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CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

**5th meeting of the
Group of Experts
on Biodiversity and Climate Change**

Reykjavik, Iceland, 21-22 June 2010

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REPORT

*Document
prepared by
the Directorate of Culture and Cultural and Natural Heritage*

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The Group of Experts on Biodiversity and Climate Change held its 5th meeting in Reykjavik (Iceland) on 21 and 22 June 2010.

The Standing Committee is invited to:

1. Thank the Iceland authorities for the excellent preparation of the meeting,
2. Take note of the report of the meeting and of the 3 reports presented on:
 - ✓ Climate change and mountain biodiversity,
 - ✓ Climate change and island biodiversity,
 - ✓ Climate change, wildland fire and biodiversity in Europe;
3. Examine and, if appropriate, adopt the three draft recommendations found in Appendices 5, 6 and 7 of this document:
 - Draft Recommendation : Guidance for Parties on biodiversity and climate change in mountain regions,
 - Draft Recommendation: Guidance for Parties on wildland fires, biodiversity and climate change,
 - Draft Recommendation: Guidance for Parties on biodiversity and climate change in European islands ;
4. Take note of the proposals of the Group for its future work and take them into account when deciding its Programme of Activities for 2011.

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1. Opening of the meeting by the Chair

➤ Welcome by Ms Svandis Svavarsdottir, Minister of Environment of Iceland

Ms Svavarsdottir welcomed participants, noted the present threats to European biodiversity in this International Year of Biological Diversity 2010, praised the good work of the Bern Convention in building the Emerald network and spoke about the challenge of climate change to Iceland and other States (full text of the Minister's speech in Appendix 3 to this report).

➤ Introductory remarks by Mr Jón Gunnar Ottósson, Chair of the Bern Convention

Mr Ottósson was pleased to see progress in the Bern Convention over the last years and noted that the Convention was particularly good in innovation, as the work of this Group of Experts had shown. The Convention was pioneer in this field. Countries like Iceland were going to be affected by climate change, specially as the surrounding North Atlantic and Arctic seas were one of the areas with more relative change. Summer were becoming longer and there was concern on how invasive alien species may spread into natural habitats if they found more temperate conditions.

➤ Progress since last meeting, by Mr Snorri Baldursson, Chair of the Group

The Chair was pleased to report that the draft recommendation prepared by the Group at its last meeting had been adopted by the Standing Committee with some amendments as *Recommendation No. 143 (2009) on further guidance for Parties on biodiversity and climate change*. He noted that 3 new reports have been prepared, all of them of great interest for adaptation of biodiversity to climate change. The Chair noted also that, since 2009, other Groups of Experts had started work both in the Convention on Biological Diversity and the European Commission and it was in the interest of all to co-ordinate the work of the Group with those and other initiatives.

Finally he thanked the Vice-Chair, Mr Peter Zhelev, for having conducted work at the last meeting of the Group when he had to leave the meeting for family reasons.

2. Adoption of the Agenda

The agenda was adopted as it figures in Appendix 2 to this report.

3. Introduction by the Secretariat

For the Secretariat, Mr Eladio Fernández-Galiano, Head of the Biological Diversity Unit of the Council of Europe, informed participants that he was sorry to announce that the Secretary of the Bern Convention, Ms Carolina Lasén Díaz, had moved to a different job at the Council of Europe and that she would not be longer serving the Group.

The Group unanimously expressed recognition for the high professionalism and competence of Ms Lasen all these past years and asked the Secretariat to transmit her both their gratitude and their best wishes for her career and personal life.

The Secretariat informed the Group that Ms Ivana d'Alessandro had been appointed new Secretary to the Bern Convention and that she would be most likely be serving this Group of Experts in the future.

The Secretariat also informed the Group that the Council of Europe was experiencing an interesting process of reform following the appointment of Mr Thorbjörn Jagland as Secretary General and that it was important for all governments to support biodiversity activities.

4. Updates on biodiversity/climate change work in other fora

a. UN-ECE activities

Mr Marco Keiner, Director of Environment at UN-ECE, introduced the environmental work of UN-ECE, that shares with the Council of Europe a Pan-European approach, integrating also five Central Asia Republics. UN-ECE is active in the climate change, as they are involved, as UN regional body, with issues such as drought or energy (on top of managing important conventions such as the Arhus or Bale Conventions). They were responsible in the Environment in Europe process which will

hold its next Conference in Astana on September 2011 with two main topics: water and water ecosystems and “greening the economy”.

b. Convention on Migratory Species

Ms Melanie Virtue, from the UNEP-CMS Secretariat, presented an update of CMS activities aimed to address the climate challenge for migratory species. She explained how environmental conditions (fundamentally availability of food resources highly dependent on climate, rainfall and vegetation growth) are fundamental to shape migration and how migration patterns are already changing in many species. Migratory species are vulnerable because migration already puts a biological stress in species although the phenomena of migration may help some species find more suitable wintering areas (as it is already happening with some migratory birds in North America).

CMS is identifying most climate change-threatened species and proposing exceptional conservation attention by Parties (although for many the only option for survival is mitigation of climate change). The different Agreements under CMS are integrating climate change consideration into their instruments and practice.

c. European Commission

Ms Karin Zaunberger, of the European Commission, informed the Group of the different initiatives at Community level to deal with biodiversity and climate change, and in particular on the work of the EU *ad hoc* Expert Working Group on Biodiversity and Climate Change. A discussion paper has been prepared by the group, entitled “Towards a Strategy on Climate Change, Ecosystem Services and Biodiversity” in which a number of species proposals are made, fundamentally to use the ecosystem-based approaches (in adaptation and mitigation) to achieve multiple benefits, to act now on the issue before the problem is more difficult to solve, to engage other sectors (economy, energy, agriculture, etc.), to collaborate with other partners, and to continue with research and communication efforts on the issue. A number of precise recommendations are made in the strategy, many of which are largely in line with previous guidance proposed by this group.

The need to co-operate at international level was stressed, both in climate negotiations, where EU positions are firm and well-known, and in CBD negotiations, looking for more synergy among all relevant instruments in biodiversity and in climate change.

Several EU decisions and policy papers support those views (for instance Environmental Council Conclusions on International Biodiversity, December 2009 and European Council Conclusions of March 2010). It was important to obtain a good mandate on biodiversity and climate change from Nagoya (COP of CBD).

d. European Environment Agency

The Chair, Mr Snorri Baldursson, presented the work on “Streamlining European Biodiversity Indicators” (SEBI) done by the EEA. The main objection of SEBI is to produce streamlined sets of policy-relevant indicators meaningful in the context of the 2010 target. Work was started in 2005 and ends in 2010. Within the several working Groups established under SEBI, one is charged with developing indicators on the impacts of climate change in biodiversity. Changes will be measures using trends in 120 common bird species, changes in cover of alpine plants and an indicator based on butterfly data. Results are being analysed and will be soon presented.

After COP-15 of CBD, other policy goals (post-2010) will be adopted, in a last phase of the SEBI programme.

e. Conclusions of the 2nd World Conference on bird migration and global change

Mr Miguel Ferrer, Migres Foundation, presented the conclusions of the Conference held in Algeciras (Spain) in March 2010 (see full text in Appendix 3).

Many birds are already changing their migratory behaviours, which makes this group of vertebrates excellent indicators for the effects of climate on biodiversity. Breeding ranges of some species are already shifting to the North. Decline in reproductive success is being observed by birds that arrive to their “traditional” breeding grounds after the optimal food supply has passed (because of plants tend to flower earlier and insects emerge earlier too).

Close monitoring of migration is vital to know how bird populations are responding to climate change. Spain has established a permanent centre to follow the Gibraltar Straits flyway.

f. Convention on Biological Diversity

In the absence of a representative of the CBD Secretariat, Mr Fernández-Galiano briefly informed participants of negotiating on climate change and biodiversity at the 2010 May meeting of the CBD Technical Committee, SBSTTA. That Committee has submitted to COP-15 a draft recommendation “in-depth review of the work on biodiversity and climate change” proposing guidance to Parties on ways to conserve, sustainably use and restore biodiversity and ecosystem services while contributing to climate change and adaptation.

The guidance contains several chapters on:

- Assessing the impacts of climate change on biodiversity;
- Adopting ecosystem-based approaches for adaptation;
- Reducing biodiversity impacts of climate change mitigation and adaptation measures;
- Promoting valuation and incentive measures.

The matter whether to adopt a joint Work Programme of the 3 Rio Conventions (CBD, Framework Climate Change Convention and the Convention to Combat Desertification) was not settled at Nairobi. Some States saw difficulties in such joint work programme, specially as the bodies ruling the other conventions need to agree.

5. Brief updates on recent activities and initiatives on biodiversity and climate change since the previous meeting (September 2008)

The following States presented written reports that can be found in Appendix 3 to this report: Armenia, Bosnia and Herzegovina, Czech Republic, European Commission, Latvia, Spain, Sweden, Ukraine and United Kingdom.:

- The delegate of **France** informed the Committee that the report presented last year contained most of action done by his country on this field. He explained how France keeps building its ecological networks (“*trame verte et bleue*”): as a main prevention for changes brought by climate change. Well preserved, connected, resilient natural habitats built an ecosystem-based approach will help adaptation.
- The delegate of **Latvia** (see full report in Appendix 3) informed the Group that a new Climate Change Adaptation Policy is in preparation and that his country is involved in a number of projects (for forests, wetlands, etc.) and in much research on the impact of climate change on Latvian water resources and ecosystem.
- The delegate of **Switzerland** apologised for not having sent a report this year and invited the Group to consult that of last year. Switzerland is working on a strategy to adapt to climate change that will be finished shortly. Also legislative changes have been passed, reinforcing fight against invasive alien species (particularly plants). A new legislation has been adopted on biofuels which makes this activity more respectful of biodiversity or food needs in developing States.
- The delegate of **Bulgaria** informed the Group that his country was studying the impact of climate change on forest ecosystems, as a third of Bulgaria is covered by forests. Another issue of particular concern was the future of Biodiversity hotspots in the Balkans, where climate change is a factor likely to affect many species listed in Red Books.
- The delegate of **Bosnia and Herzegovina** (see full report in Appendix 3) said that his State was worried by the impact of climate change on ecosystem services and areas of high biodiversity and forests, particularly those of narrow ecological valence, as fir-tree forests. Much work is being developed on shift of vegetation zones, of distribution areas of species and of fragmentation of habitats and species extinction. New capacity building to follow change and adapt is a real need.
- The delegate of the **United Kingdom** (see full report in Appendix 3) informed on UK climate change legislation framework and on the strategies for biodiversity and climate change and other

policy documents being developed by DEFRA, Natural England, Scottish Natural Heritage. New information is available on the impacts of climate change on UK's biodiversity. There is also a thorough discussion on biofuels so as to minimise their impacts on environment.

