National Park aims to conserve semidesert landscape, gazelles included in the Red Book of Azerbaijan Republic and fauna species specific for the area.

Aghgol National Park

Established at 17924 ha in administrative areas of Aghjabedi and Beylagan regions on July 5, 2003.

Aghgol was included in "Ramsar List" of Ramsar Convention on wetlands of international importance as main habitats of water birds, being wintering place of migratory bird species as significant wetland.

Hyrkan National Park

Established on February 9, 2004. The National Park is located in south-eastern of Azerbaijan, i.e. in administrative areas of Lankaran and Astara regions. Its area is 40358 ha. Main purpose in establishment of National Park aims at complex protection of nature in the same area and conservation of unique relic and endemic plant species of III era.

Altiaghaj National Park

Established in administrative areas of Khizi and Siyazan regions on August 31, 2004. Its area is 11035 ha.

Main purpose in establishment of the National Park aims at conservation of natural landscapes, flora and fauna species of south-eastern slopes of Great Caucasus.

Absheron National Park

Established at 783 ha in administrative area of Azizbayov district of Baku city on February 8, 2005. The National Park is located in south-eastern end of Absheron peninsula - Shah Dili area.

Main purpose in establishment of Absheron National Parks aims at conservation of rare nature complexes, sites, Khazar seal, gazelle and wetlands.

Shahdagh National Park

Established in administrative areas of Guba, Gusar, Ismayilly, Gabala, Oghuz and Shamakhy regions on December 8, 2006. Its area totals to 130508 ha.

Objective in establishment of Shahdagh National Park is to restore and protect globally important mountain forests and pasture ecosystem located in uplands including multiple endemic and endangered species and transboundary migratory animals.

Goygol National Park

Established in administrative areas of Khanlar, Dashkasan and Goranboy regions on April 1, 2008. Its area totals to 12755 ha.

The National Park was established for the purpose of conservation of typical landscape, fauna and flora of Little Caucasus.

Zangazur National Park

There created Zangazur National Park named after academician Hasan Aliyev on the basis of Ordubad National Park and Shahbuz State Nature Reserve on November 25, 2009. Area of National Park is 42797.4 ha.

Alongside with National Park, Ordubad State Nature Sanctuary is located in 27869.0 ha of the protected area.

Objective in establishment of Zangazur National Park aims at protection of separate components in the area, availability of the unique climate, relief and other physical-geographical features and conservation of various animals, including endemic species.

There created Arpachay State Nature Sanctuary in 68911 ha area of Sharur region on June 26, 2009.

Objective at establishment of Protected Areas aimed to protect rich and endemic vegetation and wildlife.

Gizilaghaj State Nature Reserve

Established on July 3, 1929. Its area is 88360 ha. There exists Little Gizilaghaj State Nature Sanctuary at 10.7 thousand ha area together with the reserve.

Main purpose in establishment of the reserve aims at creation of favorable condition for study of natural complex in the area, protection and growth in number of wildlife inhabited here.

Gizilaghaj State Nature Reserve was included in "Ramsar List" of Ramsar Convention on wetlands of international importance as main habitats of water birds in 1976 and therefore, it is considered to be internationally important reserve.

Considering possible attraction of multiple local and foreign tourists to the area by variety of the reserve nature and richness of flora and mainly of fauna, it is planned to establish first seaside national park at the area of approximate 100000 ha on the basis of the reserve in the future.

Zagatala State Nature Reserve

Established in administrative areas of Zagatala and Balakan regions in 1929. Its area totals to 47349 ha.

Main purpose in establishment of Zagatala State Nature Reserve aims at conservation of natural complex, flora and fauna of south slope of Great Caucasus.

Turyanchay State Nature Reserve

Established on May 6, 1958. Its area is 22488 ha. The reserve is located in administrative areas of Aghdash, Oghuz, Yevlakh and Gabala regions.

Objective in establishment of Turyanchay State Nature Reserve is to protect one of arid forest areas, i.e. Bozdagh arid forest landscape complex being the principal one.

Shirvan State Nature Reserve

Established in administrative areas of Salyan and Neftchala regions on April 30, 1969. Its area is 4657 ha.

Objective in organization of the reserve is to conserve and rehabilitate gazelles included in the Red Book of Azerbaijan Republic and other fauna species specific for this area. The reserve is functioning in the composition of Shirvan National Park.

Basitchay State Nature Reserve

Established in administrative area of Zangilan region on July 4, 1974. Its area totals to 107 ha. It was arranged for conservation of rare natural plane forest.

The reserve, which contains rare natural plane trees, is presently outside the control of the Azerbaijani authorities.

Garayazy State Nature Reserve

Established in administrative area of Gazakh region on March 2, 1978. The area is 9658 ha.

Nature complex of well-known tugai (riparian) forests is protected in the reserve.

Ilisu State Nature Reserve

Established in administrative area of Gakh region on February 20, 1987. Area of the reserve is 17381.6 ha.

Objective in organization of the reserve is to conserve and restore natural complex.

Garagol State Nature Reserve

Established in administrative area of Lachin region on October 17, 1987. The area totals to 240 ha and is one of the high mountainous lakes being particularly interesting. Alp has landscape complex. This lake is characterized in important hydrological and economy.

The reserve is at present outside the control of the Azerbaijani authorities.

Eldar Shamy State Nature Reserve

Established in administrative area of Samukh region on December 16, 2004. The area covers 1686 ha.

Objective in establishment of the reserve is to conserve rare Eldar shamy forest.

State Nature Reserve for Mud volcanoes range of Baku and Absheron peninsula

Established on August 15, 2007. The area covers 12322.84 ha. 52 mud volcanoes were titled as state nature reserve. Objective in establishment of the reserve is to organize elimination of anthropogen impacts upon mud volcanoes and protection of them which located in Baku and Absheron peninsula.

Korchay State Nature Reserve

Established in administrative area of Goranboy region on April 1, 2008. The area covers 4833.6 ha.

Objective in establishment of the reserve is to conserve rare animal and bird species.

Conservation outside Protected Areas

1. In situ conservation measures in the wider landscape

The President of Azerbaijan Republic signed a Decree №1152 dated February 18, 2003 “National Programme on forest renewal and enhancement in Azerbaijan Republic” and according to the Decree the Ministry of Ecology and Natural Resources prepared National Programme on forest renewal and enhancement by involving state and local self-governing bodies and scientific organizations. There carried out actions for forest renewal and reforestation at 69700 ha area under the Programme. 66400 ha of them are shared by the Ministry of Ecology and Natural Resources.

There established regional forest seed orchards such as Absheron, Guba and Kura (Hajigabul) in order to create plant materials containing various trees and shrubs required for establishment of protective forest lands in Caspian side sandy places. More than 21 million various trees and shrubs were cultivated in the above regional forest seed orchards from their establishment time up today. The Ministry of Ecology and Natural Resources carried out reforestation works at total 60674 ha area from its establishment time up today that 24132 ha are shared by newly planted forests. At the same time, total 200 million plant materials were cultivated in various cultivars and strains comprised by trees and shrubs within this period. Seed harvesting totalled to 1155 tons.

Moreover, launching of National Monitoring system on 2001 aims at collection of environmental monitoring data and tracking of processes in water basins, soil and atmosphere and, assessment of anthropogenic impacts upon the environment. The Ministry of Ecology and Natural Resources has created special network engaged in collection of information and data on biodiversity monitoring, i.e. vegetation and forests and animal population within this structure.

2. *Ex situ* conservation

In general, there is little *ex-situ* propagation or reintroduction of rare native species in Azerbaijan, despite recent efforts to improve the situation including legislation to support *ex-situ* conservation¹. In particular, there is a real lack of local expertise in *ex-situ* conservation. There is a need to develop a coherent strategy for *ex-situ* conservation, captive breeding and reintroduction in Azerbaijan, in line with international (IUCN) guidelines. As a start, laws are currently in force, that protects threatened species from unlicensed collection for unofficial breeding or propagation programmes.

Plant propagation and botanic gardens

The main collection and site for plant propagation in Azerbaijan is the Mardakan Tree Nursery, which was established in 1926 on a 12 ha site on the Absheron Peninsula, 40km from Baku. This garden hosts a wide collection of specimens, both of exotic and native species.

Captive breeding

The main centre for captive breeding in Azerbaijan is at the Baku City Zoological Park, which has a collection of nearly 200 different species. The zoo is active, and the size of collections has grown over the period 2001 to 2003. The collection includes a number of species that are listed on the Azerbaijan Red Book, including Mediterranean turtle (*Testudo graeca*), greater flamingo (*Phoenicopterus roseus*), Dalmatian pelican (*Pelecanus crispus*), purple gallinule (*Porphyrio porphyrio*), mute swan (*Cygnus olor*), tawny eagle (*Aquila rapax*), Peregrine falcon (*Falco peregrinus*), lammergeier (*Gypaetus barbatus*), and goitred gazelle (*Gazella subgutturosa*).

In addition, the zoo is actively involved in breeding a number of animals, including native species such as European pond turtle (*Emys orbicularis*), Mediterranean turtle (*Testudo graeca*), Caspian gecko (*Cyrtopodion caspius*), Griffon vulture (*Gyps fulvus*), purple gallinule (*Porphyrio porphyrio*), golden jackal (*Canis aureus*), wolf (*Canis lupus*), badger (*Meles meles*), and goitred gazelle (*Gazella subgutturosa*).

According to the Decree №109 dated 26, 2008 of the President of Azerbaijan Republic, works are ongoing towards creation of Zoological Park to the extent of 200 ha area responding the highest standards by the Ministry of Ecology and Natural Resources.

National Parks	Size (ha)	Est. Date*	Major Habitats	Representative Species
1. Absheron N.P.	783.00	2005	sea coast	Caspian seals, birds
2. Altiagac N.P.	11035.00	2004	Mountain forests	hornbeam, beech, bear, lynx
3. Shirvan N.P.	54373.50	2003	semi desert, wetlands	gazelle, flamingo, migr. birds
4. Agh Gol N.P.	17924.00	2003	semi desert, wetlands	many birds, reed cat
5. Hyrcan N.P.	40358.00	2004	Talysh Mt. Relict forest	endemic plants, leopards
6. Zengezur N.P.	42797.40	2003	semi arid mountains	mouflan, Bezoar goat, leopard
7. Shahdag N.P.	130508.10	2006	high mts and forests	endemic plants, birds, tur
8. Goy Gol N.P.	12755.00	2008	Mid-altitude mts	oaks, maples, bear, marten
Total land in N.P.s	310534			
State Nature Reserves	Size (ha)	Est. Date*	Major Habitats	Representative Species
1. SNR Ghizil-Agaj	88360	1929	saline, fresh wetlands	migratory birds, fish
2. SNR Ilisu	17381.60	1987	Mountain forests	Hornbeam vultures, bear
3. SNR Zakatala	47349	1929	forests, alpine meadows	Yew, birch, bear, chamois
4. SNR Turyanchay	22488	1958	Gravel formations	pistachio, bear, vultures
5. SNR Edlar Shami	1686	2004	semi desert, steppe	eldar pine, chucar, boar
6. SNR Garayazi	9658	1978	Floodplain forests, steppe	willow, acacia, deer, badger
7. SNR Korchay	4833.60	2008	semi desert	wormwood, eagles, gazelle
8. SNR Mud Volcanos of Baku-Absheron Peninsula	12322.84	2007	mud and rock	Sparse vegetation
9. SNR Gara Gol	240	1987	glacial lake	clover, buttercup
10. SNR Basitchay	107	1974	Riverbed	Eastern plane tree, juniper
11. SNR Shirvan	4657	1969	semi desert, wetlands	gazelles
Total land in SNRs.	209083.04			

State Nature Sanctuaries	Size (ha)	Est. Date*
1. SNS Lachin	20000.00	1961
2. SNS Korchay	15000.00	1961
3. SNS Bendovan	4930.00	1961
4. SNS Sheki	10350.00	1964
5. SNS Gusar	15000.00	1964
6. SNS Shemkir	10000.00	1964
7. SNS Gil island	400.00	1964
8. SNS Garayazi-Aghstafa	10000.00	1964
9. SNS Berde	7500.00	1966
10. SNS Zuvand	15000.00	1969
11. SNS Ordubad	27869.00	1969
12. SNS İsmayilli	23438.00	1969
13. SNS Gubadli	20000.00	1969
14. SNS Lesser Gizil-aghac	10700.00	1978
15. SNS Dashalti	450.00	1981
16. SNS Gizilca	5135.00	1984
17. SNS Arazboyu (Zengilan region)	2200.00	1993
18. SNS Gabala	39700.00	1993
19. SNS Gax	36836.00	2003
20. SNS Hyrcan	1553.00	2005
21. SNS Arazboyu (Nakhchivan AR)	9118.00	2005
22. SNS Zakatala	6557.00	2008
23. SNS Arpachay	68911.00	2009
24. SNS Rvarud	510.00	2009

Total land in protected areas – 880774.04 ha, 10.2% (8 National Parks, 11 State Nature Reserves and 24 State Nature Sanctuaries).

BULGARIA / BULGARIE

NATIONAL REPORT ON CLIMATE CHANGE AND BIODIVERSITY 2012 (BULGARIA)

According to projected impacts and consequences of climate change for this century, regarding the territory of Bulgaria are expected larger temperature differences and more floods in winter, less summer rainfall and more fires - especially during the hottest time of year, increasing temperature, reduction of snow cover and increase the risk of soil erosion in the mountains, migration of species in the direction from south to north, respectively, from lower to higher parts of mountains, and increased risk of extinction of species.