- The delegate of **Iceland** noted new research being carried out by the University and on work on wetlands and invasive alien species. There is concern that some species may be lost as the climate warms-up and that some alien species (like *Lupinus nootkatensis*) may spread to the highlands, so controls are necessary.

- The delegate of **Poland** informed the Group that his country was preparing a strategy for adaptation to climate change, to be finalised in 2012.

6. Brief updates from other Group of Experts under the Bern Convention and other activities in the Council of Europe

a. Group of Experts on Invasive Alien Species

The Secretariat informed the Group that this Group of Experts was working intensively in the implementation of the 2003 European Strategy on Invasive Alien Species, adopting lists to be avoided from trade and elaborating codes of conduct (on Horticulture and IAS and on Companion and IAS). The Group was also recommending the avoidance of IAS in biofuel crops. Interesting enough the Group thought that, because of climate change, the term "alien" species had to be redefined and they proposed a recommendation on the issue that was adopted by the Standing Committee as Recommendation No. 142 (2009) "interpreting the CBD definition of invasive alien species to take account of climate change".

b. Group of Experts on European Island Biodiversity

The Secretariat informed the Group of the creation of this Group of Experts that met for the first time in 2009. As island endemics is one of the groups of species most threatened by climate change, given its very limited "climate migration" possibilities, the future work of this islands Group is likely to interest the Group.

c. Congress of Local and Regional Authorities

Mr Halldor Halldorsson, Mayor of Isafjordur, presented the work of the Congress of Local and Regional Authorities on climate change, and biodiversity, pointing out that now over half of the world population lives in cities (his speech in Appendix 3). The Group considered carefully his proposals and decided to entrust the Secretariat to pass this message to the Standing Committee.

d. Parliamentary Assembly

The Secretariat informed the Group that, largely inspired in the work developed by the Group, the Parliamentary Assembly of the Council of Europe had dealt with the issue of biodiversity and climate change and that Ms Francine John Calame had presented on 14 December 2009 a report asking for further and better funded government and European action on adaptation of biodiversity to climate change. The Group received this news with satisfaction.

e. Council of Europe's Parliamentary Assembly – Recommendation 1918 (2010) "Biodiversity and Climate Change"

The Group examined a "draft opinion" to be delivered by the Standing Committee on the recommendation adopted by the Parliamentary Assembly and proposed the Bureau of the Standing Committee to adopt it as it figures in Appendix 4 to this report.

7. Impacts of climate change on mountain biodiversity in Europe

[document T-PVS/Inf (2010) 8]

Ms. Eva Spehn, Executive Director of the Global Mountain Biodiversity Assessment, presented her report.

She noted that mountains both were very diverse because of the different environmental conditions found in relatively little space, depending on slope, topography, exposure, and the

difference in substrate, nutrients, water and temperatures. Mountains and their biodiversity are already experiencing change, with a decrease in glaciers and a general trend for species to migrate upwards. This is a threat for species living in the upper parts of mountains that cannot migrate upwards. Many data confirm those trends and models predict many local extinctions. The East-West position of European mountains makes migration to other mountain ranges difficult.

She presented a number of policy recommendations, that were discussed and amended by the Group and are presented as a draft recommendation in Appendix 5 to this report.

8. Climate change and wildfires: impacts in Europe's biodiversity

[document T-PVS/Inf (2010) 10]

Mr Jose Manuel Moreno, Professor of Ecology, presented his report. A very substantial part of Europe's wilderness (particularly in Southern Europe) is subject to frequent forest fires (up to 50,000 fires every year in Mediterranean States). Burnt surface can be important. For instance, Portugal has seen a third of her forests burnt in the period 2000-2008. Mediterranean vegetation has evolved with fire. Climate change will make some areas that are not suffering fires more prone to burning, increasing the effect of fire on ecosystems. The increase of forest area in many European countries, following rural depopulation, brings also an increased risk of fire.

Fires also depend on vegetation, but they are also linked to presence of people. There is also a clear relationship between forest fires and climate and weather conditions. Fires shape vegetation and can also cause the death of many plant and animal species, increasing extinction risks of threatened species. As in many parts of Europe rainfall is predicted to fall and there will be more drought and heat waves, fires can be the first stage of a desertification process, so fire and fire protection has to be integrated into management of natural ecosystems, particularly in Protected Areas.

He presented a number of policy recommendations that were discussed by the Group, amended and are the base of a draft recommendation found in Appendix 6 of this document).

9. Impacts of climate change on Europe's island biodiversity

[document T-PVS/Inf (2010) 9]

Ms Cordula Epple, UNEP-WCMC, presented her report. The particular geographical and biological features of islands make these territories poor in species but very rich in endemism (while they comprise only 5 % of land they have 20 % of endemic plants). They are often conservation hotspots (especially "oceanic" type islands) and their flora and fauna is already threatened because of the small size of many islands and the intense human action. A third of globally threatened mammal, bird and amphibian species live in islands. Islands in Europe are very varied and most require a specific conservation approach. Island Biodiversity hotspots are specially in the South of the continent and the Macaronesian region. Island biodiversity is very vulnerable to climate change because of low possibilities of dispersal, high rates of endemism and often very limited distribution areas for many species although little information on overall population trends is available at present. Climate change is held partly responsible for large-scale decline in sea birds in the North Sea and North Atlantic. Islands will also suffer how expansion of invasive alien species linked to climate change.

She made a number of policy proposals that were discussed by the Group and are presented in the form of a draft recommendation (see Appendix 7 of this document).

10. Next steps and future work of the Group of Experts

The Group agreed that the report of the meeting be prepared under the supervision of the Chair and circulated to all members.

The Group agreed to continue its valuable interaction with other Bern Convention Groups of Experts, other Council of Europe institutions and relevant conventions and organisations. As regard areas of work for the future, the Group agreed to consider the following issues in the preparation of further guidance:

- Adaptation needs of Mediterranean ecosystems;
- Mechanism available for taking care of climate-orphaned species;

- Wetlands and climate change – Adaptation – Role in mitigation;
- Marine biodiversity and climate change in Europe (with other regional conventions);
- The role of nature in cities in helping mitigate climate change and increase citizen awareness;
- Review existing national adaptation strategies for biodiversity;
- Forest biodiversity and climate change;
- Impacts of mitigation on biodiversity.

The Group suggested that, at its next meeting, there is a presentation of the “ATLAS of Biodiversity Risks” (result of the European Research Project ALARM).

The Group thought it was also important to liaise with other Groups of Experts or organisations working in the effects on biodiversity of mitigation (impacts of wind energy, impacts of biofuels, impacts of desalination plants).

The Secretariat presented a Council of Europe publication compiling a number of reports discussed by the Group at its previous meetings.

11. Election of Chair and Vice-Chair

Mr Peter Zhelev (Bulgaria) was elected Chair and Mr Vilnis Bernards (Latvia), Vice-Chair.

12. Any other business and closing

Participants unanimously thanked Mr Snorri Baldursson for his performant chairing of the meeting and expressed gratitude to the Government of Iceland and the Icelandic Institute of Natural History for the excellent hosting and preparation of the meeting.

Appendix 1



Group of Experts on Biodiversity and Climate Change

Reykjavik, Iceland, 21-22 June 2010

AGENDA

1. Opening of the meeting

- Welcome by Ms Svandís Svavarsdóttir, Minister of Environment of Iceland
- Introductory remarks by Mr. Jón Gunnar Ottósson, Chair of the Bern Convention
- Progress since last meeting by the Chair (Mr Snorri Baldursson)

2. Adoption of the agenda

3. Introduction by the Secretariat

4. Updates on biodiversity/climate change work in other for a:

- a. UNECE activities on Climate Change and Biological Diversity (Mr Marco Keiner)
- b. Convention on Migratory Species (Ms Melanie Virtue, CMS)
- c. European Commission (Ms Karin Zaunberger, DG Environment)

5. Brief updates on national activities and initiatives on biodiversity and climate change since the last meeting (July 2009)

6. Brief updates from other Groups of Experts under the Bern Convention and other activities in Council of Europe

- a. Group of Experts on Invasive Alien Species (Mr Eladio Fernández-Galiano)
- b. Group of Experts on European Island Biodiversity
- c. Congress of Local and Regional Authorities of the Council of Europe Local authorities facing Climate Change, presented by Mr Halldor Halldorsson, Mayor of Isafjordur
- d. Parliamentary Assembly of the Council of Europe (Report by Ms Francine John Calame: Biodiversity and Climate Change, presented by the Convention Secretariat)
- e. EEA (Mr Snorri Baldursson)
- f. Conclusions of the 2nd World Conference on bird migration and global change (Mr Miguel Ferrer)
- g. Council of Europe Parliamentary Assembly Recommendation 1918 (2010) - "Biodiversity and climate change" (Mr Eladio Fernández-Galiano)
[document T-PVS (2010) 6 revised]

7. Impacts of climate change on mountain biodiversity in Europe

By Ms Eva Spehn, Executive Director of The Global Mountain Biodiversity Assessment)

[document T-PVS/Inf (2010) 8]

8. Climate change and wildfires: impacts in Europe's biodiversity

By Mr José Manuel Moreno, Director of the Dept. on Environmental Sciences, University of Castilla-La Mancha, Spain)

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9. Impacts of climate change on Europe's island biodiversity

By Ms Cordula Epple, World Conservation Monitoring Centre

[document T-PVS/Inf (2010) 9]

10. Next steps and future work of the Group of Experts

11. Election of Chair and Vice-Chair

12. Any other business and closing

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[Apologised for absence / Excusée]

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Appendix 3

SPEECH BY THE MINISTER OF ENVIRONMENT OF ICELAND

Chairman of the Bern Convention, dear members of the Group of Experts on Biodiversity and Climate Change under the Bern convention and other guests. I would like to welcome you to this meeting in Iceland which will discuss issues related to the interaction between climate changes and biological diversity. This includes many different aspects of the problem, both globally and on regional scale, such as wildfires, affects of mitigation methods, bio fuel, migratory species, and Mediterranean and island biodiversity just to mention a few.

It is widely recognized that climate changes affects biological diversity and ecosystems in the territory covered by the Bern Convention, just as well as in other parts of the world. However, in recent past the scientific and environment community has had to work very hard to raise awareness and understanding of the consequences of loss of biodiversity in context with the dangers of climate change. Somehow biodiversity seems not to be as politically sexy as climate changes. This is the reality we face, although it should be accepted that biodiversity and healthy ecosystems are essential for the resilience of societies and our economies.

The goal of halting the rapid loss of biodiversity and degradation of ecosystems and habitats by 2010 is the subject of several key international agreements and is well know to all of you here. In political terms, this commitment represents a radical departure from previous approaches. You will be discussing interactions between the Bern Convention and two of the Rio Conventions at this meeting, the Convention on Biological Diversity and the Climate Change Convention. This reminds us of the importance to interact and increase the synergies between the various Multilateral Environmental Agreements, specially now that we are already in mid 2010 knowing that we have not been able reach the targets set for 2010 and to halt the loss of biodiversity. The extent and intensity of many human activities is ever-increasing and the objective of halting or stopping the decline of biodiversity after 2010 will require unprecedented efforts, specially in adapting our human activities to the needs of natural systems.

Many different types of policy can affect the resilience of ecosystems and biodiversity worldwide. We do also have to keep in mind the interlinkages between decisions taken under different Conventions and try not to contradict implementation of other Conventions, their goals and targets, in our work. Consumption and production patterns are served by ecosystems globally and it is therefore necessary to affect these patterns by promoting individuals, businesses and governments to exert a global reach to the problem.

Much have been done of course, that's no question, and much of it is based on the work done in regime of the Bern convention with its connection for example to the Habitats and Birds directive of the EU. The Natura 2000 and the Emerald networks are significant agreements that have contributed to the protection of biological diversity according to the convention on biological diversity. But all this work can be thrown away if we do not combine it in synergistic way with the United Nations Framework Convention on Climate Change. In this fora I'm specially referring to what mitigation methods we use for example for carbon sequestration and bio fuel production.

The current global economic crisis may temporarily reduce the pressure on our natural resources but it may also reduce funding for nature conservation and increase the call for less stringent environmental rules and regulations, which by the way will not be heard by this minister standing here. But the crises has also brought into sharp focus our need to know more about the true costs and benefits of our biodiversity policies not the least in context with climate change and our use of fossil fuels, which we have been so harshly reminded of by the oil spill in Gulf of Mexico. On the other hand nature it self has also reminded us by the eruption in Eyjafjallajökull that we are only a small part of nature despite the great negative effect we seems to be causing us and our future prospects.

But let us not stay with the gloomy site of things and never think for a moment that the mission is impossible. There is a lot of work to be done and I hope you have a meaningful and constructive meeting that will contribute to solving the challenges a head and of course I wish you a wonderful excursion to Eyjafjallajökull and its surroundings on Wednesday.

**CONCLUSIONS OF THE SECOND INTERNATIONAL CONFERENCE ON BIRD
MIGRATION AND GLOBAL CHANGE
(Spain, March 2010)**

1. Birds are perhaps the best group of animals on which to monitor the effects of climate change. They are diurnal in habits, conspicuous and easy to identify, and popular with many people, including scientists. In various parts of Europe, their distributions and numbers have been well monitored for several decades, as has the timing of their migrations and breeding. Among birds, raptors are especially important due to their utility as indicators of biodiversity.
2. Migratory birds are perhaps more vulnerable than most species, because they can be influenced by conditions in their breeding and wintering areas, as well as by conditions at sites on their migration routes.
3. Changes in the migratory behaviour of birds, in association with trends in climate, have already been recorded. Many species are migrating earlier in spring than formerly, and some are also migrating later in autumn, so that individuals now stay for longer on their European breeding areas. In addition, some species which were once wholly migratory, are now partially migratory, with increasing numbers of individuals now staying year-round in their breeding areas. In yet other species, individuals are now migrating less far than formerly, and wintering further north. This is exemplified by the increasing numbers of White Storks which are now remaining to winter in southern Spain, rather than migrating to Africa. Long-distance migration would be itself at risk. Estimations are that around 20,000 millions of birds are responding yet to climate change.
4. One problem that has come to light is that different plants and animals do not all respond with the same speed to changing climate. This means that some birds which once arrived on their breeding areas at the optimal time for breeding (when their food-supplies were reaching their peak) now arrive too early or too late. In the latter case, they breed less successfully, resulting in declines in populations. These mismatches have been well documented in this second meeting
5. Breeding ranges of some species in Europe are already shifting to the north, as birds are withdrawing from the southern parts of their range, and spreading at the northern edge. The biggest concerns involve mountain-top species, which may disappear from much of their potential range. In the other hand, typical African species in the past are now breeding in Europe.
6. Now we have the first good estimations of mortality of migratory birds when crossing Sahara desert. Around 30% of young migrating birds died in their first migration. According some climatic models, Sahara is expected to increases, increasing mortality rates to young migrants. In this scenario, the flyway of Gibraltar is expected to decline in the future, increasing the number of birds using the Bosphorus strait. Nevertheless, some other authors predict a movement of Sahara to the north without a clear increase in size. In this scenario, the proportion of migratory birds between both routes would be stable.
7. Some measures taken to combat the causes of climate change, such as the development of wind farms, could themselves have severe impacts on migratory birds. This is particularly so if wind farms are badly sited, on major migration routes. Large numbers of birds could then be destroyed through collision with the rotor blades. Some other potential causes of bird mortality, like power lines, must be considered.

**COMPILATION OF NATIONAL REPORTS
ON ACTIVITIES RELATED TO
BIODIVERSITY AND CLIMATE CHANGE**

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1. ARMENIA / ARMENIE

PROGRESS IN IMPLEMENTING MEASURES ON BIODIVERSITY AND CLIMATE CHANGE IN ARMENIA

Preventing forest degradation, forest fires, pest invasion, and fostering collaboration between different actors involved in the forest protection and use are all targets addressed in the scope of the “Adaptation to Climate Change Impacts to Mountain Forest Ecosystems of Armenia” UNDP/GEF project in Armenia. The project is implemented by the Ministry of Nature Protection of the Republic of Armenia with assistance of UNDP. The project duration is 2009-2012. Financed through the Strategic Priority on Adaptation (SPA) as part of the Global Environment Facility’s Trust Fund, the Armenia’s project is in the global spotlight. The SPA is a pilot program with a total funding of US\$ 50 million allocated to 23 projects worldwide.

Armenia’s forest ecosystems are of a global conservation priority, listed by the WWF as a Global 200 Eco-region, and by Conservation International as a biodiversity hotspot. Containing nearly every plant community found in the Caucasus the protection of the Armenia’s mountain forest ecosystems is of critical importance as they are strongly vulnerable to climate change impacts. The forests are home to over 300 species of trees and bushes and include more than half the region’s floral diversity. Armenia’s forests also possess rare species found nowhere else on earth and form a vital eco-corridor that extends through the region.

Targeting 75,000 hectares of forest land to benefit, efforts are underway to protect sensitive and unique ecosystems. The project’s objective is to improve resilience of forests to increasing pressures posed by climate change. In cooperation with scientists, government officials, forestry enterprises, and local communities, the project is working in the fragile forests to reduce their vulnerability to climate change while helping communities to participate in and benefit from the adaptation efforts.

As part of the project, establishment of enabling environment for integrating climate change risks into management of forest ecosystems, introduction of innovative technologies for forest restoration, pest management and forest fire prevention is planned. Introduction of measures to reduce forest fragmentation and improve ecological restoration as means to improve resilience is underway: one pilot project is in the area with fragmented forests, another one is in the area of burnt forest. The experience of both pilot projects is unique for Armenia. Particularly the second project is designed to rehabilitate burnt juniper forest with no similar local experience over the last decades. Implementation of the third forest rehabilitation pilot project in the area affected by pest outbreaks and forest fire and is in the planning phase yet.

On national level substantive efforts are recently done in extending forest coverage under the protection to improve forest resilience. An obvious need identified is the improvement of pest monitoring system along with planned testing of an innovative pest control approach. An early fire warning and response system is going to be set up, in parallel with efforts to improve forest fire prevention measures. The staff of corresponding agencies is to be trained to increase their capacity.

Strong cooperation links are established with scientific community. Particularly, a study on forest pests and pestholes exacerbated by climate change and climate variability in along with identification of the most applicable environment friendly prevention measures for improving forest health management practices is underway.

Additionally, the project is working on advocating the importance of sustainable forest use practices and addressing climate change adaptation among governmental agencies, local communities, educational institutions, non-governmental and community based organisations. Besides, the project plans raising awareness on forest fire prevention and working with local forest enterprises, tourist organizations, farmers and communities to reduce activities that lead to forest fires.

Guided by the principle of prevention, collaboration, and cooperation, the project may have important consequences for local and regional forests, and will serve as an example for other ecosystems in need of conservation.

Prepared by A.Ter-Zakaryan, Project Task Leader, “Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia”
27 May 2010

2. BOSNIA AND HERZEGOVINA / BOSNIE-HERZEGOVINE

B&H development scenarios should include expected changes of biodiversity (B&H development is significantly based on biodiversity), as well as assess expected changes in nature, especially in nature as a resource (for example, changes in precipitation and hydrology, as a natural element, as well as changes in usage of waters in energy, agriculture and supply of the population and industry).

ASSESSMENT OF VULNERABILITY

1. Natural Ecosystems

Bosnia and Herzegovina is characterized by very high degree of biodiversity. The latest data point out that there are 5134 types of vascular flora in the area of Bosnia and Herzegovina, which places it at the very top of the European countries in terms of the ratio between its surface and the number of flora species.

In B&H, there are developmental endemic centers, in which processes of development of new species have occurred.

From this aspect, particularly significant are highly mountainous areas, such as the endemic center of Herzegovina (Prenj, Cvrstica and Cabulja mountains), as well as canyons of the rivers Una and Neretva and their tributaries in the river heads, which are at the same time very sensitive to disturbances.

The biggest value have species of plants which are precisely related to these areas, which include numerous paleoendemics, neoendemics, as well as tertiary and glacial relics which have been kept in refugiums in these areas.

The assessment is that there are around 450 endemic taxa in the flora of tall plants, at which the biggest value have numerous stenoendemics, i.e. taxa that have very limited distribution zone.

1.1. Biodiversity and geodiversity in B&H

Bosnia and Herzegovina has a particularly rich biodiversity due to its location in three distinct geological and climatic regions: The Mediterranean region, the Euro Siberian-Bore American region and the Alpine-Nordic region. According to some authors, it is divided to four main biogeography regions: (1) mountains and river valleys (1.28 million ha), (2) lowlands in the Pannonian region (2.25 million ha), (3) Mediterranean region (0.5 million ha), and (4) Karst region (1.08 million ha). According to this, it may be concluded that geographic, geologic, climate and historical diversities and factors have provided for development of a very diverse specter of ecosystems on a horizontal and vertical profile, from the sea level to the highest top of the Maglic Mountain at 2386 m.