Within the project SECILIA, simulated climatic scenarios for Bulgaria by applying a regional model ALADIN (source: NIMH) and the following conclusions about Bulgaria are made:

- Winters will be milder in the coming decades;
- Ice days will decrease, while higher temperatures will affect the many crops; Mean maximum summer air temperatures will be above 30° C, especially in lowland areas of the country;
- The number of summer days will be increased to 90 days in the period 2021-2050. The percentage of summer days is expected to grow by 18-20% and will reach over 40% in most lowland areas in southern Bulgaria;
- The hot days will increase to 30% by the end of the 21st century

The major challenge, facing the scientific community due to climate change is the analysis and evaluation of the effects of these changes on ecosystem functioning and hence the supply of ecosystem services. The general problem of all ecological analyses and all environmental decision processes in the enormous complexity of the investigated ecosystems and landscape patterns. To build up an evident projection that is able to represent the most important features of the environmental status, the ecosystem integrity, the complexity of ecosystem elements and the multiple webs of actions, reactions and interactions have to be considerate. Biodiversity is closely linked to ecosystem functioning. Changed processes lead to change of biodiversity structure, loss of species, emergence of invasive species and hence decreasing of the provision ecosystem services

I. Key challenges, caused by climate change in the country.

Marine Biodiversity: Among the main challenges, caused by climate change is the geographical isolation of the Black Sea, which makes it impossible or limited the movement in a natural way of the area of distribution of species in the north, following the favorable weather conditions. However, the migration of organisms in cold-depth is hindered by the presence of hydrogen sulfide in water masses of the Black Sea in depth of 150-200 m, which further hampers the adaptation of species to climate warming.

Another challenge is that a large number of endemic species have limited widespread in the Black Sea and they are particularly vulnerable to climate change due to the narrow limits of environmental tolerance.

Plants: Glacial relict plant species are particularly sensitive to climate change (warming and reducing the amount of rainfall). Analysis of data collected by field observations on the target glacial relict species shows that most of them have highly fragmented populations. Individual fragments often are relatively numerous, but are limited to small areas where abiotic environmental factors are very severe and there is no competition from other plant species.

Birds: As a serious challenge should be considered indirect effects of the equipment for renewable energy, including wind farms and solar farms on birds and in particular on migratory species. The potential negative effect is expressed, regarding habitat loss and the risk of direct confrontation, especially the concentration of birds and nesting areas. Specific concerns are some endangered species, nesting and wintering in Bulgaria as a Red-breasted Goose (*Branta ruficollis*), Imperial Eagle (*Aquila heliaca*), Egyptian vulture (*Neophron percnopterus*), Dalmatian Pelican (*Pelecanus crispus*) and Hunting falcon (*Falco cherrug*).

II. Integration of biodiversity into national strategies / policies / actions on mitigation of climate change and adaptation

Policy on Climate Change

- *Third National Action Plan on Climate Change*

In process of preparation are Third National Action Plan on Climate Change, Strategy on adaptation to climate change, including specific measures for biodiversity protection and National Climate change Act. The main strategic objective of the Third Action Plan on Climate Change is to outline a framework for action in field of climate change for the period 2013-2020, according to global policy and EU commitments, reflected in the adoption in late 2008 at highest political level (the European Council and European Parliament) legislation. The provided measures are consistent with Climate policy after 2007 as well as with national economy potential to reduce greenhouse gas emissions.

- *Joint Implementation Mechanisms*

Bulgaria takes up "joint implementation" as a major initiative to attract investment in activities for energy efficiency, renewable energy, cogeneration and new low carbon or carbon-free use of the mechanism technologies. By means of the mechanism the country successfully attracts private sector investment and facilitates technology transfer and know-how, which in turn helps to meet the requirements of European norms and standards. Projects 'Joint Implementation' have environmental, social and economic impact. Bulgaria participates in the European trading scheme for greenhouse gas emissions through the allocation under the National Plan for allocation and the related legal requirements and procedures.

Forestry Sector

Policy priorities in the forestry sector related mitigation and adaptation to climate change (<http://www.iag.bg>) are :

- Inclusion in the legislation on forests requirement for multifunctional forest management and implementation of long-term programmes ;
- Improvement of Cadastre and Database of forests through modern satellite technology and implementation of National Programme for forest inventory;
- Creation of an Interinstitutional Council for scientific services and implementation of good practices on prevention and forest adaptation to climate change;
- Implementation a programme of prevention and protection of forests against fires;
- Development and implementation of environmentally friendly regimes in forest of ecological network NATURA 2000;
- Information campaigns on the contemporary forest management;
- Inclusion in the new Forest Act (2011) ecosystems services and payment of their benefits;
- Increased utilization of waste wood biomass for obtaining renewable energy;
- Inclusion of programme of measures for adaptation of forests in Bulgaria and mitigation of the negative impact of climate change in national adaptation strategies and National Action Plan on Climate Change ;
- Improvement of the monitoring of pests and diseases in forest;
- Development and adoption of a National Strategy of Forests;
- Approval of the practices for sustainable forest management in Natura 2000 (2011);

In 2011 a Programme of measures on Adaptation of forests in Bulgaria and Mitigation of climate change was published. The conservation of forest biodiversity in Bulgaria in relation to climate change is analysed and relevant forest management is proposed. Climate scenarios, based on modern climate data and models are developed. On this basis, are defined areas of vulnerability of forest

ecosystems in terms of climate change and natural hazards - fires, pests and diseases. This Programme of measures will be used for elaboration of Strategy of Adaptation and National Action Plan on Climate Change. http://www.iag.bg/data/docs/Programa_ot_merki.pdf

With respect to investigate the forests genetic reserve a National report on the Status of forest genetic resources in Bulgaria was developed by the Forest Research Institute (Bulgarian Academy of Sciences). The researches on the genetic variability of main tree species in the country are summarized and the number of populations and their area are determined, which are included in *in situ* conservation units of forest species and *ex situ* conservation in collections, arboretums and seed banks. The outcomes will be used in carrying out the activities, related to the afforestation and application of sustainable forest management of forest ecosystems in terms of climate change.

Farming Sector

GHG emissions from Agriculture sector are a result of the activities and processes of production and processing of agricultural production, soil fertilization and treatment of animal waste. Processes and activities in this sector are mainly sources of CH₄ and N₂O. Powerful tool for reducing emissions is the application of good agricultural practices and compliance with the biological diversity in agricultural land undertaken within the Common Agricultural Policy, respectively, through payments and subsidies under Rural Development Programme (2007-2013).

III. Assessing the vulnerability of the species and habitats

Executive Environment Agency at the Ministry of Environment and Water organizes and coordinates the monitoring of biodiversity and maintains systems for biological monitoring <http://eea.government.bg/biodiversity/nsmbt/>, including species and groups of plants and animals (birds, large mammals, bats, etc.). Information is important for determining the status of species and their habitats, and making decisions, regarding their management. In terms of climate change, the data are indicative of general condition, trends, distribution and migration of species, but also for the ecosystems they inhabit and the modeling process. Observations on birds have the longest history and include the Mid-winter Waterfowl Census (conducted from 1967), observations of migratory species (more than 30 years), monitoring of common birds (since 2008), of breeding birds and monitoring of certain species (raptors and other species representing conservation interests) <http://www.bspb.org/>.

- *Birds*

Birds are one of the groups, vulnerable to climate change. Currently, there are no specific conclusions on this effect, but there is evidence of fluctuations of some migratory species' period, the places and length of stay in the country, during the migration. Is needed, however a longer period of observation and in-depth studies to identify impacts and to outline trends.

- *Invertebrate marine species and their habitats*

The only representatives of the marine invertebrate fauna, inhabiting the Bulgarian acvatory of Black Sea, which are included in the Bern Convention are *Pholas datylus*, and *Homarus gammarus*. Of these two species *Pholas datylus* is customary occupant while *Homarus gammarus* is rare for the Black Sea.

Vulnerability assessments of *Pholas datylus* and *Homarus gammarus* are not performed and they are not included in the new edition of Red Data Book of Bulgaria volume 2. Animals (Ed.) 2011). From the marine invertebrate fauna species evaluated only in the category of Vulnerable (VU) is *Eriphia verrucosa*. Habitat of *Pholas datylus* is classified and described as subtypes of the habitat 1170 Reefs of the Habitats Directive. Habitat of *Pholas datylus* is included in the Red Book of Bulgaria Volume 3. Habitat which is generally placed in the category of endangerment "vulnerable" [VU - A1, 2 D2 E2 G1 H1]. Habitat 1170 is included in Appendix № 1 of the Biological Diversity Act, and *Pholas dactylus* is included in some of the proposed protected areas of Natura 2000. Among the invertebrate marine species are those, which are not included in the Berne Convention, but has a key ecological role in the Black Sea such as the black mussel *Mytilus galloprovincialis* and therefore need special protection. Proposed are new areas, covering population of the black mussel *Mytilus galloprovincialis* in the Bulgarian Black Sea water area, for inclusion in the Natura 2000 network.

- *Marine mammal species*

With respect to the assessment of the status of marine mammals, which are target species, according to the Berne Convention, the Institute of Fishing Resources - Varna is implementing the Networking of monitoring of discarded cetaceans and assessing the incidental capture of them. The project is estimating incidence of stranded and incidental catches in fishing gear cetaceans. According to the recommendations of the Berne Convention to mitigate climate change impacts on biodiversity are taken measures to raise the awareness of the social benefits arising from biodiversity.

- *Marine habitats*

Within the project MESMA, FP7 and participation of Institute of Oceanology - Bulgarian Academy of Sciences (IO-BAS) are defined "significant" European marine habitats. An European catalogue of marine habitats is elaborated, which includes important Black Sea habitats (Salomidi et al., 2010).

Within the project STUDY THE BLACK SEA ECOSYSTEM TO THE BULGARIAN COAST IN TERMS OF CLIMATE CHANGE implemented by the Institute of Fishing Resources - Varna, an examination is made of the Black Sea ecosystem. Project activities also include the establishment of coming changes, building scientific capacity and knowledge to tackle new scientific challenges that climate change poses to each country.

- *Glacial relict species and habitats*

The project CONSERVATION OF BIODIVERSITY HOTSPOTS OF GLACIAL RELICT PLANTS IN BULGARIA -BG0034 (contractor Institute of Biodiversity and ecosystem research at BAS), studied populations of glacial relicts of the Bulgarian mountains, which have high genetic diversity and these populations is needed to be preserved. These include the following target species *Antennaria dioica*, *Bartsia alpina*, *Bistorta vivipara*, *Dryas octopetala*, *Leontopodium alpinum*, *Papaver degenii*, *Phleum alpinum*, *Salix reticulata*, *Saxifraga oppositifolia*, *Silene acaulis*, *Gnaphalium supinum*, *Juncus trifidus*, *Alopecurus gerardii*, *Saxifraga paniculata*, *Primula deorum*, *Rhodiola rosea*, *Plantago gentianoides*, and *Veronica kellereri*, *Potentilla fruticosa*, *Potentilla palustris*, *Astragalus alopecurus*, *Gallium boreale*, distributed in 13 habitat types, according to the Habitat Directive: 4060; 4070*; 6150; 6170; 6230*; 62 D0; 6430; 7140; 8110; 8210; 8220; 91W0 and 95A0.

The climate in the studied areas will become warmer and drier, especially in the second half of the 21st century. It is likely to be a reduction in rainfall amounts and it is expected to have negative effects on ecosystems, incl. and forest. Main threats identified in addition to climate change are tourism in the region, the weak competitiveness of glacial relict species of plants and their suitability to specific environmental conditions. Strong negative impacts of changes in microclimate can occur when large groups of trees are cutting or change in the water regime in neighboring territories. Although the impact in these cases is indirect, it can cause local temperature increase and lead to localized drought, which would cause a significant change in the area of distribution of populations of glacial relicts.

- *Forest ecosystems*

Monitoring of forests ecosystems: <http://eea.government.bg/cms/bg/soer-bg-2009/3quality/8forest>

Forests represent a diverse habitat in nature and are particularly important for conservation of biodiversity and biological resources, and climate regulation. Contemporary forest management objectives are not only to secure timber production, but also the maintenance of ecosystem services such as finding the right balance between environmental and economic interests. Important role in sustainable forest management has the information, gathered in the monitoring of forest ecosystems. The ongoing drought and climate change, and changes in forest health, require the monitoring of forest ecosystems at two levels - a large-scale and intensive monitoring. In large-scale monitoring annually are collected information on defoliation and discoloration of the crowns, defines the causes of observed symptoms of disease and injury, analyzed changes in the health of trees and plants and

the relationship between the observed damage to the habitat conditions, the main climatic parameters, soil characteristics, air pollution and others. For the purpose of intensive monitoring observations is to establish relationships between habitats, stressors and the condition of forest ecosystems. Based on many years of monitoring of forests in Bulgaria and Europe, has developed a harmonized system of criteria and indicators for forest health, as well as appropriate monitoring techniques.

Within the project CLIMATE CHANGE AND ITS IMPACT ON WATER RESOURCES Southeast Europe OP, EU, has been estimated the impact of forest ecosystems on the quantity and quality of water resources in the catchment of the Struma river situated in one of the most affected by climate change areas in Bulgaria. Recommendations are made regarding the application of appropriate silvicultural methods in order to adapt the forest ecosystems to adverse climate change and preserve their role as a major source of water resources and their quality regulator. <http://www.iag.bg>

IV. Protected Areas

One of the priorities of Ministry of Environment and Water is to participate in the development of EU common policies for adaptation. Good management of ecosystems such as wetlands and forests remains an effective mitigation options given the high sequestration potential of natural systems. It is envisaged to determine the most vulnerable zones: alpine forests, wetland and lower mountain zone up to 800 altitudes and preference is given to the evaluation of the most sensitive biological groups such as migratory birds, amphibians and reptiles, invertebrates, plants. Protected areas are a priority for inclusion in adaptation measures as an important tool for preserving genetic, species and ecosystem diversity.

Currently, the area of European ecological network Natura 2000 in Bulgaria is 34.4 percent of the country. This is one of the highest rates in the European Union. The network of protected areas (national parks, reserves, managed reserves, protected areas and natural monuments) covers an area of 582,122 ha, which represents approximately 5.3% of the country's territory. In relation to the effective functioning of these areas, the priorities are turned to sustainable management and the establishment of a network of interconnected marine protected areas.

Institute of Oceanology participates, as a leading national research organization in developing of the network of marine protected areas and protected areas in the Bulgarian Black Sea.

In 2007-2008, the Institute of Oceanology implemented the project THE DEVELOPMENT OF AN INDICATIVE ECOLOGICALLY COHERENT NETWORK OF SUB-TIDAL MARINE PROTECTED AREAS (MPAS) IN BULGARIA AND ROMANIA, financed by the BBI-Matra. Collected and analyzed are the scientific evidence for geographical distribution of habitats and status of species, subject to protection by the Bern Convention, namely: *Alosa immaculata* (syn: *A. pontica*, the Convention) *Tursiops truncatus*, *Phocoena phocoena*, *Delphinus delphis*, *Pholas dactylus*, *Zostera marina*. Based on the global scientific information are proposed to extend and revise the boundaries of existing or include new marine protected areas which to cover a sufficient population of the above mentioned species and ensure their protection .

Work on the establishment of representative and relevant regional Black Sea network of marine protected areas continues within the project CoCoNet, EC, FP7.

V. Link between climate change and invasive species

Climate change is directly related to the distribution and behavior of invasive alien species, quickly occupying new territories and expanding distribution of its vectors. Studies in-depth on them are performed by groups - vascular plants, terrestrial insect species, marine invertebrates, freshwater mollusks and fish species, amphibians. The most endangered are marine and freshwater habitats, and invertebrates are with the greatest potential to spread their negative impacts.

In connection with the recommendation to improve information on the biology of invasive species and how their populations respond to climate change, team of IO at BAS takes the following activities:

- Within the project KnowSeas, FP7, EC-SCIENTIFICALLY SUSTAINABLE MANAGEMENT OF EUROPEAN SEAS was erected working hypothesis for a correlation between climate change and invasive effects of predatory sea snail *Rapana venosa*, which is alien for Black Sea and coming from the Far East seas. Collected primary data about distribution, abundance and population parameters of *Rapana venosa* in 2010-2011 will allow to track future changes. Team IO-BAS analyzes possible management alternatives for supervising of *Rapana venosa* as invasive species and sustainable exploitation and was presented them to the relevant stakeholders.
- In the regional study TRANSBOUNDARY DIAGNOSTIC ANALYSIS 2007, served as a scientific basis for revising the Strategic Action Plan for Environmental Protection and restoration of the Black Sea 2009, an international expert group on biodiversity with partnership of IO at BAS prepared an inventory of invasive and introduced species in the Black Sea by 2006. An analysis of the main vectors of transmission indicates that about one third of all human mediated introductions of alien species is carried by ships (ballast water and sediment or fouling on hulls). The number of the introduced species correlates closely with increased ship traffic through the Bosphorus. This increases the risk of any imported species invasion and can cause damage to the Black Sea ecosystem (Langmead et al., 2009). In accordance with the scientific conclusions a statement of recommendations to the competent Marine Administration was supplied on the appropriate measures to prevent and control the spread of invasive species in the Black Sea from ships.

Within the project STUDY OF SHIP BALLAST FOR DETERMINING THE EXISTENCE OF INVASIVE SPECIES, implemented by Institute for Fishing Resources at Agricultural Academy (AA) for the first time in Bulgaria are examined the ballast water, arriving in the port of Varna in order to determine the presence of invasive species.

With a view to raising awareness of climate change is developed. EUROPEAN THEMATIC NETWORK ON AQUACULTURE, FISHERIES AND AQUACULTURE RESOURCES (AQUA-TNET 2008-II) - (AQUACULTURE, FISHERIES & AQUATIC RESOURCE MANAGEMENT TN). Is established multidisciplinary thematic network for closer interaction between education, research organizations and end users in the field of aquaculture.²

June, 2012

² The report is prepared by the Ministry of Environment and Water with kind assistance of Executive Forest Agency, Forest Research Institute, BAS, Institute for Fishing Resources at AAS, Institute of Oceanology at BAS, Institute of Biodiversity and Ecosystem Research at BAS, NGO Bulgarian Society for the Protection of Birds.

CYPRUS / CHYPRE

NOTE ON MEASURES AND STRATEGIES FOR BIODIVERSITY AND CLIMATE CHANGE

In an era of economic slow down the threat of climate change is an even bigger challenge. According to IPCC the Mediterranean region is an area that is particularly vulnerable to climate change.

Cyprus as a Mediterranean island needs a coherent plan to adapt to climate change and to combat it as far as possible. It is therefore expected that climate change will affect numerous sectors of the Cypriot economy. The Cyprus Government, recognizing the problem, is in the process of implementing a number of studies in relation to climate change and its effects on economy and society.

According to the aforementioned studies the sectors that will be affected are the following:

- Agriculture: soil erosion, loss of productivity of livestock/crops, increase in desertification process, loss of good agricultural land.
- Fisheries and aquacultures: reduced stock, invasive alien species due to the introduction of Red Sea species, loss of species, loss on productivity
- Biodiversity: reducing the productivity of forests, changes in habitats, loss of habitats, extinction of species, invasive alien species, changes in the distribution of species, extinctions of species
- Extreme weather conditions: More floods and droughts are expected. Changes in storm frequency will affect all the above-mentioned issues.
- Tourism: reduced tourism flow due to high temperatures during summer time.
- Health issues: diseases such as elonozia may appear again,
- Energy sector: Prolonged periods of drought resulting in higher energy demands especially for air conditioners could cause problems in the island's electricity distribution. Moreover infrastructure will be affected resulting in a severe impact on many sectors of economy and society
- Loss of land: Sea level rise may affect coastal communities and may lead to migration of people at higher altitudes.

Given the challenges of dealing with climate change the Cyprus Ministry of Agriculture, Natural Resources and the Environment cooperated with other stakeholders and relevant bodies to finalize the preparation of the following:

- National Action Plan to Combat Desertification
- National Action Plan on Biodiversity
- Impact Assessment of Climate Change on the Forests of Cyprus
- Assessment of the future of agriculture in Cyprus, which includes impact assessment of climate change on Cypriot agriculture.
- Experimental investigation of the impacts of minimizing irrigation needs while keeping the high sunlight and high temperature exposure in specific types of crops.
- Action Plan for achieving continuation of drinking water supply, independently from precipitation levels for production and supply of drinking water.

Since September 2011 a Life+ project with the name CYPADAPT is being implemented. The project aims to develop a National Adaptation Strategy. In order to achieve the goal for the preparation of the Strategy specific objectives have been set as follows:

- Describing the climate change and impacts
- Projecting future climate changes and providing estimates of potential impacts
- Assessing the sensitivity of different systems, sectors or communities to climate change.
- Assessing adaptive capacity, vulnerability and opportunities associated with climate change
- Proposing appropriate actions that should be taken immediately as well as policies for future actions.

For the successful implementation of the project six actions must to be fulfilled. Actions 1 and 2 have already been implemented and the project now is working on Action 3:

- Action 1: Described the preparatory actions. One of the activities was the recording of the observed impacts of climate change in different sectors such as forestry, fisheries, marine and coastal zones, freshwater and terrestrial biological systems.
- Action 2 Review of existing national adaption plans worldwide and assessment of relative measures implemented in Cyprus.
- Action 3: Prediction of future changes and responses due to climate change in Cyprus.
- Action 4:Development of a multi-criteria analysis tool for the elaboration of the adaption plan for Cyprus
- Action 5: Elaboration of a National Adaption Plan for Cyprus.
- Action 6: Dissemination

CZECH REPUBLIC / RÉPUBLIQUE TCHÈQUE

Biodiversity and Climate Change –report of the Czech Republic

The amended **State Nature Conservation and Landscape Protection Programme of the Czech Republic** was approved by the Government of the Czech Republic in November 2010 (Ministry of the Environment of the Czech Republic 2009a). Under Chapter *Landscape* there is formulated a target concerning biodiversity and climate changes - to preserve and improve ecological stability (*e.g.*, resistance and resilience) of the landscape by maintaining a network of biologically and ecologically significant elements, through a mosaic of connected biologically functioning elements (habitat patches) which are able – to some extent - to resist external negative effects including climate change. One of the key actions is up-dating of the Territorial System of Ecological Stability of the Landscape (TSES, a national multi-level ecological network, *cf.* Mackovčín *et al.* 2005) documentation. The network provides preservation of natural heritage including its richness, diversity and heterogeneity, favourable impact on the surrounding less healthy parts of the landscape, and forming a basis for multiple use of the landscape.

In May 2009, a draft version of the **Climate Protection Policy of the Czech Republic** was presented by the Ministry of the Environment of the Czech Republic (Ministry of the Environment of the Czech Republic 2009b). The final document will be submitted to the Government of the Czech Republic by the end of 2012 (most likely). Climate change has been already occurring in the Czech Republic and as projected, it will have further negative impacts. It is therefore necessary to adopt measures that will keep the undesirable consequences of climate change within acceptable limits. The document deals particularly with the urgent need to stabilize and reduce greenhouse gas concentrations in the atmosphere.

The purpose of the Policy is to propose functional measures and procedures, but not to replace other policies and strategies. The target of the Policy is to reduce greenhouse gas emissions by 20 % between 2005 and 2020 (*i.e.* by 40 % compared to 1990 level). Meeting the target is ambitious but feasible with full and timely use of suitably chosen measures and instruments. The shift in energy mix of the Czech Republic should lead up to 50 % reduction of CO₂ emissions of the energy sector (depending on the decision on use of nuclear power). The second highest potential is in reduction of the buildings energy intensity, the use of more energy-saving appliances and the installation of more efficient lighting. Various other measures to support increase in energy efficiency and reduce greenhouse gas emissions should be introduced in the transport, industry and agriculture sectors. The cumulative reduction potential of all included measures was calculated to be 28 million tones of CO₂-eq. a year by 2020.

The Policy addresses the adaptation issue only in general terms. Regarding the agricultural and forestry sectors the Policy deals particularly with following measures: reduction of methane production in agriculture, reforestation/afforestation, soil carbon sequestration, better efficiency of agricultural production and support of sustainable agriculture. Specific measures relating to biodiversity conservation will be included in the Strategy of Adaptation to Climate Change in the Czech Republic which has been under preparation, as mentioned below. The Ministry of the Environment of the Czech Republic has prepared an outline of the **Strategy of Adaptation to Climate Changes in the Czech Republic** (Ministry of the Environment of the Czech Republic 2009) based on the draft of the **Strategy on Adaptation Measures in Nature and the Landscape** ((Ministry of the Environment of the Czech Republic 2009c).), which was also approved by the Government of the Czech Republic in November 2010. The document shall be elaborated by the respective ministries, so that the Ministry of the Environment of the Czech Republic shall be able to submit to the Government a comprehensive national strategy on the topic. The draft strategy is not limited to simple description of the possible impacts of current and expected climate change on the landscape as a whole and on its individual components, but also proposes a range of the specific measures on how to cope with the consequences of changing climate for nature and the landscape in a reasonable manner in the Czech Republic. The documents summarize the current and projected

climate change effects on four main ecosystem types, namely: forest, aquatic, agricultural and urban. It also analyses financial sources, both domestic and the European Community's funds, with proposals for their changes to enabling implementation of adaptation measures in the landscape by various stakeholders. The Strategy also includes a gap analysis of the current legislation according to various sectors.

In July 2009 the Ministry of the Environment of the Czech Republic launched a new subsidiary scheme, the Landscape Natural Function Restoration Programme (LNFRP) and allocated 34.17 million CZK (1.3 million €) for it in 2009. The LNFRP focuses, *inter alia*, on supporting adaptation measures in the landscape related to the existing and projected climate change effects in water, non-forest and forest ecosystems. For the climate change adaptation measures, everybody can apply and the implementation is possible within the whole Czech Republic's territory.

The Ministry of the Environment of the Czech Republic has granted financial support to the following projects:

- **Czech Terra - adaptation of landscape carbon sinks in the context of global changes.**
<http://aplikace.isvav.cvut.cz/projectDetail.do?rowId=SP%2F2D1%2F93%2F07>

The main objective is to track and evaluate possible climate change adaptation mechanisms in the Czech Republic; to elaborate possible climate change adaptation mechanisms and significantly influence health, resistance and resilience of forest ecosystems; to develop various stress scenarios which can pose, in the near future, a risk to ecosystem health in the Czech Republic; with established dynamic information system it will be possible to determine changes in ecosystems and landscape components across the country associated with climate change; such information system will be accessible to experts and decision-makers.

- **Specification of current estimations of impacts of climate change in the sectors of water management, agriculture and forestry management, and adaptation measures. proposals.**
<http://www.isvav.cz/projectDetail.do?rowId=SP%2F1A6%2F108%2F07>

The main objective is to develop and up-date climate change scenarios for the Czech Republic for 2021-2050, 2071-2100 respectively, to specify expected impacts of climate change in hydrology, water management, agriculture and forestry, to propose relevant adaptation measures and to support implementing the National Programme to Abate the Climate Change Impacts in the Czech Republic.

- **Long-term changes in abundance and distribution of water-birds in the Czech Republic in relation to climate and environmental changes.**

The main objective is assess possible effects of climate changes and other external drivers on the model ecological/functional group (waterfowl) in the Czech Republic: the outputs of the study can be applied in nature conservation practice.
<http://www.isvav.cz/projectDetail.do?rowId=SP%2F2D3%2F109%2F07>

- **The impact of forest management type on biodiversity of forest ecosystems in the context of global climate change.**

The main objective is to evaluate the importance of selected impacts of forest management on the biodiversity of indicator groups of organisms in relation to the stand condition on the basis of gathering already existing and newly collected sets of data.
<http://www.isvav.cz/projectDetail.do?rowId=SP%2F2D1%2F146%2F08>

- **The dynamics of spreading of invasive plant species in the Czech Republic taking into account different scenarios of global climate change.**

The objective is to select suitable predictive systems for the Czech Republic; to develop alternative maps of possible invasive alien plant species distribution under the individual global change scenarios; to develop maps (identification possible monitoring sites, sub-national centres of biodiversity threatened by plant invasions, identification of sites for effective early warning and intervention); to summarize possible economic consequences based on invasive plant management; to draft a proposal of plant invasion management strategy/policy.
<http://www.isvav.cz/projectDetail.do?rowId=SPII2D1%2F37%2F07>

There have been many interim studies already presented, which can be seen under the same links.

One of the most important national forestry documents is the **National Forests Programme for the 2008- 2013** (approved by the Government of the Czech Republic). It also focuses on climate change issue. Under the Environmental pillar there is the Key Action 6 which reads: *“To alleviate impacts of expected global climate change and extreme meteorological phenomena”*.