It is home to a number of endemic species and habitats, and the location of relict centers-refuge of tertiary flora and fauna, preserved today in the specific conditions of paleo-climate. B&H is one of the countries in Europe with the greatest diversity of species of plants and animals. Vascular flora counts for about 5 000 confirmed taxa of species, subspecies, and variety and form level. As much as 30% about of the total endemic flora on the Balkans (1 800 species) is contained within the flora of Bosnia and Herzegovina. There are still no reliable data on the number of bacteria, blue-green bacteria or blue-green algae, but they are estimated to more than 2 000 species. Lichen and moss are poorly documented, as are fungi, although it is estimated there are several thousand fungi. Fauna inventories are more advanced and indicate that the animal kingdom is rich and diverse, particularly in comparison to other countries in the Balkans and in Europe. This rich biodiversity is endangered. Today there is a large number of registered domesticated plants in fruit growing, wine growing, tillage, vegetable growing and horticulture that are only preserved in certain parts of the country. There were previously a number of indigenous breeds of bovine cattle, sheep, goats, horses, donkeys and dogs. These are now decreasing and some are becoming extinct. B&H has extremely high level of diversity of biotopes (habitats), i.e. geodiversity. This is contributed by specific orography, geological surface, hydrology and ecoclimate. Given the area of the country and the number of registered geological rarities, Bosnia and Herzegovina is one of the countries with the greatest diversity in Europe and worldwide. Even though it is under significant anthropogenic pressure, geodiversity is still

locally preserved, and it requires an adequate sustainable management regime. Centuries of coexistence and a broad range of interactivity between biological and geologic diversity, are best reflected in extremely high diversity of landscapes, in the whole area of Bosnia and Herzegovina. However, many landscapes are now changed, devastated, and degraded through different anthropogenic activities and transformed into lower forms of ecological organization (NEAP, 2003).

1.2. Direct impact on biodiversity and ecosystems

Global climate change impact on recent biodiversity is more exposed and many studies are published on that subject. But, there has been lack of studies that are treating climate changing problem and their regional and local influences on biodiversity. Few studies about climate changes influence on agriculture and forestry in Bosnia and Herzegovina has been published. As far as the author of this text has known there haven't been studies which are treating problem of climate changing influence on biodiversity, their sensitivity and adaptation. There haven't been created models that could be used for valuation possible change areals on plants and animals communities in Bosnia and Herzegovina too. In biodiversity protection strategy in Bosnia and Herzegovina is pointed on climate changing problem and possible influence on some landscaping systems in Bosnia and Herzegovina. Therefore, there haven't given concrete examples for some species, and models of changing areals haven't been created for specific ecosystems, plants and animals communities. Based on existing researches and available literature we will valuate climate changes and the valuation of possible influence on agroecosystems in Bosnia and Herzegovina. Applying fast socio-economical development scenario with balanced usage of energetic sources and applying technological advancement in all forms of productions and extreme consumption of energy, with all significant differences in projections of future emitting green house gases, in the region of Southern east Europe which includes Bosnia and Herzegovina, in the end of 21st Century can be expected increase of mean annual air temperature for about 3.5 °C comparing with year average temperature in last decade of previous Century. Temperature increase like that would be followed with rainfall reduction on a year level of 12% with the most reducing during spring and summer seasons for about 16-24%. Beside these regional climate changes caused bay global climate changes, significant changes could be expected in a local area. In that context, following that scenario of partially application of measures for declining emitting of greenhouse gases, on the territory of Bosnia and Herzegovina could be also expected the increase of air temperature for 3-4 °C under the average by the end of 21st Century. In that thermal conditions, in next few decades could be expected significant reduction of days with snow, reduction of rainfall in warm half of the year which would be resulted with reduction of soil humidity and availability of water resources. Reduction of summer rainfall on territory of Bosnia and Herzegovina would be under 20% by the end of the century, and towards climate models in the worst possible scenario (continuing the usual practice of emitting of greenhouse gases), the increase of air temperature would be even bigger and rainfall deficit could reach 40% during the summer. Based on Predic T. (2001.b) in FAO project is fortified frequency and extension of dry period for climatology station Banja Luka in two periods (1962-72 & 1992-2000) which averagely had equal quantity precipitation quantity per year. There have been compared lends with capacity of 50 mm (shallow land) and 100 mm (deep land). Results pointing on the fact that in period 1962-1970 dryness appeared three times, and in period of 1992-2000 even five times. Therefore, it is alarming the fact that that in 1998, 1999 and 2000, the dryness is appearing every year. Dryness period, for shallow land with water capacity of 50 mm which are mostly on sand (euteric and distric cambisol) and there are dispersed in the area of Bosnian Posavina, and there will be under the more influence.

Fig.1.2.1. Number of dry days in period 1962-1970 and 1992-2000 for land with 50mm and 100 mm water capacity.

It is evident that the number of dry days is increased in period 1992-2000., even the average precipitation quantity on a year level is not significantly increased. Precipitation regime for months is significantly disturbed, meaning that for agroecosystems is more improper because the lack of precipitation is evident in vegetation period. Increasing dryness period trend is continued after 2000 and as an example we can point and last year (2007) which was the warmest year in Bosnia and Herzegovina for last 100 years. Beside, from previous text results that land with more capacity for water in the same climate conditions has shorter dryness period. Researches of Trbic, G. et al, 2007 pointing that the vegetation period in Bosnia and Herzegovina is increased in one month period and

also natural vegetation starts fenofaze development a month before, so it matching with spring on calendar. Increasing of intensity and dryness frequency ,as precipitation regime changing on Bosnia and Herzegovina territory is pointing on necessity of detail researches of climate changes and possible influence, not only on biodiversity but also on food production, water resources, natural ecosystems etc. which are indirectly related to biodiversity, and intending of mitigation of negative consequences.

0 50

100

150

200

250

501mm 1002 mm

Capacity lands for water

No day

1962-1970.

1992-2000.

1.3. Impact on ecosystems services

The areas of Bosnia and Herzegovina which are the most sensitive to global climate changes are defined by the strategy for the protection of biodiversity, inhere including an action plan. High-mountainous and mountain ecosystems, on the basis of an up to now conducted research on global climatic changes in B&H, are exposed to the biggest impact. In other words, the areas whose altitude is higher than 1 500 meters above sea level have a faster increase of an average temperature than when compared with the areas of different altitude. Beside that, extremes in temperature represent the biggest pressure that is being exerted on the areas, what is especially visible in warmer season of the year, leading to melting and drying, and with it, to a threat that many glacial and boreal relicts and their habitat would be destroyed. On a biodiversity of high-mountainous and mountain areas negatively impact acid rains, which appear as a result of over-pollution of the atmosphere. Acid rains, to a large extent, change the PH value of a habitat, especially of surface layers composed of accumulated humus, with which are again connected the most intensified processes of decomposition of organic matter and active part of risosphere. Decreasing of the PH value in basic species lead to a reduction in their number, what has an impact on the cycles of reproduction. In that way it may happen that

some stenovalent species and forests disappear, especially those growing at dolomites and dolomit lime-stones. When we talk of forest ecosystems, the most endangered ones are the fir-tree forests, which, taking into account the temperature and humidity, have a very narrow ecological valence. Contrary to them, the beech-tree forests have a very broad ecological valence, and it is expected that they become more prevalent in forests which are composed of a combination of both beech-tree and fir-tree. Ecosystems of submediterranean forests and underwoods, and of karst caves and basins, as a result of global climate changes, are exerted the presure by the soil becoming sour. Peripannonian and hilly ecosystems are the most in danger only after highmountainous and mountain ecosystems. If we take into account the calculated changes of temperature, the biggest pressure would be exerted to the oak-tree forests, that means the cork-oak-tree and English-oak-tree forests. The cork-oaktree forests are the lowest forests at the territory of Bosnia and Herzegovina, and the scope of altitude they grow at is from 280 to 860 m. (altitude amplitude is very low – 580 m). Moving of the cork-oak-tree and English-oak-tree onto the areas of higher altitude is disabled due to their heavy seed. (Burlica, C., Travar, J., 2001). Beside that, in case the increase in temperature is accompanied by an increase in dryness that will result create the conditions for slowing down of the decay of forest ground vegetation, which, under those conditions, would decompose slowly. As a result of that, a layer of raw humus would be formed, what would for a consequence lead to the process of subsolation in the soil, and a significant decrease in biodiversity in a lower layer of vegetation.

Pannonian ecosystems (natural and cultural) are endangered the most by the floods, as one of the main factors which significantly change the quality of a habitat. In itself, the floods have a high percentage of nutrients, what brings to the nitrification of the soil and underground waters. Changes of PH values that appear as a result of that cause acidiphil plants and pedofauna to disappear. The floods

are one of the dominant factors in the expansion of invasive species. In this way, at the area of Bosnian Panonija many species of weeds have found their habitat. With the aim to prevent from flooding, along the river Sava, the levees have been raised, which significantly changed the shape of the natural surrounding of those areas.

A key problem of an impact of climate changes onto biodiversity and ecosystems in B&H represents an adaptation of forest ecosystems to climate changes which happen very quickly. Undertaking of responsive measures in terms of maintaining the forests can to a certain amount lower social and economic consequences of a decay of forests under the influence of global climate changes. Defining of the protection measures for forest ecosystems require more advanced research of an impact of regional climate changes on the forests, and an analysis of the socioeconomic potentials leading to a decay of forests.

In the area of Bosnia and Herzegovina, the following main groups of climate change effects on biodiversity are to be expected:

1. Shift of vegetation zones (layers) in a horizontal and vertical direction,
2. Shift and changes in areals of individual taxa of flora and fauna,
3. Extinction of individual species,
4. Changes in the quality and quantity composition of biocenoses,
5. Fragmentation of habitats,
6. Changes in functioning of ecosystems.

Impact on plant species

Impact on biocenosis of the soil

Impact on biocenosis of fresh waters

Physiological and ecological impact on fauna

Impact on coastal ecosystems

With impact of changes in the regime of temperature and precipitation on biodiversity of coastal ecosystems of the Adriatic coast, the change of the sea level will also make an impact. For the Mediterranean area, projection of the sea level increase is from 34 – 52 cm. Habitats and biocenoses which will be directly exposed to these impacts are low coastal areas, for example, coastal sand, salina and estuaries. Changes in physical, hydro-dynamic, biological and chemical parameters may be expected, with accompanying quality and quantity changes in the components of biocenoses. Serious consequences to biocenoses of fresh waters may cause warming of water surface layer and deeper breakthrough of brackish water into estuaries. Damage or disappearance of certain valuable coastal habitats in these erosive processes may be expected. Direction of changes or impact on individual taxonomic groups is hardly predictable. Rivers of the Dinaric catchments basin will be very much affected, particularly the Neretva and Trebišnjica rivers. The Neretva River area has been, due to its biological specificities, protected and included in the list of valuable swamp habitats according to the RAMSAR Convention (Hutovo Blato), possible negative trends are extremely negative.