Elaboration of the Key action 6 has been in progress. Partial outcomes of the Expert Group for the action indicate huge interest in increasing the proportion of broadleaves and in increasing the number of tree species used in particular stands. Changes in existing recommended guidelines for forest management regarding the tree species composition of future stands can also be one of the solutions. The key idea is to raise stands formed by three tree species in minimum, so that the species dominance would be 3 x 20% at least. This would definitely contribute not only to adapting forests in the Czech Republic to climate change, but also to support forest biological diversity. Proposals for other measures helping to increase biodiversity are expected as well – e.g. to support natural regeneration or enhance environmentally friendly afforestation of farmlands.

However, the whole Key action 6 has not yet been approved by the National Forest Programme Coordinative Board so it is necessary to wait for its endorsement, which is expected by the end of 2010.

In 2010, the Czech Geological Survey and the Ministry of the Environment of the Czech Republic launched an annual painting competition for schoolchildren and teenagers between the age of 6 and 18 years called *My Patch of Earth*, held under the auspices of the Ministry of Education, Youth and Sports of the Czech Republic. Children were invited to produce paintings on their visions of the future world, answering the question *How shall the world of humans, animals and plants look like if huge climate changes occur?* (<http://soutez-2010.geology.cz>).

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EUROPEAN COMMISSION / COMMISSION EUROPÉENNE

Implementation by Parties of Recommendations No. 135 (2008) and 143 (2009) of the Standing Committee on guidance and further guidance on biodiversity and climate change

The report³ aims to inform on the measures/actions/strategies/policies implemented in accordance to the guidance appended to Recommendation 135 (2008) and Recommendation 143 (2009).

➤ **Main challenges posed by climate change in the country**

The 2012 report on climate change impacts, vulnerability, and adaptation of climate prepared by the EEA et al. will be published in fall 2012.

➤ **Integration of biodiversity in climate change mitigation and adaptation national strategies/policies/actions;**

The European Commission plans to adopt a Green Paper on a Strategy on Green Infrastructure in fall 2012. This shall – *inter alia* – be a contribution to the overall adaptation effort.

Green Infrastructure is seen as an essential means of integrating biodiversity and climate change adaptation. Work is underway to further shape Green Infrastructure for the EU. The development of Green Infrastructure - using ecosystem-based approaches - working with nature is embedded in target 2 "by 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems" of the EU Biodiversity Strategy to 2020⁴.

In addition flood risk management and natural flood management options are also being developed, linking to the Green infrastructure aspects.

➤ **Vulnerability assessment**

A study to elaborate the guidelines on Natura 2000 and climate change also assessed current knowledge of risk from climate change to species and habitats of EU conservation concern protected by the network and set out on approaches to reduce, mitigate and adapt to such impacts, both within the sites and at broader network level. In addition it looked at the benefits arising from management and restoration of Natura 2000 sites to climate change mitigation and adaptation considering that Natura 2000 areas provide multiple benefits such as flood conveyance, maintaining water flow and quality of wetlands, natural coastal protection of dune systems, carbon sequestration of peatlands and the ability of forested mountain areas to prevent erosion and landslides.

Before publication the draft guidelines prepared under this contract need to be discussed with Member States and key stakeholders.

➤ **Elaboration and implementation of adaptation strategies/actions, including ecosystem-based approaches to climate change adaptation**

The EU Adaptation Strategy, planned for the first trimester in 2013, aims to enhance the preparedness and capacity to respond to the impacts of climate change in the EU, its Member States and regions, down to the local level. This includes, *inter alia*, preparing for and responding to rising temperatures, changing precipitation patterns, sea level rise and extreme weather events.

Based on the best available knowledge on climate impacts, risks and vulnerabilities, the EU Adaptation Strategy could outline a comprehensive range of feasible solutions and required actions at

³ Information in this report stems in part from the Joint Action Plan (JAP) on the follow-up to the White Paper on Adaptation COM(2009)0147:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009DC0147:EN:NOT>

⁴ <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>

all levels (EU, national, regional, local) and dimensions (sectoral and horizontal) to adapt to climate change. The Strategy should also take due account of other on-going activities at EU level in which adaptation considerations are already being integrated.

The development and use of ecosystem-based approaches to climate change adaptation and mitigation are one of the specific objective areas of the BEST⁵ initiative. The two consecutive open calls for proposals (BEST-2011 and BEST-2012) with a budget of 2 million € for each call were made possible due to the Preparatory Action BEST voted by the European Parliament. One of the 9 projects selected during the open call BEST-2011⁶ contributes to put in place a pilot partnership for the "*Development and Implementation of National-level Joint Activities between the Rio Conventions in Support of Ecosystem-based Approaches to Climate Change Mitigation and Adaptation*".

➤ **Cross cutting issues**

✓ *Invasive Alien Species*

Recognising the increasingly serious problem of invasive alien species in Europe, the European Commission is currently working on a dedicated legislative instrument on Invasive Alien Species which is due to be adopted by the end of 2012. This is one of six key objectives of the EU 2020 Biodiversity Strategy⁷. Technical support as well as the recommendations by stakeholders can be downloaded from the EC website⁸. Tackling invasive alien species is expected to contribute to the resilience of ecosystems and their capacity to respond to the impacts of climate change.

✓ *Protected areas and landscape scale conservation*

Natura 2000 is an ecological network of protected areas designated under the Birds Directive (Special Protection Areas, SPAs) and the Habitats Directive (Sites of Community Importance, SCIs, and Special Areas of Conservation, SACs). It represents the areas of highest biodiversity value in the EU, covering almost 18% of the terrestrial environment as well as substantial marine areas. Natura 2000. As the establishment phase is nearing completion the focus is increasingly on the management and restoration of sites in the network, and on its overall ecological coherence. Natura 2000 is a core element of the future Green Infrastructure for Europe.

➤ **Mainstreaming of adaptation to climate change in sectoral policies**

Mainstreaming climate change adaptation considerations into key EU policies has been an important element of the work in the area of adaptation.

Where relevant, please provide additional information on:

➤ **Knowledgebase, research, studies, monitoring and awareness raising**

The European Climate Adaptation Platform⁹ was launched in March 2012. More and more research findings are being made available on the costs of inaction and action on climate risks.

Several studies have been undertaken to underpin the work on Green Infrastructure including "*Green Infrastructure Implementation and Efficiency*" which gathered data and evidence on effectiveness, costs and benefits of GI. This in particular involved an assessment of the effectiveness and efficiency of different types of GI measures in terms of biodiversity and broader ecosystem benefits. Information on the variety of GI initiatives and their implementation across the EU has been gathered and in-depth case analyses of the most advanced approaches has been prepared to shed light on their socio-economic and biodiversity benefits. Socio-economic benefits assessed include health

⁵ BEST stands for Biodiversity and Ecosystem Services in EU Outermost Regions and Overseas Countries and Territories.

⁶ <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm> [you have to scroll down to the bottom of the page]

⁷ [http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_ACT_part1_v7\[1\].pdf](http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/2020/1_EN_ACT_part1_v7[1].pdf)

⁸ http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

⁹ <http://climate-adapt.eea.europa.eu/>

benefits, regulating services (e.g. water purification, recharging of groundwater, flood control, erosion control, carbon storage), provisioning services (eg water provision, soil fertilisation), cultural benefits (e.g. recreation, cultural identity), and broader economic benefits (e.g. tourism, employment) and supporting services (e.g. genetic diversity, nutrient cycling and decomposition, photosynthesis).

Another study delivered an *"Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe"*. The first objective of this study was to take stock of current examples of working with nature - ecosystem-based approaches to adaptation - in Europe and compare to the extent possible their cost to the costs of traditional engineered approaches. Secondly it reviewed where and to what extent ecosystem-based approaches have been integrated in climate change programmes on local, regional, national and transnational levels. Existing obstacles for integration of ecosystem-based approaches into climate change programmes were identified and recommendations brought forward how to overcome them. The final report has been listed as knowledge product in the UNFCCC information document on ecosystem-based adaptation¹⁰.

The reports of the studies as well as the recommendations by the Working Group on Green Infrastructure can be downloaded from the EC website¹¹.

¹⁰ FCCC/SBSTA/2011/INF.8, <http://unfccc.int/resource/docs/2011/sbsta/eng/inf08.pdf>

¹¹ http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

MALTA / MALTE

IMPLEMENTATION OF RECOMMENDATIONS NO. 135 (2008) AND 143 (2009) OF THE STANDING COMMITTEE ON GUIDANCE AND FURTHER GUIDANCE ON BIODIVERSITY AND CLIMATE CHANGE

*Information submitted by the
Malta Environment and Planning Authority (MEPA)*

May 2012

1. Main challenges posed by climate change in the country

The effects of climate change are already being felt in Malta as in other parts of the world. Small island states, such as Malta, have a number of geophysical and socio-economic characteristics that make them particularly vulnerable to the effects of climate change. Such characteristics include small overall land size, high population density, inherent land-resource constraints, limited natural resources, land fragmentation and higher susceptibility to natural hazards. Main challenges posed by climate change in Malta include drought, deterioration of fresh water resources, increased risk and intensity of flooding, soil and coastal erosion, desertification, changes in sea level, and progressive loss of biodiversity and resilience of natural ecosystems.

The 2010-2011 Environment Report Indicators related to climate change (www.mepa.org.mt/teri2010_2011) document that Malta's estimated greenhouse gas (GHG) emissions had increased by 49% between 1990 and 2010. Although rising, Malta's GHG emissions are low due to the nation's size in geographic, demographic and economic terms. GHG emissions are derived largely from the energy (including transport) and waste sectors. The climate change and energy sectors have well developed policy frameworks, which align national policy objectives with the United Nations Framework Convention on Climate Change (UNFCCC), and the EU Climate and Energy Package.

2. Integration of biodiversity in climate change mitigation and adaptation national strategies/ policies/actions

Biodiversity considerations are included in Malta's Climate Change Adaptation Strategy that was adopted in May 2012. This Strategy and the previous consultation documents are available at:

<http://www.mrra.gov.mt/page.aspx?id=124>

<http://www.mrra.gov.mt/loadfile.ashx?id=001d6ce1-8ca4-4550-aae5-647d50220cc6>

The Climate Change Committee for Adaptation as mentioned in the National CC Adaptation Strategy draws attention to *inter alia* the need:

- to strengthen protected sites of scientific importance as a fundamental pillar of Malta's biodiversity policy, with further extension to include the marine environment, and supplemented by the concept of Green Infrastructure (Recommendation 20);
- to include biodiversity conservation and the restoration of habitats to a favourable conservation status as one of the pillars of an adaptation strategy (Recommendation 22);
- to adopt a national strategy and appropriate contingency plans to deal with the threat posed by alien and invasive species, which could also have significant health and economic implications (Recommendation 25); and
- to safeguard biodiversity in all rural areas and not just in protected areas and hence calls for the maintenance of Maltese agro-ecosystems through the management of agricultural landscapes

since this has a central role to play in contributing to overall resilience to climate change (Recommendation 54).

The interlinkages between climate change and biodiversity, and synergies when addressing biodiversity loss and climate change in an integrated manner, are also recognised in the consultation document putting forward Malta's National Biodiversity Strategy and Action Plan (2012-2020) available at: www.mepa.org.mt/biodiversity-nbsap. The draft NBSAP, which was under public consultation till the 10 April 2012, proposes a number of action and outcome-oriented measures under the thematic area on climate change. Other relevant measures are included under the thematic areas which address: genetic resources and diversity, species and habitats, ecological network of protected areas, biological introductions, sustainable use of biological and natural resources, research and development, and biodiversity monitoring. In essence, such measures reflect Recommendations No. 135 (2008) and 143 (2009) of the Standing Committee on guidance and further guidance on biodiversity and climate change, as well as other guidance provided by relevant biodiversity-related Multilateral Environmental Agreements. The NBSAP also proposes a set of national targets including that by 2020, the impacts of climate change on ecosystems have been reduced, in so far as feasible and, mitigation and adaptation responses to climate change that support and conserve biodiversity have been agreed and are being implemented.

3. Vulnerability assessment for Bern Convention species and habitats

Malta's Second National Communication (SNC) to the UNFCCC identified various vulnerability and adaptation issues in individual sectors, including for biodiversity. The document is available at: www.mrra.gov.mt/loadfile.ashx?id=13bfd544-15f9-4a71-bc34-0192a04735e4. In the context of biodiversity, the SNC assesses the consequences of climate change on ecosystems in the Maltese Islands based on current best available knowledge on local biodiversity and professional judgement on the potential impacts from the expected climatic changes on local biota and habitats. In the case of terrestrial ecosystems the following consequences are mentioned: loss of biodiversity and increased risk of extinction, shift in the distribution of species, sea level rise, temperature increase, decrease in rainfall, and effects of carbon dioxide emissions on terrestrial ecosystems. Consequences of climate change are also assessed for marine ecosystems with respect to: temperature increase, changes in coastal hydrodynamics, changes in deep water circulation, sea level rise, increase in the intensity of rainfall events, and increase in carbon dioxide. The SNC draws attention to *Posidonia oceanica* meadows and the littoral and sublittoral species as some of the most vulnerable groups of marine species to such impacts. A number of adaptation measures are recommended with short term and long term goals. Measures include managing stresses on the environment, facilitating migration, undertaking habitat restoration and natural resources management, expanding reserves and other protected areas, carrying out environmental monitoring and increasing the knowledge base.

While recognising the need for more comprehensive studies on the effects on climate change on biodiversity, it is worth mentioning that local expert observations are noting the increase in drought-tolerant species in wetlands, and the arrival of new species to the Maltese Islands from northern Africa, possibly as natural extension (e.g. *Persicaria lanigera*; *Persicaria senegalensis*). However, the link of this with climate change has not been scientifically ascertained, as yet.

4. Cross cutting issues

Protected Areas

The development of management plans for terrestrial protected areas as part of an EU funded project, will take into consideration climate change and adaptation issues, in so far as possible.

Invasive alien species

Higher sea temperatures can result in the westward range expansion of Lessepsian migrants, leading to potential competition with native species. A local example of such a recent introduction of an Indo-Pacific species is the Blue-spotted Cornet Fish (*Fistularia commersonii*), first recorded in Maltese waters in 2005, and which is now on the increase (Deidun & Germanà, 2011).

5. Mainstreaming of adaptation to climate change in sectoral policies

Environmental Policy

Earlier this year, the Ministry for Tourism, Culture and the Environment adopted the National Environment Policy (NEP), as a comprehensive environmental policy covering all environmental sectors and natural resources, including climate, biodiversity, coastal and marine areas. The document is available from: www.tsdu.gov.mt/environment-nep.

The NEP considers both climate change and biodiversity and ecosystems as key long-term sustainability issues. In the context of climate change, the NEP includes the following relevant actions:

- (2.3.18) Undertake a study on coastal dynamics to address *inter alia* beach issues, in connection with climate change and other coastal processes causing erosion by 2014;
- (2.6.1) Implement the National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions;
- (2.6.2) Finalise and implement the National Climate Change Adaptation Strategy;
- (2.6.3) Prepare national impact scenarios on climate change by 2012;
- (2.6.4) Integrate climate change assessment into EIA and SEA processes; and
- (2.6.11) Review current spatial planning guidance and regulations with a view to further promoting climate change-related improvements by 2014.

In the context of biodiversity, the NEP includes the following relevant actions, amongst others:

- (2.3.16) Designate additional marine protected areas, including Special Protection Areas, and promote their management with a view to achieving the ecological and socio-economic goals set out for each area by 2017;
- (2.6.13) Finalise the National Biodiversity Strategy and Action Plan by 2012;
- (2.6.14) Ensure an adequate knowledge-base, including baseline information about national biodiversity and ecosystems by 2015;
- (2.6.19) Continue and strengthen the management of protected areas;
- (2.6.20) Draw up necessary management plans for terrestrial Natura 2000 sites by 2013;
- (2.6.22) Draw up an action plan to restore at least 15% of damaged ecosystems by 2020;
- (2.6.23) Prepare policy framework for the agriculture sector to integrate biodiversity considerations into future directions for the sector by 2014;
- (2.6.24) Prepare policy frameworks for the fisheries sector to integrate biodiversity considerations into future directions for the sector by 2014;
- (2.6.27) Continue to prevent introduction of invasive alien species through border controls and permitting; and
- (2.6.28) Identify, prioritise, control, mitigate and/or eradicate non-native alien species via the drafting of an Invasive Alien Species Strategy by 2015.

The NEP mentions that due to the expected impacts of climate change on soils and water availability to plants, and the need to address adaptation to climate change, further soil protection measures have become increasingly necessary. In this respect various soil and water related measures are also included in the NEP.

Land-use Planning

In the knowledge that land-use planning plays an important role in responding to climate change, MEPA launched a detailed assessment of its land-use planning system as part of the EU Interreg IV C “Regions for Sustainable Change” project. The project resulted in the provision of recommendations on the way forward for mainstreaming climate change into land-use planning including *inter alia* the

principle of green infrastructure which supports local biodiversity and healthy, living environments. More information is available from: www.mepa.org.mt/interreg4c_rsc.

Water

On recognition that climate change may significantly hinder attempts to restore water bodies to good ecological, chemical and quantitative status, an analysis of the linkages between climate change and water was addressed through a climate checking exercise of Malta's Water Catchment Management Plan in line with the requirements of the Water Framework Directive (WFD). Such consideration of climate change in the WFD process can also create synergies between WFD measures and national mitigation and adaptation efforts, including adaptation efforts in other sectors. The aim of this exercise was to climate proof measures in order to ensure the sustainability of investments over their lifetime taking an explicit account of a changing climate. This was done by identifying measures best suited to strengthen Malta's capacity to adapt to climate change (known as win-win measures) from those which would weaken that capacity or be less effective (known as regret measures). No regret measures were identified. The climate check is presented in Chapter 11 of the Water Catchment Management Plan for the Maltese Islands.

6. Main challenges faced while elaborating/implementing adaptation activities/policies

Main challenges arise in view of limitations associated with the information available on climate change effects on Maltese biodiversity. Such limitations include the following:

- local available data on climate parameters (especially long time-series data) is limited, thus also limiting projections of climate change impacts at a local scale;
- local data and knowledge on vulnerability is mainly qualitative rather than quantitative;
- the resolution of climate change projections and impact scenarios at a global/regional scale may not be applicable to the Maltese Islands or they do not necessarily take into consideration characteristics that are specifically associated with small island states;
- lack of long time-series data on species and ecosystems, as well as limited knowledge of native and endemic species' tolerance ranges to changes in environmental parameters; and
- paucity of knowledge in addressing climate change and adaptation issues in the local management of protected sites.

Given the existing limitations of available information, there is a need to step up research on the effects of climate change on biodiversity, in order to fill knowledge gaps. This is essential in order to minimise, in so far as possible, climate change impacts on threatened and protected species and natural habitats, and, so that effective adaptation and mitigation measures, which integrate biodiversity considerations, are developed and implemented.

NORWAY / NORVEGE**NORWEGIAN DIRECTORATE
FOR NATURE MANAGEMENT****Bern-convention: Implementation by Parties of Recommendations No. 135 (2008) and 143 (2009) of the Standing Committee on guidance and further guidance on biodiversity and climate change****REPORT FROM NORWAY.****• Main challenges**

Norway is expected to get warmer and wetter during the next century. The temperature will rise most in winter, particularly in the north. Precipitation will increase in autumn, winter and spring, especially in West Norway. The growing season will be longer, with less snow in the lowlands.

A warmer climate forces species to move higher on the mountains or further north, and ensuring corridors for migration and combating habitat-fragmentation are main challenges. Some high-alpine or arctic species, like the polar bear and the Arctic fox, may, however, not have suitable places to move to in the future, exacerbating the management challenges. Another important issue is to ensure large enough populations with high genetic variability (e.g. focus on red list species) so the species may be able to adapt to climate change through natural selection.

A Norwegian assessment has shown that many alien invasive species (e.g. sycamore, wild boar, raccoon dog, some insects) will find conditions more favourable with climate change, hence increasing the threat to indigenous species. Having been safe from the establishment of many alien species earlier due to the cold winters, Norway now face a much greater challenge with the combination with climate change.

Plant growth increases in a warmer, milder climate and leads to more rapid overgrowing of the landscape where farming ceases or declines, increasing the already existing high threat to important cultural landscapes.

In freshwater systems both temperature increase and changes in precipitation offer challenges. Higher precipitation gives more runoff. More nutrients in fresh water may lead to lakes becoming choked with vegetation and cause algal blooms. The higher temperatures influence the water temperature and hence the living conditions for different species. E.g. the cold-water fish, Arctic char, is expected to be particularly vulnerable. In addition, the indirect effects of new (native or alien) species with climate change, are regarded to have potentially large impacts on freshwater biodiversity in the future.

With regard to effects of climate change in the ocean, both the effects on ocean temperature and currents and of acidification are of highest concern. However, the complex interactions between the causes and the effects make management particularly challenging. High focus has in Norway been on e.g. seabirds, arctic mammals, negative trends in seaweed, and migration of a high number of species in the benthic fauna.

In general, the threats posed by climate change come in addition to development, changes in land use, new farming practices and pollution and the management need to be concerned of the cumulative effects. In many cases adaptation to climate change will be concerned about minimising other threats. Hence, the responsibilities of different sector for securing natural diversity and sustainable development according to laws and regulations are crucial. Due to the complex nature of natural systems, ensuring necessary capacity and understanding within the different sectors, is a major challenge in itself.

To be able to reach the Norwegian goal of reducing global greenhouse gas emissions by the equivalent of 30% of its own 1990 emissions by 2020, strong measures need to be implemented. Possible actions include measures that may have potential conflicts with biodiversity, such as development of renewable energy (wind power plants, water power plants, production bioenergy, etc.) Generating sustainability criteria for such development will be of great importance in the near future.

- **Integration of biodiversity in national climate change strategies/policies/actions**

The Norwegian government presented its new efforts on climate mitigation in a White Paper for Stortinget (the Parliament) in May 2012 [*Norwegian Climate Policy - Report to the Storting no 21 2011-2012*]. Funded as basis for the Norwegian climate policy are important environmental principles such as the precautionary principle, the ecosystem approach and cumulative environmental effects, and the polluter pays principle, extending beyond the scope of pollution. Also, the policy states that “one will prioritize measures that have positive effects for both reducing greenhouse gases and for securing biodiversity and other important environmental values”. The concern for biodiversity and need for developing environmental criteria for the different measures, are present throughout the paper.

In 2010 a national commission presented *Climate Cure 2020: Measures and instruments for achieving Norwegian climate goals by 2020*. A review evaluating the potential conflicts with biodiversity of all the possible mitigation measures listed in this report was afterwards made by the Norwegian Directorate for Nature Management. Both these reports have been used as background documents for the White Paper.

During 2012 the Norwegian government are also expected to present a White Paper on Climate Change Adaptation, where the concern for biodiversity is expected to be integrated equally thoroughly, conforming to both the requirements of the *Norwegian Nature Diversity Act of 2009* (English translation), and the recommendations in the Norwegian Official Report from 2010 on “Adapting to climate change” (NOU 2010-10, (English version)) in which The committee recommends “a comprehensive approach where the effects of greenhouse gas emissions, pollution and the natural environment are always assessed when adaptive measures are planned.”

- **Vulnerability assessments**

In Norway several specific vulnerability assessments for species and natural systems with regard to climate change have been conducted, e.g:

- *Changes in Norwegian marine benthic fauna 1997-2010* (DN utredning 8-2011) (English abstract)
- *Effects of climate change on seashores* (NINA Rapport 667-2011) (English abstract)
- *Atlantic salmon in future climates: Review on current knowledge and scenarios with focus on water discharge and temperature* (NINA Rapport 646-2010) (English abstract)
- *Climate change and Norwegian vegetation. How are Norwegian vegetation models affected by climate change?* NINA Rapport 529-2009 (English abstract)
- *Alien species and climate change in Norway: An assessment of the risk of spread due to global warming* NINA Rapport 468-2009 (in English)
- *Adaptation to climate change and Northern Norway and Svalbard. An assessment for the need for new protected areas and terrestrial ecosystem's ability to bind carbon* NINA Rapport 436-2009 (English abstract)
- *Climate and effects on ecosystems and biodiversity – a scenario for a mountain summer farming landscape in Valdres* (DN utredning 10-2008) (English abstract).

However, in many cases climate change vulnerability analyses are being integrated into broader vulnerability analyses, such as in *the Action plan for seabirds in Western-Nordic areas* (2010), or following up of the different marine management plans (*Barent Sea and Lofoten, the Norwegian Sea* (the North-Sea and Skagerak under preparation)), or as part of the assessments of the environmental

state of water regions in Norway, conforming to the common implementation strategy for the water framework directive (2000/60/EC).

In addition, specifically for the Bern convention species, analysis of climate vulnerability has been conducted in connection with development of action plans for several species, including:

- ✓ *Anser erythropus, Emberiza hortulana & Limosa limosa* (birds)
- ✓ *Margaritifera margaritifera, Osmoderma eremita & Parnassius mnemosyne* (invertebrates)
- ✓ *Dracocephalum ruyschiana & Najas flexilis* (plants)
- ✓ *Alopex lagopus* (mammal)

With regard to migratory birds, long-term monitoring of the dates of arrival, breeding and autumn migration and time of egg laying has been studied in several species and in general migrating passerines as part of surveillance programmes in Norway. It has e.g. been shown that spring migration and nesting in most species wintering in Europe or Africa have shifted to earlier dates in the past three decades, the pink-footed goose arrives 3 weeks earlier now compared with 20 years ago and that time of egg laying has shifted to earlier dates in several species. In general it's difficult to predict the influence climate may have upon birds, some have a better potential to cope with it and other will be affected negatively. But the exiting data show that composition of bird fauna in Norway changes and populations for a high number of species will be affected.

• **Adaptation strategies/actions, ecosystem-based approaches and cross cutting issues**

Nature management measures with regard to climate change are to a large extent based on the report Climate Change - Nature Management (Norwegian Directorate for Nature Management Report 2007-2) and the strategy within nature management is to integrate climate change adaptation measures into existing managing structures. Focus areas have been protected areas, cultural landscapes, freshwater systems, marine systems, game management, alien invasive species, areal planning and areal use and outdoor recreation.

Very recently a new report on the importance of Norwegian ecosystems with regard to climate adaptation and mitigation was published "*Climate and ecosystem services. The potential of Norwegian ecosystems for climate mitigation and adaptation – NINA Report 791- 2012* (English abstract). This report will be an important input to nature management in the development of further adaptation and mitigation actions, including and insuring ecosystem-based approaches.

At the Norwegian Directorate for Nature Management, one has seen that challenges related to climate change are similar for many of the thematic areas, e.g. with regard to the focus on cumulative effects or need to focus on ecosystem services. Hence a multidisciplinary team has been established to ensure information and collaboration across the different divisions at the directorate.

• **Mainstreaming of adaptation to climate change in sectoral policies**

Norway has established a climate change adaptation programme: a national coordination programme linking 13 ministries to provide cross-sectoral perspectives and policies on climate change adaptation. The coordination group is chaired by the Ministry of Environment, whereas the programme's executive secretariat is hosted by the Directorate for Civil Protection and Emergency Planning (subordinate to the Ministry of Justice). The programme thus links both the environmental and the civil preparedness issues inherent in climate adaptation. Their activities include maintaining and developing the Norwegian climate change adaptation clearinghouse - www.klimatilpasning.no . They provide courses, training programmes, etc. and operate one part of "Cities of the Future" (pilot programme for 13 biggest cities in Norway) dealing with climate change adaptiaion. They have now developed an online climate adaptation guide for local and regional planners (English version), a sea-level rise guideline for planners and also developed the use of GIS in planning for climate change.

The Norwegian Official Report from 2010 on "Adapting to climate change" (NOU 2010-10) gives an overview of risks of climate change on different parts of the society: health and safety, physical infrastructure, trade and the natural environment. It also identifies and prioritizes tools and means for reducing vulnerability and increasing adaptation ability. Another conclusion from the

report is that “*Adaptation must be integrated into the regular planning processes.* The responsibility for adapting to climate change in a given area should be delegated to the responsible authorities.” It is expected that this policy of mainstreaming will be included in the announced White Paper on climate change adaptation. As described in the report, many of the sectors (e.g. land transport, buildings, agriculture, energy supply) have already conducted climate change vulnerability analyses and included climate change into their sectoral policies. In addition, according to the Norwegian Nature Diversity Act of 2009, environmental considerations must be included in any public decisions, hence the issues of climate change and environmental considerations such as biodiversity, should be included in the sectoral policies.