Impact on protected areas

Application in the areal of individual species and communities may have impact on locations under protection. This may lead to the need to change the borders of national parks: NP “Tjentište” (Foca), NP “Kozara” (Prijeedor) and newly founded NP “Una”. “Mitigating circumstance” is that borders of these parks have not been precisely defined even today, and they have also not been determined in accordance with biological criteria. However, as these long-term processes and possibilities of correcting these failures are in question, potential need to take into account climate change effects on these borders may be pointed out. Aggravating circumstance is that only around 2% of the B&H territory was categorized of protected areas.

Most vulnerable ecosystems and areas

Bosnia and Herzegovina has a particularly rich biodiversity due to its location in three distinct geological and climatic regions: The Mediterranean region, the Euro Siberian-Bore American region and the Alpine-Nordic region. According to available data and their analysis, climate change will affect all the three macroregions in Bosnia and Herzegovina. In the context of negative trends on biological diversity, i.e. decrease of number of species per unit of space, the most endangered are the Alpine-Nordic region and the Mediterranean region. The area of the Dinaride will be particularly endangered, as a very important and rich center of endemic species of the Balkan Peninsula. This mountainous chain is recognizable because of exceptional biological and geomorphological significance. The rivers of the karst areas and ecosystems developed along these may be particularly endangered, such as the areas of karst rivers.

Priorities of future policy frameworks

In line with, the following gaps and limitations have been identified for the purpose of prioritising future policy frameworks, measures and actions:

- Incoherency and incongruity between strategic and development documents (in forestry, agriculture and water management) and biodiversity management;
- Lack of well-defined socio-related research addressing the current problems in the fields of biodiversity and implementation of relevant international conventions and directives;
- Very low level of public awareness of the importance of biodiversity for preservation of fundamental environmental values, in particular in climate change management;
- Extremely low number of scientists, experts and institutions focusing on biodiversity and its preservation,
- Lack of financial resources and funds for scientific research in the field of climate change and biodiversity as well as the environment as a whole.

Priority tasks:

- Carry out the Initial National Communication on Climate Change and to identify in it the impact of climate change on biodiversity and adaptation measures;
- Establish a framework setting down long-term activities aimed at addressing the problem of climate change;
- Establish a framework for adoption of a national climate change adaptation strategy as a general adaptation plan;
- Define measures and activities for mitigation of the impact of global climate change on biodiversity and ecosystems in BiH;
- Improve the body of knowledge on global climate change, especially in connection with the anthropogenic effects on global climate change and their potential impact on biodiversity in BiH;
- Develop and perform vulnerability analysis for ecosystems (including agro-ecosystems) and habitats against projected climate change;
- Develop a set of recommended adaptable monitoring measures for conservation and restoration;
- Assess the existing environmental monitoring programme for the purpose of determining whether there is a need for additional monitoring of biodiversity and communication of new climate change information;
- Develop scientific tools for assessing the impact of climate change on local fish and wildlife populations and habitats;
- Assess the vulnerability of forest resources to climate change (special attention will be given to the understanding and development of management practices so as to reduce, to the extent possible, the risk of forest fires and insect pest outbreaks);
- Comprehensive training assistance to small landowners, increased possibility for fire control planning and proper management of public land;

- Develop a database on the effects of climate and products on forestry practices (e.g. reforestation techniques and pest control) which are considered most adaptable to climate change as well as information on how to reduce the risk of forest fires and insect pest outbreaks;
- Ensure that the actors in South-East Europe and national adaptation teams are provided with up-to-date information on the impact of climate change on forests and the preservation of forests through relevant seminars, workshops and media outlets.

PRIORITY PROJECT PROPOSALS

The priority projects to be financed focusing on obstacles and methods for overcoming them can be grouped as follows:

- ✓ Projects relevant for increasing energy efficiency,
- ✓ Projects focusing on the use of renewable energy sources,
- ✓ Projects aimed at removing obstacles to efficient energy use,
- ✓ Projects in agriculture.

It is necessary to develop the Climate Change Mitigation Strategy and Action Plan. The Strategy containing short-, mid- and long-term objectives with regard to implementation of the Convention and the Protocol will set a framework for the Action Plan. The Action Plan should identify the policy tools, technical and other measures, organisation, responsibilities, costs, funding options and implementation timeframe. It is necessary to involve all stakeholders and the general public in the development of the Strategy and the Action Plan. The Strategy should:

- define the national policy on mitigation of climate change in BiH and the relationship with the national economic and development plans;
- define the policy, measures and activities that are necessary for implementation.

The issue of climate change refers to a series of economic areas and requires changes to the behaviour of each individual as a user of natural resources. The process of developing the national strategy is an opportunity to increase general knowledge on climate change issues, discuss open issues and make progress towards integration of the climate change policy in different sectors in line with national developmental priorities and principles of sustainable development. It is necessary to:

- Carry out a needs assessment with the aim of:
 - making an in-depth analysis of institutional, legislative, organisational, HR and financial needs for the purpose of developing capacities of the UNFCCC and Kyoto Protocol implementation system.
 - gathering information about good practices in the transition countries and developed countries of the European Union that have adopted the strategy and action plans for implementation of the UNFCCC and the Kyoto Protocol.
- Ensure that implementation monitoring mechanisms are put in place
- Ensure the improvement of knowledge on causes and effects of climate change in BiH
 - Establish international cooperation with the countries that are already implementing the Convention and the Kyoto Protocol, encourage the transfer of knowledge, experience and good practices in capacity development, and promote cooperation in projects focused on reducing GHG emissions.

BiH is certainly adversely affected by CC and will be affected even more in the future. As a Contracting Party to the UNFCCC¹, BiH must cooperate in order to adapt to the impacts of CC and it has to address CC in its sectoral policies, in order to minimise its effects on the environment.

¹ Date of ratification : 7 September 2000 ; date of entry into force: 06 December 2000 (Source : UNFCCC). BiH has also acceded to the Kyoto protocol 16 April 2007 (date of entry into force: 15 July 2007) and would ratify it in the very near future.

The NEAP does not take CC into consideration very much² and no specific programme or activity on CC and biodiversity has been undertaken in BiH yet. As previously mentioned, there is a general lack of monitoring and reporting in the field of biodiversity. This is especially the case for the most vulnerable biotopes and species.

Considering BiH's ecological and socio-economical context, it is recommended to focus CC activities related to nature and biodiversity, on forest and water resource management. Priority should be given to the mountain regions and wetlands, which constitute a major part of the nature and biodiversity in BiH; CC will probably affect these ecosystems the most.

The ECCP Working Group on biodiversity outlines the position of the EU and indicates priorities for action in the area of biodiversity, which is reflected in the following list of EU policies:

- the Birds, Habitats, WF, EIA and SIAs Directives;
- the Countdown 2010 programme;
- the biodiversity strategy and communication.

The working group also recommended paying more attention to the integration of biodiversity into sectoral policies, especially in the field of agriculture and in relation to invasive species. It emphasises the necessity to set up ecological networks³ and promote all measures that seek to provide connectivity between natural habitats and that mitigate the fragmentation of the EU landscape. These conclusions confirm the necessity for BiH to set up a network of PAs, as well established (?) ecological corridors that secure the functional connectivities between areas of high biological values. They also emphasise the need to establish a monitoring system that gathers all data and information on the state and trends of nature and biodiversity. These activities should be carried out in accordance with the Pan-European Biological and Landscape Diversity Strategy (PEBLDS).

The discussions and meetings conducted with local stakeholders during the project, at all levels of responsibility, national, entity and local, led to conclusions that can be summarized as follows:

- **a lack of reliable data and the absence of monitoring system for biodiversity;** efforts were made which partly fill this gap but work still needs to be done to gather, up date and complete the statistics and data on nature and biodiversity, and to build a Nature Information System (NIS) as required by EU and national regulations;
- **a lack of long-term vision on the values and functions of natural resources and ecological services;** nature and biodiversity are still not considered as important assets for the welfare and economy of the country. The concept of ecological services, a central concern of the EU strategy on biodiversity, should be promoted and better understood by the local actors. There is a need for information and awareness raising measures that should be targeted at the economic values of biodiversity;
- **insufficient PAs and the absence of a coherent functional network of PAs, in compliance with the CBD decisions and the EU regulation;** few PAs meet international criteria and these areas only represent a very limited part of BiH's biodiversity. Furthermore, these PAs do not have enough human, technical and financial capacities to be appropriately managed and they do not build a functional network as required by international and EU regulations;
- **weak governance, illustrated by a complicated institutional framework and a lack of coordination between entities;** an inter-entity coordination body should be set up to ensure a coordinated approach of the activities undertaken at the national level in the field of nature and biodiversity;
- **lack of capacities, at all levels and in both, public and private sectors;** it is crucial to strengthen local capacities and to increase local expertise on EU policies and legislation;

² "Future research will be directed towards this issue and growth of consumption of natural resources (water resources above all)" (Source: BiH, 2003, p 27).

³ Ex.: Natura 2000 for the EU States, the Emerald network for the other European States, the Pan European Ecological Network (PEEN).

- **inadequate legislation and weak enforcement of mechanisms, combined with a partial transposition of EU Directives;** in the light of the conclusions of the review of the transposition of EU regulations on the environment, BiH should make efforts to comply with the legal requirements of the EU, in the field of nature and biodiversity. All regulations that may have an adverse impact on nature and biodiversity should be further assessed and priority actions to be carried out should be determined in order to harmonise entity regulations and to make BiH legislation in full compliance with the EU directives. This effort should be accompanied by a strong political commitment to enforcement of this legislation;
- **absence of a cross-sectoral approach between national and entities policies and strategies;** this is a crucial issue. Most of the public policies adversely affect but can also significantly contribute to the preservation of natural resources and to the maintenance of the ecological services. The IPA project should foster an holistic approach and promote activities seeking to strengthen cooperation between the different socio economic sectors;

Before going into further detail on the recommendations, a few additional comments are made:

- as said in the introduction of this report, the recommendations here do not respond to all needs arising from the current situation. They seek to contribute as much as possible to fill the identified gaps and focus on the main legal obligations of the EU Members States, in the field of nature and biodiversity;
- this project proposal should only be understood as a contribution of the EU, parallel to other donors, with the aim to facilitate further accession of BiH to the EU;
- particular attention was paid to the follow up of the many activities in BiH, aimed at preserving natural heritage and the wise use of biological resources, which are on going or have already been completed.