- **Research, monitoring, and awareness raising**

The main climate research in Norway, including research on climate change and biodiversity (among others; the “Climate Change and Impacts in Norway” -NORKLIMA programme which goes on until 2013) is under evaluation, and a new plan for the national climate research is under development. For the NORKLIMA programme, the primary objective has been to generate vital new knowledge about the climate system, about climate trends in the past, present and future, and about the direct and indirect impacts of climate change on the natural environment and society, as a basis for adaptive responses by society. The next call in the programme will be on: *Climate change: Ecosystem response and adaptation*; where the aim of the call is to improve knowledge on terrestrial and freshwater ecosystems’ response to climate change, and on ecosystem management and adaptation strategies needed to both alleviate negative and facilitate positive ecosystem responses.

The monitoring programmes established on terrestrial ecosystems, palsa mires, common birds, and mountain vegetation (GLORIA) the most relevant monitoring programmes going on in Norway today on linkages between climate change and biodiversity. These programmes have been followed up with new data collection in recent years. Existing monitoring activities in freshwater and marine ecosystems give additional knowledge on climate change effects. These programmes have been reviewed during the last years with respect to climate change effects, and supplementary activities have been proposed, but not started yet due to lack of financial resources.

A lot of focus has on awareness raising connected with climate change. The National Emergency Planning College (NUSB) has for several years offered courses in climate adaptation and spatial planning under consideration for climate adaptation, crisis management and risk and vulnerability assessment. The topics covered have been cross cutting and integrated, included among others consequences of climate change for ecology, society and industry and consequences for spatial planning. For the last four years, the Ministry of the Environment has offered a seminar for teachers and pupils at lower and upper secondary schools all over the country. Participants have been presented up-to date scientific knowledge about man-made changes in nature, with emphasis on knowledge about climate change and loss of biodiversity.

SLOVAKIA / SLOVAQUIE

REPORT ON IMPLEMENTATION OF RECOMMENDATIONS OF THE STANDING COMMITTEE NO 135/2008 AND 143/2009 WITH RESPECT TO THE BIODIVERSITY AND CLIMATE CHANGE - SLOVAK REPUBLIC

Main challenges posted by climate change in the country

The biodiversity in Slovakia is negatively influenced mostly by extreme drought or rains/floods on the other hand, often „supported“ by several human activities changing water regime and conditions (change of water streams, building water reservoirs, irrigation etc.).

According to the report on impacts of climate change and possible adaptation measures in various sectors¹² the biodiversity is negatively influenced by both „natural processes“ (natural disasters, floods etc.) as well human activities (pollution of air, water, soil, non-appropriate methods of land use, invasive species etc.). Higher impacts are on the most vulnerable ecosystems exposed to the changes of weather and water regime. The loss of species diversity due to climate change is expected 1-2 % (by 2100), already now biodiversity of main ecosystems (forest, grassland, water) shows slightly negative trend. The most vulnerable are mountain spruce ecosystems, wetlands and meadows or mountain and sub-mountain areas (exposed to strong rains) and water ecosystems of south Slovakia (dry weather). According to the report the most important impacts of climate change are on (i) “endangerment” of „species sensitive to climate change“, (ii) change of ecological conditions of specific plant and animal species, (iii) potential migration of species and (iv) impact of invasive species.

Integration of biodiversity in climate change mitigation and adaptation national strategies/policies/actions;

The Ministry of the Environment of SR is preparing the national adaptation strategy that is to be submitted by December 2012 for the approval of the government. Its draft will be discussed within the Commission for coordination of the climate change policy (body composed of representatives of 8 ministries and NGO). The strategy will among others include evaluation of the climate change impacts on biodiversity and it will propose adaptation measures.

Vulnerability assessment for Bern Convention species and habitats, with particular focus on migratory birds, amphibians and reptiles, invertebrates, plants and protected areas:

Knowledge on possible impacts on climate change on migratory species may be gained partially via planned project of the State Nature Conservancy of the Slovak Republic (providing data to achieve favorable conservation status of „trigger“ bird species and its habitats in special protection areas in Slovakia). There are also other activities undertaken mainly within the rescue programs for the most endangered species (plants, *Castor fiber*, *Maculinea*, *Tetrax sp.*, large carnivores) or mapping of invasive alien species (this activity is implemented by the state in restricted level, according to the nature protection law the owners/users of the land are obliged to remove the invasive species from his land).

¹² RNDr. Pavol Nejedlík, CSc, Doc. RNDr. Ing. Jozef Mindáš, PhD . (editors), 2012: Dôsledky klimatickej zmeny a možné adaptačné opatrenia v jednotlivých sektoroch: záverečná správa – zhrnutie, SHMÚ, Bratislava

Elaboration and implementation of adaptation strategies/actions, including ecosystem-based approaches to climate change adaptation/Mainstreaming of adaptation to climate change in sectoral policies

The above mentioned national adaptation strategy on climate change will analyze impacts on the main economy sectors (agriculture, forestry, water management, transport, energy sectors, tourism as well as on biodiversity and health). Its aims and measures should be incorporated into the operational programs for the new EU financial period (2014-2020) including LIFE+.

Cross cutting issues (IAS, protected areas and landscape conservation)/

IAS is the issue tackled for many years in Slovakia (in 2012 the national strategy on IAS should be prepared where relevance for climate change will be stressed). Slovakia has high portion of protected areas (almost 39 % of its territory) and well elaborated territorial system of ecological stability (which unfortunately has not been implemented at the local level to the level that would support significantly landscape elements). Their role needs to be strengthened in the future with respect to the climate change.

Research, monitoring and awareness raising

Detail information on research and monitoring are regularly published at the national reports on climate change (available also in English on <http://www.enviro.gov.sk/sekcie/temy-oblasti/ovzdušie/politika-zmeny-klimy/dokumenty/>). For instance the 5th national report on climate change provides details within its chapter 6 (expected impacts of the climate change and vulnerability, adaptation measures), chapter 7 (research and monitoring) and chapter 8 (education and raising public awareness). Other data are publicly available in the publications of the National climate program (within the Slovak Hydrometeorologic Institute in Bratislava). Other sources: <http://www.shmu.sk/en/?page=1>; <http://climate-adapt.eea.europa.eu/countries/slovakia>

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SPAIN / ESPAGNE

SECRETARÍA DE ESTADO DE MEDIO AMBIENTE

DIRECCION GENERAL DE CALIDAD
Y EVALUACION AMBIENTAL Y MEDIO NATURAL**CLIMATE CHANGE AND BIODIVERSITY IN SPAIN:
IMPACTS, VULNERABILITY AND ADAPTATION**

The Spanish National Climate Change Adaptation Plan (PNACC), which fulfills the compromise acquired by Spain as a Party of the UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, in which article 4.1b, states that all Parties to the Convention shall “formulate, implement, publish and regularly update national programs containing measures to facilitate adequate adaptation to climate change”, was adopted in July 2006 providing the current framework for carrying out assessment actions to evaluate impacts, vulnerability and adaptation to climate change in Spain.

The Plan is being implemented through work programs, in which, among others, biodiversity is been tackled as a priority sector for the action. Until now some evaluation, analysis, and participation activities related to this aspect had been carried out, but more actions are to be done in this framework.

The PNACC’s main objective is to mainstream adaptation to climate change in the planning processes of all the relevant sectors or systems. Regarding biodiversity, on the 16th of September, 2011, the Council of Ministers approved the **Strategic Plan for Natural Heritage and Biodiversity**, main planning instrument for conservation and sustainable use of biodiversity, which integrates the main lines of action of the PNACC. The Strategic Plan includes multiple references to the PNACC which can be considered as a good example of mainstreaming adaptation to climate change into sectoral policy.

The Plan, developed by the Ministry of Environment, Rural and Marine Affairs, nowadays, Ministry of Agriculture, Food and Environment, includes actions to promote mainstreaming of biodiversity into sectoral legislation.

The PNACC describes the following lines of action in biodiversity:

- Mapping the vulnerability of Spanish biodiversity.
- Consolidation of ecological monitoring networks.
- Development of a system of biological indicators for impact assessment.
- Assessment of the protected areas -including the Natura 2000 Network – under different climate change scenarios.
- Evaluation of the potential of ex-situ conservation measures.
- Assessment of the impacts on ecosystems goods and services

Regarding these lines of action, the Ministry of Agriculture, Food and Environment has developed different projects under the PNACC framework, described in the last report (2010). In this report we described the main achievements of those projects during 2011.

1. Climate change and biodiversity in Spain: Impacts, vulnerability and adaptation

The Ministry of Environment started in 2007 the project to assess the potential effects and the vulnerability of the Spanish Biodiversity to climate change along the XXI century, using spatial modelling techniques applied to the best available information of climate change and objective species distribution. This project, developed by two research Spanish Institutions, and coordinated by the Directorate General on Nature and Forest Policy and the Spanish Office of Climate Change, both of them from the former Ministry of Environment and Rural and Marine affairs, has finally been published in 2011.

The assessment was divided in two different studies; one of them was based on the impacts over the flora species and habitat types, and the other one studied the impacts over the fauna species.

These studies had been used to develop two atlas, the Atlas of Climate Change impacts over the Spanish Iberia fauna and the Atlas of impacts and vulnerability of climate change over flora and main land habitats of the Spanish peninsula.

The main results can be summed up as follows:

- Distribution models depending on the climate of the taxa of flora, fauna and habitats most representative of Spain.
- Projections of climate envelopes along the XXI century (3 temporary horizons).
- A preliminary interpretation of model results, including a vulnerability assessment of each of the taxa, an analysis of the evolution of the optimal climatic areas, both in area and location.
- An initial proposal of adaptation measures and implications for conservation of projected climate changes.
- Proposed lines of research for the future.

Both studies can be downloaded at: <http://www.magrama.es/es/biodiversidad/temas/inventarios-nacionales/inventario-especies-terrestres/biodiversidad-cambio-climatico/#para3>

There is also a web page, created by the authors, with more information about the project (links to reports, data, models, ect.): <http://secad.unex.es/wiki/libroOECC/>

2. Consolidation and expansion of the Global Change Monitoring network in the Spanish National Parks. Publication of a six monthly Electronic Newsletter.

The Global Change Monitoring Network in the National Parks, described in 2010 report, has continued its expansion throughout 2011.

This network, developed by four Organizations from the former Ministry of Environment, Rural and Marine affairs (National Park Autonomous Organization, The Spanish meteorological agency, the Biodiversity Foundation and the Spanish Climate Change Office) pretends to be an observatory, storage, and processing data infrastructure in the Spanish National Parks. It also pretends to encourage the scientific community to use it, so it can help to develop an assessing and monitoring system of global change impacts.

As it was said in the last report, the zero number of a periodic electronic bulletin was launched in 2010 as a communication channel among all the interested people and participants in this initiative.

During spring of 2011 the number 1 was distributed and in February 2012 the number 2 was published. Both of them can be downloaded in the website: http://reddeparquesnacionales.mma.es/parques/rcg/html/rcg_boletin_indice.htm

This second number of the bulletin focus its information in the *Picos de Europa* National Park, offering information regarding the progress made, the research projects developed, and a vision of the problems the experts have to deal with. This bulletin, as the previous ones, leaves some space for general items information, global reflexions and experiences, as well as for new information, publications and other interest subjects.

During 2011, the Ministry of Agriculture, Food and Environment, has also taken part in other activities regarding climate change and biodiversity outside the PNACC framework:

CBD Notification 2011-201: Submission of views and case studies on the integration of biodiversity into climate-change-related activities.

The tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD), through paragraph 9(j) of decision X/33, requested the Executive Secretary to compile current and additional views and case studies from Parties on the integration of biodiversity into climate-change-related activities.

These views and case studies will supplement those received from Parties pursuant to Notification SCBD/STTM/JW/ac/64561 and incorporated into UNEP/CBD/SBSTTA/14/INF/22 (<http://www.cbd.int/doc/meetings/sbstta/sbstta-14/information/sbstta-14-inf-22-en.pdf>). The Secretariat has further reviewed views and case studies reported by Parties in Fourth National Reports to the Convention on Biological Diversity, Second, Third and Fourth National Communications to the UNFCCC, and National Adaptation Plans of Action submitted to the UNFCCC.

In response to the CBN Notification 2011-201, Spain, in December 2011, sent its contribution to the Submission of views and case studies on the integration of biodiversity into climate-change-related activities.

The notification included a description of the activities carried out in Spain to mainstream biodiversity into mitigation and adaptation to climate change activities, as well as a description of its potential benefits.

UNITED KINGDOM / ROYAUME-UNI

Main challenges posed by climate change in the United Kingdom

The Government published the UK Climate Change Risk Assessment (CCRA) on 25 January 2012, the first assessment of its kind for the UK and the first in a 5 year cycle. Your attention is drawn to the *summary report* for an overview.

The CCRA is divided into 11 themes, one being dedicated to Biodiversity and Ecosystem Services . Underpinning the CCRA is the *Evidence Report*; the natural environment is covered at Chapter 8.

Figure 8.1 (page 253) provides a summary of natural environment impacts with an indication of direction, magnitude and confidence, and Table 8.8 (page 312) provides the UK scorecard for natural environment.

In order to identify all the impacts on biodiversity, it is necessary to make linkages to other sector reports, especially agriculture, forestry, water and marine that all have risks relevant to biodiversity.

The Climate Change Act 2008 introduced a new power for the Secretary of State to direct ‘reporting authorities’¹³ to prepare reports on how they are assessing and acting on the risks and opportunities from a changing climate.

The government asked 91 organisations to report from the water, energy, and transport sectors as well as environmental bodies and regulators. These reports are published on Defra’s website: <http://www.defra.gov.uk/environment/climate/sectors/reporting-authorities/reporting-authorities-reports/>

Of the 91, Natural England, the Forestry Commission and the Environment Agency voluntarily produced reports for Defra, setting out their climate change adaptation actions.

Many of the organisations noted that the analysis for the reporting process helped embed adaptation into their organisation, though highlighting awareness, particularly with senior managers, as well as ensuring that adaptation was included into their organisation priorities, meaning it will be considered on a continuing basis. .