The gaps identified in this report constitute the baseline for an IPA project design, in addition to:

- the IPA design, which can provide support for activities in BiH relevant to transition assistance and institution building;
- the EU commitments for 2010, its action Plan, and its ten priority objectives, which aim at halting the erosion of biodiversity in Europe by 2010 and beyond.

CONCLUSION

BiH hosts a unique biodiversity, which has in many cases, still good conservation status. The need to protect its natural resources in the long-term is a constraint as well as a heavy responsibility for BiH. However, nature and biodiversity also have important values and functions and they provide BiH with opportunities for the development of many socioeconomic activities in the future.

If the authorities take the decisions needed to develop the country in a sustainable way, activities based on the use of nature and biodiversity can contribute to the well being of local people and the development of the country.

According to the terms of reference, it was required to make a gap analysis of the implementation of BiH international obligations and existing BiH legislation in the field of nature and biodiversity. It was also required to assess BiH's situation with regard to EU policy and legislation.

The analysis led to the identification of many weaknesses that are described in this report. General objectives and priority activities are recommended to strengthen BiH capacities and to assist BiH in meeting the challenge of nature and biodiversity protection in compliance with EU requirements.

The recommendations in chapter 3 of the report indicate selected and very concrete activities although some of them have a more strategic character and will need a longer preparation and implementation process. This report has been designed to facilitate the development of a EU project potentially funded by IPA resources. It draws a roadmap for a comprehensive programme of activities on nature and biodiversity that would prepare BiH for its accession to the EU. These activities cannot all be completed in the three years period of the IPA project. However, most of them can at least be initiated during this period of time, if sufficient funding is available.

Regarding the protection of nature and biodiversity in line with EU commitments, it is not only a matter of vision, strategy and policy but it is also a matter of day to day activities at the local level. That is what this report tries to put forward, the necessity to work very practically, in the field, in close cooperation with all local stakeholders.

To conclude, according to the terms of reference of this project, a draft IPA fiche for the development of a “**Nature and Biodiversity Programme and Action Plan in BiH**” based on the results of the present assessment must be developed. This fiche will be finalized by mid-July 2008 after discussions with the main stakeholders at a workshop to be held in BiH, on 9 July. This fiche will contain proposals for the contents, budget and timetables to implement the activities recommended in this report.

Ecosystems and biodiversity

Changes to BiH's climate are already occurring over natural variability (e.g. long-term spatial and temporal changes in rainfall and temperature patterns), and these changes are expected to have an impact on the country's biological diversity. BiH is one of the richest countries in Europe in biological diversity, in particular in wild plants and animals. Unfortunately there are a number of risk factors endangering the biodiversity in BiH. Amongst them are: illegal construction of buildings, manufacturing facilities, infrastructure, and others, excessive exploitation of natural resources, Non-participation in international projects such as Natura 2000, pollution, and many others.

More information on the impacts of climate change on the nature and the response measures envisaged could be found in “Assessment of Biodiversity and Nature Conservation Capacities in BiH according to EU Standards”.

In order to implement successfully the adaptation measures, BiH needs to take full advantage of the available **donors' support**. The UNFCCC provides a variety of support mechanisms to encourage the implementation of adaptation actions in developing countries. Negotiations on the operationalisation of these mechanisms are ongoing under the UNFCCC and there are already sources of funding for adaptation through the Global Environment Facility (GEF). These include: the GEF Trust Fund, the Special Climate Change Fund, and the Least Developed Countries Fund. Adaptation projects implemented under these funds are being operationalised through the implementing and executing agencies of the GEF. Additional funding is forthcoming through the Adaptation Fund under the Kyoto Protocol. The current available funding under the UNFCCC process, however, is not likely to be sufficient to cover adaptation needs of the developing countries. There is a clear need for allocating national resources to adaptation measures.

International and intergovernmental organisations are increasingly undertaking work on climate change impacts, vulnerability and adaptation. Such organisations include: the United Nations Development Programme, the United Nations Environment Programme, the World Bank, the Food and Agriculture Organization of the United Nations, the United Nations International Strategy for Disaster Reduction Secretariat, the United Nations Department of Economic and Social Affairs, the World Health Organization, the World Meteorological Organization, the Asian Development Bank, the World Conservation Union, the Organisation for Economic Co-operation and Development, the South Pacific Regional Environment Programme, and the International Federation of Red Cross and Red Crescent Societies.

The EU provides support to agriculture under the EU Instrument for Pre-Accession Assistance for Rural Development. If used wisely, it could simultaneously help facilitate the transition process in the agriculture sector and advance the EU integration agenda.

When developing the BiH First National Communication with the support of the UNDP, general aspects of the vulnerability are going to be assessed and adaptation measures identified. On the basis of the outcomes of the National Communication, a policy framework for implementing adaptation measures should be developed.

3. CZECH REPUBLIC / REPUBLIQUE TCHEQUE

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.* MACKOVČIN *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). Since August 2009 a Strategic Environmental Assessment of the Policy has been under preparation and it is expected that the official statement from the above procedure on the topic will be released in June 2010. The final document should be adopted by the Government of the Czech Republic by the end of 2010 (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 CO_{2-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. By late September 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 by the end of 2010. 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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4. EUROPEAN COMMISSION / COMMISSION EUROPEENNE

The European Commission has set up an EU Ad Hoc Expert Working Group on Biodiversity and Climate change in autumn 2008. The Working Group collaborates with the ENCA (European Nature Conservation Agencies) adaptation group, the Group of Experts on Biodiversity and Climate Change under the Bern Convention, the AHTEG (Ad Hoc Technical Expert Group) on Biodiversity and Climate Change established under the CBD (Convention on Biological Diversity) and the Intergroup Climate Change, Biodiversity and Sustainable Development of the European Parliament.

One of the main outputs of the work of this group so far is the Discussion Paper - Towards a Strategy on Biodiversity, Ecosystem services and Climate Change".⁴ This includes consideration of the Natura 2000 network and ecological connectivity, and the role of biodiversity and ecosystem services with regards to combating climate change. More information on the work of the group as well as background documents are accessible via the CIRCA group "Biodiversity and Climate Change": http://circa.europa.eu/Public/irc/env/biodiversity_climate/home.

The White Paper on "Adapting to climate change: Towards a European framework for action" was adopted on 1 April 2009 together with a number of staff working papers, i.e. the Impact Assessment, documents on "Adaptation and Health", "Climate Change and Water, Coasts and Marine Issues" and a report on "Adapting to Climate Change: the challenge for European agriculture and rural areas". All documents are available on the DG CLIMA adaptation website.

Most relevant with regards to biodiversity and ecosystems is the sub item 3.2.3 of the Adaptation White Paper: Increasing the resilience of biodiversity, ecosystems and water and the related action points which include: "Explore the possibilities to improve policies and develop measures which address biodiversity loss and climate change in an integrated manner to fully exploit co-benefits and avoid ecosystem feedbacks that accelerate global warming"; and secondly "draft guidelines by 2010 on dealing with the impact of climate change on the management of Natura 2000 sites".

The White Paper also mentions an Impact and Adaptation Steering Group (IASG) which is supposed to be supported by other technical groups. The Ad Hoc Expert Working Group on Biodiversity and Climate Change is to serve as the technical group on biodiversity, ecosystem services and ecosystem-based approaches to adaptation – short "ecosystem-based adaptation".

The European Commission together with the Swedish Presidency held a side-event on "Ecosystem-based approaches - Convenient solutions ready for use" at UNFCCC COP 15 in Copenhagen in December 2009. The presentations have been webcasted and can be watched under <http://www.se2009.eu/en/1.26298> or downloaded from the CIRCA site of the EU Ad Hoc Expert Working Group on Biodiversity and Climate Change http://circa.europa.eu/Public/irc/env/biodiversity_climate/home.

The **Environment Council Conclusions** adopted on 22 December 2009⁵ include the following paragraphs:

...

RECOGNISES that financing of activities to mitigate and adapt to climate change should contribute to the conservation and sustainable use of biodiversity, ecosystem services and socio-economic co-benefits, based on appropriate criteria;

9. EMPHASIZES the need for targeted and strengthened actions to effectively reverse the loss of forest cover and the loss of forest biodiversity through, inter alia, action at global level within the initiative on Reducing Emissions from Deforestation and Forest Degradation (REDD), and forest conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+), based on an active participation by developing countries, keeping in mind the objectives of the EU to reduce gross tropical deforestation by at least 50% by 2020 compared with current levels and halt global forest cover loss by 2030 at the latest

⁴ See http://ec.europa.eu/environment/nature/pdf/discussion_paper_climate_change.pdf

⁵ See http://www.se2009.eu/polopoly_fs/1.28576/menu/standard/file/112041.pdf

10. HIGHLIGHTS the mitigation and adaptation potential of resilient wetlands, oceans, forests, peatlands and grasslands and other ecosystems, and that conservation, restoration and sustainable use of these ecosystems result in carbon emission reductions, carbon storage and increased adaptation potential; RECOMMENDS the development and use of ecosystem-based approaches for the mitigation of and adaptation to climate change;...

The **Commission Communication "Options for an EU vision and target for biodiversity beyond 2010"** (COM(2010) 4)⁶ refers to the climate change – biodiversity link:

... As well as having intrinsic value, biodiversity delivers 'value' through ecosystem services, for example through the provision of food and water, by offering natural protection from floods and storms, and by regulating the climate. ...

... Since nature is both the most effective climate regulator and the largest carbon sink, biodiversity loss jeopardises climate objectives. Strong and resilient ecosystems are our life insurance against climate change, providing a 'natural fix' for mitigating and adapting to its consequences. ...

... Also, since biodiversity provides many of the same services as man-made technological solutions, often at significantly lower cost, protecting and restoring biodiversity provide some cost-effective opportunities for climate change mitigation or climate change adaptation. As natural resources are inputs to a wide range of economic activities, restoring their status and enhancing their use may raise productivity or develop new sources of growth, through eco innovation process. ...

... It should be a priority to seize all opportunities to make progress towards biodiversity policy goals while at the same time delivering cost-effective climate change mitigation and adaptation. ...

At the **poster session at CBD SBSTTA 14** in May 2010 a poster "Working with –Nature – Ecosystem-based approaches to climate change adaptation and mitigation"⁷ was presented in the name of the EU Ad Hoc Expert Working Group on Biodiversity and Climate Change and the ENCA adaptation Group referring to the discussion paper and the ENCA workshop report⁸.

ONGOING WORK

The **EU Post 2010 Biodiversity Strategy** is currently being developed. The promotion of working with nature – green infrastructure – ecosystem-based approaches is under discussion as one of the potential sub-targets for the EU Post 2010 Biodiversity Strategy. A dedicated strategy on Green Infrastructure is envisaged for 2011.

The **International Year of Biodiversity** shall also mark the collaboration of the three Rio Conventions (CBD, UNFCCC and UNCCD). A High-level Meeting of the United Nations General Assembly on 22 September 2010 is being prepared as a contribution to the International Year of Biodiversity. It is stressed – *inter alia* - that biodiversity and the climate change crises are inextricably linked and it is demonstrated that determined action to conserve and sustainably use biodiversity and ecosystem services contributes significantly to climate change adaptation and mitigation while providing additional benefits. A Rio Conventions' Ecosystems and Climate Change Pavilion is planned at upcoming CBD, UNFCCC, CCD COPs and Rio + 20 to raise awareness and encourage partnerships. The European Commission is supporting this initiative.

⁶ See http://ec.europa.eu/environment/nature/biodiversity/policy/pdf/communication_2010_0004.pdf

⁷ See http://circa.europa.eu/Public/irc/env/biodiversity_climate/home

⁸ See <http://www.bfn.de/fileadmin/MDB/documents/service/Skript264.pdf>

5. LATVIA / LETTONIE

1. The policy documents:

The Climate Change Mitigation Programme for 2005-2010 was elaborated and approved in 2005; mainly aiming at reduction of emissions and use and development of different types of energy resources;

A new Climate Change Adaptation Policy is under preparation;

The National Environmental Policy Strategy (containing chapters “Climate Change” and “Biodiversity”) was approved in 2009 and aims to minimize the clash between biodiversity conservation and climate change mitigation measures.

The State Program for Environment Monitoring was approved in 2010 (containing chapters “Air monitoring program”, “Water monitoring program”, “Land monitoring program” and “Biodiversity monitoring program”)

2. Projects

The Faculty of Geography and Earth Sciences of the University of Latvia as a partner was involved in the INTERREG III B project "Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region" (ASTRA) (2005-2007).⁹ The main objective of the project was to assess regional impacts of the ongoing global change in climate and to develop strategies and policies for climate change adaptation.

INTERREG IVC Project: FUTURE forest - Woodlands for Climate Change (2008-2011)

Project partner – the Ministry of Agriculture; activities carried out in cooperation with Latvian State Forestry Research Institute “Silava” and Latvian Forest Owners’ Association

The project aims to ensure that future European forests continue to deliver multiple benefits and to leave future generations forests that are well adapted and resilient to natural risks, including effects of climate change.

3. Research

Several researches were and are being done on climate change and its impact, major of them:

National Research Program „Climate Change Impact on Water Environment in Latvia”¹⁰ starting from 2006. Scientists in Latvia have joined forces to investigate how climate change will potentially influence Latvian lakes, rivers and the Baltic Sea coast and coastal waters, and to elaborate scientifically justified proposals to adapt to and mitigate adverse impacts;

“Importance of Genetic Factors on Formation of Forest Stands with High Adaptability and Qualitative Wood Properties” (2009-2012) – funded by ESF, lead by State Forestry Institute “Silava”. The aim of the project is to unit competence in forest research, chemical engineering and biology sectors, attracting young professionals and foreign experts, to analyze the potential impact of the genetic factors of pine, spruce and hybrid aspen to increase the adaptability and improve the wood.

“Adaptation of forestry to climate changes” (2010-2011) – funded by JSC “Latvia’s State Forests”, lead by Latvian State Forestry Research Institute “Silava” in cooperation with University of Latvia. Project aims to improve Latvian-scale predictions of climate variables, important for forestry, considering both tree growth and development (trends) of diseases, insects, possible damages from abiotic factors, and provide recommendations for minimization of possible adverse effects of climate changes on forest sector. During the project also methodology for further in-depth studies of identified most important factors in relation to climate changes and sustainable forest management will be developed.

„Solutions for maintenance and improvement of productivity, resistance, genetic diversity, and propagation ability of coniferous trees in conditions of Global climate changes” (2009-2012) – funded

⁹ www.astra-project.org

¹⁰ <http://kalme.daba.lv>

by Latvian Council of Science, lead by State Forestry Institute ‘‘Silava’’ – concentrates on specific aspects of selection and propagation of trees (genotypes), resilient to several possible adverse effects of climate changes.

6. SPAIN / ESPAGNE

CLIMATE CHANGE AND BIODIVERSITY IN SPAIN: IMPACTS, VULNERABILITY AND ADAPTATION

A total of 59 “courses of action” are proposed relating to natural resources (inc. agriculture) and 24 relating to economic sectors (thus, 83 in all). Thirteen measures are listed under biodiversity.

Policy/institutional measures

- Promotion of greatest possible genetic variation in ecosystems as a basis for adaptive capacity in the light of climate change
- Development of guidelines and handbooks for management of agricultural systems with a view to short term climate change, based on simple strategies for changing farming practices such as sowing dates
- Development of the most sensitive climate change indicators for use in implementing WFD.
- Climate change to be incorporated as a variable to be considered in ecosystem restoration projects

Technical/research measures

- Monitoring soil degradation/desertification via erosion and soil carbon loss
- Assessment of carbon balances for different Spanish ecosystems
- Assessment of effects of climate change on alien spp in Spain

Implementation measures

- Consolidation of long term monitoring networks and integration of information to detect effects of climate change
- Identification of biological indicators system for climate change, and devising of protocols to set up a vigilance system for early warning

The UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, in its article 4.1b, states that all Parties to the Convention shall “formulate, implement, publish and regularly update national programmes containing measures to facilitate adequate adaptation to climate change”. Spain signed the Convention in June 1992, the ratification took place on December 1993 and it has entered into force on March 1994.

The ECCE PROJECT (A preliminary assessment of the Impacts in Spain due to the effect of Climate Change, 2005) was the first national evaluation of climate change effects in Spain. It was developed by a group of more than 400 experts in different ecological systems, and economic and social sectors. The ECCE project dealt with the impacts of these projected climate changes on 15 sectors and systems.

The NATIONAL PLAN FOR THE ADAPTATION TO CLIMATE CHANGE (NPACC) is the reference framework for the coordination of all activities related to the evaluation of impacts, vulnerability and adaptation to climate change in Spain.

The NPACC, promoted by the SPANISH CLIMATE CHANGE BUREAU (MINISTRY OF ENVIRONMENT), was presented in February 2006 to the ENVIRONMENTAL SECTORAL CONFERENCE (administrative body that embodies the cooperation between Central Government and Autonomous Communities in environmental policy issues), and has been approved by the relevant national participation and coordination bodies dealing with Climate Change: NATIONAL COMMISSION FOR THE COORDINATION OF CLIMATE CHANGE POLICIES (Administrations) and the NATIONAL CLIMATE COUNCIL (Administrations and stakeholders) in July 2006. Its main objective is the integration of the adaptation to climate change in the planning strategy of, initially, fifteen sectors and systems through a series of Work Programmes. Under the first Work Program, the priority sectors and activities considered are the generation of regional climate

scenarios and the evaluation of the impact of climate change in water resources, coastal areas and biodiversity.

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

The MINISTRY OF ENVIRONMENT started in 2006 the preparation of a project to assess the impacts of climate change on biodiversity and to make informed decisions on practical adaptation actions and measures.

The project –started in January 2008 and with a planned duration of two years– involves the participation of the UNIVERSITY OF EXTREMADURA (flora species and habitat types) and the NATIONAL MUSEUM OF NATURAL SCIENCES-CSIC (fauna species).

The main objective of the project is to assess the impacts and vulnerability of biodiversity to climate change, as well as the adaptation measures required to prevent biodiversity loss related to climate change. For this purpose, representative series of habitat types, flora and fauna taxa, are being selected taking into consideration relevant criteria for biodiversity conservation like geographic distribution, conservation status, degree of threat, etc.

In order to evaluate the effect of climate change on biodiversity, the territory has to be analyzed not only in terms of its current natural characteristics (elements, structure and natural processes), but considering also the potentiality of what the territory can house.

Land cover and vegetation maps, as well as biodiversity inventories and other natural resources information, provide us with a general scope of current biological richness. But it is also necessary to estimate the predicted situation in the future, incorporating the projected change(s) provided by different climate scenarios and predicting future species and habitat types distributions. This is considered a very important issue, especially in areas like the Iberian Peninsula where all climate change models predict substantial variations in biodiversity limiting factors, like rainfall regime or maximum temperatures.

The project can be differentiated in two main working lines:

- Development and application of methodologies to assess climate change impacts on biodiversity (APPLIED INVESTIGATION)
- Promotion of participation mechanisms for relevant partners like Public Administrations, researchers/academic institutions, NGOs, etc. and development of information campaigns (COMMUNICATION AND PARTICIPATION)

APPLIED INVESTIGATION

It comprises the application of statistical modelling and spatial analysis techniques aiming to:

- Assess the potentiality of the territory to house flora and fauna taxa and relevant habitat types.
- Assess the expected changes in this potentiality under several climate change scenarios for the XXI Century.
- Evaluate changes in biodiversity distribution patterns along different time horizons of the XXI Century and identify species turnover rates, including the identification of areas of persistence, disappearance and colonization.

It is important to highlight that the assessment of biodiversity changes in response to climate change is an evolving field of work, and it entails some constraints:

- First, neither biological data nor the simulations required to evaluate the nature and extension of future changes in ecosystems and taxa distribution are still complete, so the predicted effects can only be partially assessed.
- Second, in the current state-of-the-art of predictive habitat and species distribution modelling techniques, the species-climate envelope modelling approach –also known as ecological niche modelling– has been widely used to support estimates of species' extinction risk under climate change; despite the fact that other important influences related to biological factors (i.e.

dispersion, interactions among living organisms, habitat fragmentation) and anthropic factors (i.e. changes in land use, pollution) can not be fully assessed. In this context, the proposed approach has to be seen as a first step to assess the complex response of biodiversity to climate change, but in the light of current scientific knowledge, it is considered appropriate: (1) to evaluate biodiversity vulnerability to climate change, (2) to estimate the expected impacts of climate change on our natural heritage and (3) to identify those biodiversity elements that can be more seriously threatened by climate change. Results of this project are intended to provide decision-makers with tools to facilitate the prioritisation of actions and to assess adequate adaptation measures.