Integration of biodiversity in climate change mitigation and adaptation national strategies/policies/actions;

Part of the aim of Scotland’s Climate Change Adaptation Framework (2009) is to increase the resilience of the natural systems on which Scotland’s communities depend to the impacts of climate change. Biodiversity and Ecosystem Resilience is the subject of one of the Sector Action Plans in that Framework, and is being updated during 2012 to reflect the CCRA results for inclusion in the statutory Adaptation Programme under the Climate Change (Scotland) Act 2009.

The need to build ecological networks and to take an ecosystems approach to land use decisions in the light of climate change is included in a land use strategy for Scotland 2011, published under the Climate Change (Scotland) Act 2009.

The Scottish Biodiversity Strategy is being updated to reflect the 2020 challenge. This is likely to promote ecosystem resilience as a way of sustaining biodiversity and the ecosystem services on which people depend in the face of climate change.

The Climate Change Strategy for Wales includes consideration of mitigation relating to woodlands and peatlands within the ‘Agriculture and land use’ sector and the Adaptation Action Plan for the Strategy includes objectives relating to biodiversity adaptation and the detection of the impacts

¹³ Defined within the act as ‘Persons or bodies with functions of a public nature.....’

of climate change.
<http://wales.gov.uk/topics/environmentcountryside/climatechange/publications/strategy/?lang=en>

There is a plan to develop a Sectoral Adaptation Plan (SAP) for the 'Natural Environment in spring 2013. The Welsh Government has recently produced the 1st annual update on the Strategy including a brief outline of the proposed indicators for mitigation. Adaptation indicators are largely yet to be developed.
<http://wales.gov.uk/topics/environmentcountryside/climatechange/publications/firstprogressreport/?lang=en>

The Sustaining Living Wales programme, equivalent to NEWP in England, has set out a framework for improving resilience of the natural environment, and the intention is to embed the Natural Environment SAP within this. A key element of the Sustaining Living Wales approach is intended to be statutory Natural Resource Planning which should further the delivery of mitigation and adaptation measures at the landscape scale.
<http://wales.gov.uk/consultations/environmentandcountryside/sustainingwales/?lang=en>

In Wales, the Forestry Commission have published new [field guidance](#) on species diversification to support climate change adaptation and plant health objectives. The guidance covers both timber production, in many cases using non-native species, and also native woodland.

Following the publication of the Climate Change Risk Assessment there is a requirement under the Climate Change Act 2008 for relevant Northern Ireland departments to lay programmes before the Northern Ireland Assembly setting out the objectives of the department in relation to adaptation to climate change; the department's proposals and policies for meeting those objectives; and the timescales for introducing those proposals and policies. A number of biodiversity risks have been identified in the Northern Ireland CCRA and these will be addressed in the upcoming Northern Ireland Adaptation Programme.

In Northern Ireland the Natural Heritage Vision and Strategic Plan forms the backdrop for the operational delivery of work associated with: protection and management of designated sites, the promotion of biodiversity conservation and the gathering of evidence to increase our understanding of the natural environment. Many of the actions will help ecosystems be more resilient to the effects of and help wildlife adapt to climate change.

http://www.doeni.gov.uk/niea/policy_position_statement_on_the_selection_establishment_and_management_of_statutory_nature_reserves_june_2011.pdf

Following the recommendations of the [Making Space for Nature](#) review of England's ecological network, our [Natural Environment White Paper](#) (NEWP) and new biodiversity strategy for England ([Biodiversity 2020](#)) set out a major shift in emphasis of conservation effort towards a much larger-scale, more innovative and more integrated approach to biodiversity conservation. This is exemplified by the Nature Improvement Areas initiative. The approach is intended to make our ecological networks more coherent and resilient, and therefore more capable of responding to the challenges of climate change and other pressures.

We have now established 12 [Nature Improvement Areas](#) via a competition that the review recommended, as well as publishing a biodiversity strategy that makes *a more integrated large-scale approach to conservation on land and at sea* a priority for action. We see the Nature Improvement Areas as a key plank of our response to climate change and will want to reflect this in the NAP. The objectives of NIAs are that they will:

- become much better places for wildlife – creating more and better-connected habitats over large areas which provide the space for wildlife to thrive and adapt to climate change.
- deliver for people as well as wildlife – through enhancing a wide range of benefits that nature provide us, such as recreation opportunities, flood protection, cleaner water and carbon storage.
- unite local communities, landowners and businesses through a shared vision for a better future for people and wildlife. We hope they will become places of inspiration, that are loved by current and future generations.

The National Adaptation Programme (NAP), which we aim to publish in 2013, will respond to the high priority risks and opportunities identified in the Climate Change Risk Assessment. It will set out action by central government and local government, business, communities and civil society. In the NAP we aim to:

- Work together with partners from different sectors to co-create a programme. Ownership should be shared between all contributors with delivery of the plan to be taken forward by the most relevant actors.
- Make a start on delivering a set of priority actions to take, and set out further actions to reduce the deficit between risk and preparedness.

Links to NAP pages:

<http://www.defra.gov.uk/environment/climate/adapting>

<http://engage.defra.gov.uk/nap/>

In England, the Forestry Commission have published an [analysis](#) of the likely impacts of climate change on the ability to carry out its responsibilities and functions under the terms of the Adaptation Reporting Power of the Climate Change Act (2008). In particular, sections on barriers to adaptation and interdependencies are relevant.

The Read Report – [Combating Climate Change: a Role for UK Forests](#) – which was published in 2009 draws together current understanding on the forestry sector’s potential role in climate change mitigation, assesses impacts of climate change on UK woodlands to date, evaluates future impacts, outlines adaptation options and draws together evidence on how trees, woods and forests can help society adapt to the impacts of climate change. The [Read Report](#) was an independent study commissioned by the Forestry Commission.

UK Forestry Standard: A revised [UK Forestry Standard](#) was published in November 2011, including a new [guideline on Forests and Climate Change](#). The requirements for climate change adaptation include consideration of climate change in forest planning, adaptive management, tree and shrub species selection, landscape ecology and environmental protection. In England, comprehensive [internet-based guidance](#) has been published to support implementation of the UKFS Forests and Climate Change Guidelines.

The Forestry Commission have commissioned and published a review of the likely impacts of climate change on woodland biodiversity entitled ‘[Understanding the implications of climate change for woodland biodiversity and community functioning](#)’.

Vulnerability assessment for Bern Convention species and habitats, with particular focus on:

Research UK¹⁴:

Recent projects include:

Towards integration of low carbon energy and biodiversity policies: an assessment of impacts of low carbon energy scenarios on biodiversity in the UK and abroad and an assessment of a framework for determining ILUC impacts based on UK bio-energy demand scenarios (Research Project Code WC1012)

Low carbon energy is a fast moving policy agenda, being delivered by a range of measures such as the UK Renewables Obligation and driven by EU targets [in the Renewable Energy Directive and Fuel Quality Directive]. EU policy to promote energy from renewable sources and to reduce greenhouse gas (GHG) emissions is set out in the [20:20:20 Energy](#) package and is detailed in the provisions of two Directives: the [Renewable Energy Directive](#) (RED) and the [Fuel Quality Directive](#) (FQD). The Climate Change Act put a legal obligation on the Government to cut UK greenhouse gas emissions by

¹⁴ For all Defra research reports please visit the Defra Science pages search page at <http://randd.defra.gov.uk/Default.aspx?Location=None&Module=FilterSearchNewLook&Completed=0> and enter the Research project code

80% by 2050. To help explore possible ways of achieving this obligation, the Department of Energy and Climate Change, published in July 2010 the first version of an [Excel model](#), the 2050 pathways model. This enables users to select different mixtures of low carbon energy technologies to meet UK energy requirements and to calculate the possible GHG reductions. Defra have funded a research project that will also enable the calculator to indicate potential impacts (positive and negative) of the mixtures of energy technologies on biodiversity, to integrate impact assessment of climate change mitigation measures through energy policies with biodiversity policies. Other aspects of the project include testing and developing a method to estimate Indirect Land Use Change impacts on biodiversity. The project will complete in September/ October 2012, and results will be published on the Defra website science pages.

Defra has sponsored development of a *climate change report card* (Research Project Code WC1052) that will illustrate evidence of detectable and projected impacts of climate change on terrestrial and freshwater species, habitats and ecosystems in the UK, which will improved our evidenced base for the next Climate Change Risk Assessment. It will complement the marine climate change report card (see the annual [marine climate change impacts report cards](#)) and another new report card for water quality that is being developed concurrently. This project will complete in January 2013 and results will be published on the Defra website science pages, as well as on specially developed web pages for communicating messages about climate change.

A Report Card on [Marine Climate Change Impacts on Fish, Fisheries and Aquaculture](#) has recently been published by a Defra-funded Marine Climate Change Impacts Partnership. It highlights how climate change is affecting the fish and shellfish we find in UK seas. This report provides information for policy advisers and decision makers.

The development of the Climate Change Report Card for biodiversity will be supplemented by an additional project to extend Bicconet, Bicconet II, (Research Project Code WC1037) which will screen available UK species data for signals of responses to climate change and undertake a range of statistical analyses. This project is being developed and likely to be contracted within 2012, and complete around the end of 2013, when results will be published on the Defra website science pages.

CHAINSPAN- Research Project Code [WC0750 - The effects of climate change on the ornithological interest of the UK's Special Protection Areas](#) Defra and partners funded a project to model impacts of climate change on the bird interest of UK SPAs. The report showed both projected increases and decreases in populations of different bird species or groups of species in different geographical areas of the UK.

Defra and other partners across the UK continue to support the Environment Change Network (ECN, Research Project Code NR0155) a long term integrated monitoring network of sites, that enables normal variation to be distinguished from responses to environmental change. The long term data set includes information about biodiversity as well as climate atmospheric pollution, soils and freshwater attributes. It is used in validation of other monitoring schemes, such as the 6-8 year periodic Countryside Survey, as it can also detect more subtle year in year changes (such as a response to drought). The ECN data and other products can be accessed via the web (<http://www.ecn.ac.uk>).

Forest Research has recently established a '[Research Forest](#)' in Wales to complement the existing [Alice Holt Research Forest in England](#). One will be established in Scotland in 2012/13. Monitoring the impacts of climate change and demonstrating/evaluating adaptation options are key objectives of the initiatives.

The Forestry Commission funds a significant [Climate Change Research Programme](#), primarily through Forest Research. The research, including a number of collaborative EU projects is summarised in FC England's Adaptation Reporting Power report and reproduced at Annex 1.

Research England¹⁵

Recent work includes:

Priority Habitats, Protected Sites and Climate Change: Three Investigations to Inform Policy and Management for Adaptation and Mitigation

(*Research Project Code CR0439*). Defra funded a project to examine the potential impacts of climate change on vegetation communities, particularly to assess possible changes in Priority Habitats. The selection of Case Study Sites across the UK and Northern Ireland (25 in total) and an analysis of the uncertainty surrounding the most recent climate change projections (UKCPO9) was followed by the development and application of a dynamic vegetation model – the Climate Vegetation Response (CVR) model (the model uses the output from the spatially coherent UKCPO9 projections to predict the impact of climate changes for the decades between 2020 and 2080 under low and high Emissions Scenarios, on the composition and condition of 12 Priority Habitats). The model combines information on the response of the constant species within each of the NVC (National Vegetation Classification) community types that comprise each of the selected Priority Habitats within biogeographical zones, to predict whether the community changes type, if the PH changes and the consequences for favourable conservation status (FCS). Output from the model indicates that:

- Many Priority Habitats may already be in a process of change in vegetation composition as a result of climate change.
- Many of these gradual changes are likely to be fully evident within the next decade and will continue as climate change progresses.
- Some Priority Habitats are likely to be more affected by climate change than others
- Changes in Priority Habitats may be faster and more pronounced in the extreme north and south of the UK than elsewhere.
- In the case of some Priority Habitats the changes are more likely to be reflected in changes in composition or condition rather than spatial extent.

The project included an assessment of the habitat changes that may occur within protected sites and an evaluation of the potential role of management of Priority Habitats in climate change mitigation to enable integrated consideration of possible mitigation and adaptation strategies. The report has been peer reviewed and is nearing completion, for publication on the Defra website science pages.

Conservation and adaptation in the landscape: A review of landscape scale approaches (*Research Project Code WC0799*). Defra has worked with Natural England and Scottish Natural Heritage to develop a data base of landscape scale initiatives for conservation and management of biodiversity. It includes records of initiatives that have made provisions for adaptation to climate change. The project is nearing completion, and the final report will be published on the Defra website Science pages.

Developing tools to evaluate consequences for biodiversity of options for coastal zone adaptation to climate change, Research Project Code CR0422) The report of projected irreversible loss of selected wetland habitats around the English coastline associated with sea level rise has been published, and is available on the Defra website science pages. It showed large areas of the selected habitats within protected sites that occur within the 1:1000 year coastal floodplain are at risk now, under current climate conditions and increasingly so up to 2100. The model was the first of its kind to include habitat sensitivity to frequency and duration of marine inundation.

¹⁵ For all Defra research reports please visit the Defra Science pages search page at <http://randd.defra.gov.uk/Default.aspx?Location=None&Module=FilterSearchNewLook&Completed=0> and enter the Research project code

Within Wales, a Climate Vulnerability Assessment of Special Sites in Wales has been undertaken which includes all SACs, SPAs, SSSIs and Ramsar sites: <http://www.ccg.gov.uk/environmental-change/climate-change---what-we-do.aspx>

In England, NE are carrying out a number of projects to assess vulnerability, including pilot studies on National Character Areas. The first group were published in 2008 and second group will be published in 2012.

NE are also developing a spatial model to identify vulnerability of habitats to climate change across the whole of England, which will be tested this year

Elaboration and implementation of adaptation strategies/actions, including ecosystem-based approaches to climate change adaptation

Within Wales there is a compilation of biodiversity-related adaptation projects 'Biodiversity Adaptation – Best Practice in Wales' see: <http://www.ccg.gov.uk/environmental-change/climate-change---what-we-do.aspx>

Natural England is integrating climate change adaptation into all areas of its work. NE has a programme to embed climate change adaptation and mitigation and the ecosystem approach. A series of specific commitments have been set out in the report under the adaptation reporting power of the Climate Change Act which is reflected in their corporate plan including with a key performance indicator to monitor progress. NE are developing guidance resources on climate change adaptation.

Cross cutting issues

Invasive Alien Species

Species coming here as a natural range-expansion response to CC are not within the IAS policy remit, as was agreed under Bern: <https://wcd.coe.int/ViewDoc.jsp?id=1560527&Site=DG4-Nature&BackColorInternet=DBDCF2&BackColorIntranet=FDC864&BackColorLogged=FDC864>

However we realise Climate Change (CC) could enable some Non Native Species (NNS) already in the UK to flourish and become Invasive Non Native Species (INNS) and some non-native species that are brought here may have greater potential to become invasive than in the past. We have adapted our INNS risk assessment process therefore to include a set of questions on CC aspects, these ask the risk assessor whether CC is likely to be a significant influencing factor and if so, within what kind of timescale and what biological/ecological characteristics will be affected. <https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=16>

Mainstreaming of adaptation to climate change in sectoral policies

Scotland's Land Use Strategy & Scottish Biodiversity Strategy as above.

In Wales this will be achieved through the Climate Change Strategy and in particular delivery of the Sectoral Adaptation Plans for the Natural Environment, Built Environment and Communities. The Sustaining a Living Wales programme will lead to a new Environment Bill for Wales which will address this too.

Defra has contracted the Centre for Fisheries, and aquaculture Science to develop the UK marine climate change action plan taking into account marine risks identified by the CCRA. This action plan will form part of NAP.

Please see previous references to CCRA, NAP, NEWP & Biodiversity 2020 for England. Also see NE's climate change embedding programme above

Examples of good practices that your country can export:

* Please refer above for further details

Climate Change Act 2008*

Climate Change (Scotland) Act 2009*

Land Use Strategy for Scotland*

The UK Climate Change Risk Assessment process*

National Adaptation Programme process*

The Making Space for Nature report*

Biodiversity 2020*

Nature Improvement Areas - Increasing ecological reliance to environmental pressures by adopting and learning about landscape scale approaches to ecological coherence, improve the condition and extent of our habitats and ecosystems, and demonstrate multiple benefits of the particularly in delivery of ecosystem services to human well being.

Green Infrastructure – In England, the Government has established a Green Infrastructure Partnership which brings together over 150 core partners across England - including planning professionals, landscape architects, environmental NGOs, developers, academia and local authorities to plan and successfully deliver more green infrastructure at the local, city-wide and landscape level. Launched in October 2011, and one of the Government's commitments in the Natural Environment White Paper, the Partnership will initially run until end March 2014.

Environmental Change Network

Adaptation Reporting Powers reports

See Biodiversity Adaptation – Best practice in Wales

Scotland hosted European Nature Conservation Agencies climate change group workshop with range of examples of climate change adaptation challenges and practices in September 2011

→ and the best lesson learned - **Make the messages simple**

You may also be interested in:

Scotland

- **The Scottish Government** has set up a Centre of Expertise on Climate Change <http://scotland.gov.uk/Topics/Research/About/EBAR/StrategicResearch/future-research-strategy/CoEClimateChange> which aims to deliver objective, independent, integrated, and authoritative evidence to support the Scottish Government in relation to its climate change activities. The Adaptation Workstream incorporates biodiversity within a systems approach to identifying adaptation options. The Centre is working with Scottish Natural Heritage (SNH) on several pieces of work including information notes on observed changes to Scotland's nature from climate change, and assessing and responding to risks to protected areas. <http://www.climatechange.org.uk/>
- **Scottish Natural Heritage (SNH)** has undertaken an assessment of vulnerability of priority habitats to climate change. Adaptation priorities are being identified and integrated into relevant action plans. An updated Action Plan including priorities for the natural heritage and for SNH is being drafted. SNH's website includes additional information: <http://www.snh.gov.uk/climate-change/>
- SNH has published several Trend Notes on changes to biodiversity as a result of climate change, e.g. on rivers <http://www.snh.gov.uk/docs/B1043758.pdf> . More are in preparation. A climate indicator on the timing of seasonal events has been published <http://www.snh.gov.uk/docs/B551053.pdf> .
- **SNH** has developed summaries for different parts of Scotland of the potential impacts of climate change on landscapes and quality of life.
- <http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-research-and-projects/climate-change-landscape/>
- **Scottish Natural Heritage** has commissioned a literature review, *Translocations as a tool for biodiversity conservation during climate change'* <http://www.snh.gov.uk/publications-data-and->

[research/publications/search-the-catalogue/publication-detail/?id=1760](http://www.snh.gov.uk/research/publications/search-the-catalogue/publication-detail/?id=1760). This is being followed up with a trial translocation of a montane lichen species.

- Scotland's wildlife: an assessment of biodiversity in 2010 - chapter 4 (climate change)

<http://www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1803>

- Scotland's Marine Atlas 2011 - Chapter 6 (climate change)

<http://www.scotland.gov.uk/Publications/2011/03/16182005/0>

Forestry Commission

The Forestry Commission's decision support system for species choice and the restoration/establishment of native woodland, [Ecological Site Classification](#) (ESC) has been updated to provide guidance on climate change adaptation. ESC Version 3¹⁶ includes a wider range of species (including near and non-native), the incorporation of climate change projections in species and native woodland type suitability and revisions of all species models to encompass future climatic conditions. The revised versions will be released in summer 2012. The decision support system is supported by detailed 'species notes' to ensure appropriate species selection as part of diversification strategies when planting new woodlands and restocking existing [woodlands](#).

The forestry sector report of the UK Climate Change Risk Assessment highlighted pest and disease outbreaks as a high priority climate change risk. Defra and the Forestry Commission have developed a [Tree Health and Biosecurity Action Plan](#) to help address these risks.

Woodland expansion: Although woodland creation, in a climate change context, is generally viewed as a mitigation measure, it's role in adaptation is clear, through: expanding and buffering existing ancient woodland; increasing landscape permeability to promote species migration; providing opportunities to create more diverse and resilient woodland including the use of species and origins better adapted to the future climate, and; through targeted planting helping society and biodiversity to adapt to climate change through, for example, flood alleviation, urban cooling and provision of riparian shade to maintain freshwater thermal regimes. The [Woodland Carbon Code](#) has been developed to provide confidence in and attract private funding to woodland creation projects, and complements wider initiatives in all four countries of the UK, including through the work of the [Woodland Carbon Task Force](#) in England.

¹⁶ <http://www.eforestry.gov.uk/forestdss/> [Versions 2&3 not yet uploaded]

Annex 1: Climate Change Research Programme

Links at:

<http://www.forestry.gov.uk/website/forestry.nsf/byunique/infd-7unlzx>

<http://www.forestry.gov.uk/fr/INFD-7K9DFZ>

1.12.1 FORCCAST research programme

Forest Climate Change Adaptation Strategies is the research programme that Covers climate change impacts and adaptation. The main outputs of the current programme are:

Work Area 1 - Vulnerability assessment tool at broad scale: For targeting where adaptation action is critical. Incremental development over 2-3 years. Various options for its development, including use of multi-criteria decision analysis (MCDA), will be tested.

Work Area 2 - Risk assessment tools at forest design plan and stand scale: The development of a range of tools capable of working with UKCP09 climate projections to explore risk to forest growth and productivity, stability, phenology, chilling requirement and dormancy. To also include an economic assessment of impacts and approaches to landscape planning.

Work Area 3 - Adaptation Measures: Informed by recent reviews, reports, data and expert judgement and linking to other adaptation projects, the project will consider Forest Design Plan and operations adaptation; information on species and provenance choice; organisational and professional aspects of adaptive capacity; survey and assessment of sector preparedness; adaptive capacity, and; the scoping and analysis of costs & benefits of different adaptation scenarios.

Work Area 4 - Case Studies & Supporting Experiments: To trial and explore multi-disciplinary aspects of adaptation including management, scenario modelling and dissemination of ideas and results to stakeholders at regional level. The work area will include scoping and developing analysis of costs & benefits of different options and links to EU-funded projects.

Work Area 5 - Dissemination and Knowledge Exchange:

1.12.2 Other climate change-related research

Many of FR's other research programmes also include elements of climate change research. These elements are briefly summarised below, include those funded solely by the Forestry Commission and those co-funded by the EU and other non-FC bodies. The list of projects also includes an indication of their key objectives:

Directly funded by the Forestry Commission

ESC AND DSS – Ecological Site Classification for climate change and decision support for biodiversity: Better matching of species and provenance to site and future climate conditions to support adaptive forest management. Development of stand-based and spatial climate change impact and adaptation tools, including new modules to assess the risk of biotic and abiotic impacts of projected changes to weather patterns. Process-based (3PGN) modules to be integrated into ESC.

Pests and pathogens in a changing climate: Assessment of the effects of temperature and water stress on disease severity, reproduction and survival of major oak root pathogens, including the development of models to assess climate risk. Development of phenology models for insects in protected environments using bark beetles & weevils as study organisms, to enable the prediction of geographic variation in insect phenology and pest impact under a changing climate.

Insects & continuous cover forestry – the impact of changing management on insect diversity & abundance: Testing the hypothesis that increasing the structural complexity of forest stands will lead to greater insect diversity and hence fewer pests problems. In a climate change context, the study investigates whether increased stand structural complexity might be associated with greater resilience of forest systems to environmental change.

Climate Change and Street Trees: The development of a system for valuing the benefits of street trees through providing the evidence base for street trees. The drafting and communication of best practice guidance, together with robust assessment, evaluation and dissemination tools, will enable

the risks and benefits of street tree placement to be more fully assessed by policy makers and planners. The programme will extend the evidence-base supporting 'The Big Tree Plant' in England.

Species and Provenance Trials for Climate Change: The highest priority is provenance testing of Scots pine with an emphasis on more southerly and/or improved seed sources. Experiments will be set up in Thetford, East Scotland and at least one other contrasting site. The next highest priority is to test conifers for use as alternatives to Corsican pine in areas affected by red band needle blight. Slightly lower priorities include provenance trials of sweet chestnut and the screening of a wider range of alternative species. Alongside new species/provenance testing, data will be collected from existing plots to understand drought and winter cold response of relevant species.

Projects receiving EU and/or other co-funding

ForeStClim – Transnational Forestry Management Strategies in Response to Regional Climate Change Impacts (Interreg IVb): The overarching objective is to develop and test transnational forestry management strategies for addressing the impacts of climate change. The main tasks are: downscaling regional climate scenarios; developing tools for assessing the implications of climate change for forest planning and management; designing robust forest management strategies to preserve public benefits such as soil and water protection, flood mitigation, and carbon sequestration; and testing the implementation of the climate-proofed strategies at a regional level.

REINFFORCE – REsource INFrastructure for monitoring and adapting European Atlantic FOREsts under Changing climatE (Interreg): To establish a network of new 'arboretums' from Portugal to Scotland to monitor trends in mortality and growth of the most common European tree species under climate change, on a long term perspective.

MOTIVE – Models for Adaptive Forest Management (EU FP7): To provide an integrated assessment of forest management strategies that simultaneously considers multiple ecosystem goods and services rather than focusing on individual aspects such as timber production or biodiversity alone; to translate scientific state of knowledge about expected climate change impacts into decision support for policy makers and forest practitioners.

FUTUREforest – helping Europe tackle climate change (Interreg IVc): To explore European forestry issues and measures in relation to climate change and exchange experiences of adaptation and solutions to challenges.

ECHOES – Expected Climate cHange and Options for European Silviculture (COST): To mobilise and integrate existing scientific knowledge on climate change for European forest policymakers and managers who have to make decisions relating to adaptation to, and mitigation of, climate change.

TRANZFOR – Transferring Research between EU and Australia-New Zealand on Forestry and Climate Change (EU FP7 Marie Curie): The project aims to strengthen research partnerships on forestry and climate change through staff exchanges, networking and dissemination activities between research organisations in Europe, Australia and New Zealand.

Northern ToSIA – Assessing Sustainability of Forest-based Activities in Rural Areas of the Northern Periphery (EU Northern Periphery Programme): To investigate options for improving the sustainable use of forest resources in selected regions of the NPP area using an innovative sustainability impact assessment tool (ToSIA) and applying it in regional development and business.

Forest Adaptation to Climate Change – National Forest Provenance Planting Trial (NFC): To establish and monitor, in the long term, a series of 'climate-change adapted' tree provenance trials in the National Forest. These will serve as research-demonstration plots that are testing various proposed approaches to increase the resilience of native broadleaf species to climate change.

Multi-For – MultiFunctionality of Forests (Interreg IVa): To improving the effectiveness of forest site selection and monitoring, including the design and implementation of forest management plans that will optimise economic, ecological and social interests in the context of global climate change. This will be applied to multifunctional forest management demonstration sites in northern France and southern England, forest sites open to the public, sites designed to promote woodfuel and sites selected to improve connectivity between existing woodlands through planting and re-afforestation.

The aim is to educate, enable access to and raise awareness of forests and multi-functional forest management.

SUMMARY OF SPECIFIC RECOMMENDATIONS

Through [Recommendation No. 135 \(2008\)](#) the Standing Committee to the Bern Convention recommends Contracting Parties to the Convention and invites Observer States to:

1. Address and communicate, as a matter of urgency, the impacts of climate change on biological diversity and its conservation;
2. Raise awareness of the link between biodiversity and climate and emphasis the large potential for synergies when addressing biodiversity loss and climate change in an integrated manner; including socio-economic effects;
3. Encourage the elaboration of climate change adaptation activities for biodiversity, taking account of the suggested measures listed in the guidance set out in the Appendix to the present Recommendation; and
4. Continue to engage in the development of further guidance to implement the Convention.

Through [Recommendation No. 143 \(2009\)](#) the Standing Committee to the Bern Convention recommends Contracting Parties to the Convention and invites Observer States to:

1. Increase efforts to improve understanding of the linkages between biodiversity and climate change (according to Recommendation 135 (2008)).
2. Make full use of the large potential for synergies and co-benefits between biodiversity conservation and climate change mitigation and adaptation, including ecosystem-based approaches.
3. Ensure that biodiversity considerations, including potential negative impacts, are taken fully into account in climate change adaptation and mitigation policies and measures.
4. Develop climate change adaptation activities for biodiversity, taking due account of the proposed guidance set out in the Appendix to the present Recommendation; and
5. Continue to engage in the development and application of further guidance to implement the Convention.

More information on: www.coe.int/bernconvention