The key activities to be developed under this working line are:

- Selection of biodiversity elements (flora and fauna taxa and habitat types) representative of Spanish biodiversity, taking into consideration conservation status and degree of threat.
- Development and integration of nationwide geographic databases of current taxa and habitat types potential distributions, environmental variables –including bioclimatic variables both for present-day and future climate scenarios–, protected areas, land use and infrastructures, etc.
- Application of statistical modelling methods to project spatial shifts in potential species and habitat types distributions according to different climate change scenarios
- Identification of biodiversity distribution patterns –both at present-day and in the different climate change scenarios– and of species turnover rates, including the identification of areas of persistence, disappearance and colonization
- Assessment of the interaction between the impacts of climate change on biodiversity and land use planning considering –for instance– connectivity, habitat fragmentation, etc.
- Proposal of adaptation measures to reduce the impact of climate change on biodiversity, including the identification of priority fields for further investigation and research.

Communication and participation

It comprehends the development –in parallel to Working Line 1: Applied Investigation– of communication campaigns and participation processes with relevant agents involved in biodiversity management, research, investigation, monitoring and public awareness. Spain is characterised by a highly decentralised administrative system, where Autonomous Communities (Regional Governments) have significant regulatory and management powers, including biodiversity and nature conservation. In this context, the Central Government and Regional Governments are obviously the main agents due to their responsibility in biodiversity management, but the scientific and academic community (researchers and scientists) and the Non-Government Organizations are also relevant ones, taking into consideration their role in investigation, research and monitoring, and public awareness. Besides, specific actions to inform stakeholders will also be implemented.

The objective of this working line is to promote the participation of these agents by means of the development of a communication strategy, the promotion of inter-disciplinary working groups and discussion forums where project development and results can be presented and adaptation measures can be discussed.

The key activities to be developed under this working line are:

- Presentation of the project at its first stages to relevant administrative and scientific bodies, and to the media.
- Establishment of participation mechanisms with the administrative authorities and scientific community, aiming to inform on project development and to promote synergies with related initiatives.
- Dissemination of the results of the project and starting of a wide debate for the assessment and discussion of adaptation measures in the framework of current biodiversity management policies, priorities for investigation and research and need of reconsideration of environmental and sectoral policies in light of the predicted impact of climate change on biodiversity.

It will report on the findings of the second conference "Bird Migration and Global Change: movement ecology and conservation strategies" held in Algeciras, Spain from 17 to 20 of March, 2010.

7. SWEDEN / SUEDE

SWEDEN FACING CLIMATE CHANGE – THREATS AND OPPORTUNITIES, SOU 2007:60

The final report¹¹ from the Swedish Commission on Climate and Vulnerability was published in October 2007. The Swedish Government appointed the Commission in June 2005. The Commission has analysed how the climate of Sweden may develop over the next hundred years. Important aspects that have been investigated are vulnerability to floods, landslides and storms.

Terrestrial, marine and freshwater ecosystems will face great upheavals, and the loss of biodiversity may increase. The commission propose various measures to reduce vulnerability and adapt society to long-term climate change and extreme weather events.

Biological diversity and climate changes – What do we know? What do we need to know? What can we do?

The Swedish Biodiversity Centre (CBM) has made a report¹² in 2007 on different aspects of climate change and biodiversity. It includes published knowledge as well as interviews with scientists, officials and people working practical with nature conservation. The report is an enclosure to the final report from the Swedish Commission on Climate and Vulnerability.

CBM points out that effects of climate change on biodiversity must be determined in relation to other effects, above all land use and economization of nature resources. Land use that is negative for biodiversity today will continue to be so even in a changed climate. The conservation work on biodiversity should therefore not be narrowed down to focus on the effects of climate change only.

Instead we need to be aware and prepared for additional problems linked to climate change, for example changes in cultivation. An important conclusion of the report is that changes in cultivation due to climate change could have larger impacts on biodiversity than the climate change itself.

Effects on biodiversity in a changing climate in Stockholm

The local authority in Stockholm has made a report on the effects of climate change on biodiversity in the area of Stockholm. It is based on published knowledge as well as interviews with scientists, officials and consultants. The report¹³ describes the knowledge of today as well as the additional knowledge and analyses that will be needed to adapt the city to the climate change and effect on biodiversity. For example, new requirements and system-boundaries will be necessary in management and administration of natural areas.

Nordic nature management in a changing climate

The Nordic Council of Ministers has made a report¹⁴ in 2005 that describes how the climate and nature may develop in the Nordic Region south of the Arctic Circle in the next 100 years. The report also describes how effects of climate changes can be integrated in nature conservation and management.

Ongoing activities at the Swedish Environmental Protection Agency

Climate change is a priority area at the Swedish Environmental Protection Agency. Potential risks have been mapped to get a general view of potential vulnerabilities to climate changes in the working area of the Nature Department. For example, we need to be more alert on the status of species depending on cold water, how the saltiness in the Baltic Sea develop and how the tree line develop on high mountains.

The climate change bill which gives the Swedish EPA “an assignment to investigate the effect of CC on the loss of biodiversity and ecosystem services and to investigate possible actions to minimize the negative effects”. However, biodiversity and ecosystem services are not addressed any further than that, as the bill focuses on emission reduction and strengthening the use of renewable energy etc.

11 <http://www.sweden.gov.se/content/1/c6/09/60/02/4b04b42e.pdf>

12 <http://www.cbm.slu.se/publ/annat/bmochklimat.pdf>

13 <http://www.stockholm.se/upload/Fackforvaltningar/Miljoforvaltningen/VaxthuseffektenPdf/Anpassning/Biologisk%20mangfald.pdf>

14 <http://www.norden.org/pub/miljo/miljo/sk/TN2005571.pdf>

Ongoing activities at the Swedish Board of Agriculture

During 2009-2010 the project “Climate change and its effects on biodiversity in the agriculture landscape” has been ongoing. The objective of this study was to explore the effect of climate change on biodiversity in the agricultural landscape. The project was performed by University of Lund and the Swedish University of Agriculture Sciences commissioned by the Swedish Board of Agriculture. The study includes red listed species of vascular plants, butterflies, as well as amphibians and reptiles, and was based on existing regionally adopted climate scenarios (IPCC).

The result of the study shows that many species in the agriculture landscape actually will be positively affected by climate change, but at least in the short term, management practices will still be overarching in effect, positively or negatively. The local species pool might change as the area of distribution of many species will shift northwards. In the future, biodiversity is expected to be effected by a combination of management practices, climate change and other related pressures such as increased nitrogen deposition. However, as the climate scenarios contain some uncertainties, it is not possible to predict what species will be most affected, but meanwhile focusing on management of road verges and other potential dispersal corridors in the landscapes will be a good investment in order to retain viable populations in the future.

8. UKRAINE / UKRAINE

UKRAINE'S NATIONAL POLICY AND ACTIONS TOWARDS THE CONSERVATION OF BIODIVERSITY AND DEVELOPMENT OF NATURE RESERVE CAPACITY

The development of Ukraine's ecological network as part of the Pan-European ecological network is an important element of the country's environmental strategy. The adoption and implementation of the Law of Ukraine "On the 2000-2010 State Programme for the Development of the National Ecological Network in Ukraine and the Law of Ukraine "On the Ecological Network in Ukraine" would facilitate significant improvements in the state of natural environment, help minimise and slow down the degradation of natural ecosystems, ensure the conservation of habitats for rare and endangered species, both plant and animal; and minimise the potential for water, air and soil pollution.

In Ukraine, nature reserves and protected areas occupy 4,8 % of country-s territory. In 2008, 24 new protected areas were established to occupy 9n100 hectares.

The third edition of the Red Data Book of Ukraine (to include both plant life and animal life) has been recently published. The National Commission on the Red Data Book of Ukraine has endorsed the lists of species to be included in the third edition and approved species-specific information formats.

Other developments include a recently prepared list of rare, endangered and typical plant communities that require protection and inclusion in the Green Data Book of Ukraine, and the publication of the Green Data Book of Ukraine itself.

A number of long-term (2008-2011) research programmes are currently underway in order to develop and implement measures designed to ensure the conservation of bison and bear populations. The network of conservation/reproduction centres is being set up to facilitate the conservation of rare and endangered plant species.

As part of implementing its commitments assumed under relevant international agreements and conventions, Ukraine hosted the Scientific Symposium and the Second Meeting of the Parties to the Memorandum of Understanding on the Conservation and Management of the Middle-European Population of the Great Bustard.

During the 9th Conference of the Parties to the Convention on Biological Diversity, Ukraine supported the Stop Deforestation initiative of the World Wildlife Fund (WWF) that seeks to stop the continuous reduction of forest areas by 2020 (28.05.2008, Bonn, Germany).

During the 9th Conference of the Parties to the Convention on Biological Diversity, Ukraine joined the Memorandum of Understanding for the Co-operation between the Alpine Convention, Carpathian Convention and the Biodiversity Convention. This Memorandum aims to strengthen the linkage among these three important conventions and co-ordinate efforts taken by the Parties thereof.

During the high level meeting convened as part of the 2nd Conference of the Parties to the Carpathian Convention (19.6.2008, Bucharest, Romania), the governmental representatives of the Czech Republic, Poland, Romania, Serbia and Ukraine signed the Protocol on the Conservation and Sustainable Use of Biological and Landscape Diversity in the Carpathian Mountains to the Framework Convention on the Conservation and Sustainable Development of the Carpathians.

In line with the recommendations of Unesco's Man and Biosphere Programme, Ukraine is working on establishing a bilateral biosphere reserve on the basis of the Desniansko-Starohutsky National Natural Park (Sumy Oblast, Ukraine) and the Bryansky Forest Nature Reserve (Bryansk Oblast, Russia). The establishment of this biosphere reserve is expected to enhance the conservation of natural landscapes in the Desna River valley.

The Ukraine/Moldova Natural Park "Dniester" is being established in the Vinnytsia Oblast.

In Zakarpattia Oblast, works are underway to establish the Ukrainian/Romanian Bilateral Biosphere Reserve "Maramorosh Mountains".

The international project on the establishment of a coherent ecological network in the Ukrainian Carpathians is being implemented in Lyiv and Chemivtsy Oblasts in Ukraine, to include the establishment of a transboundary ecological corridor connecting Ukraine and Poland, and designed to provide migration route for bisons, bears and other animals. The project has brought together a team of specialists from Ukraine, Romania and Poland.

Ukraine's National Policy and Actions on Preventing Climate Change

On 25 September 2008, the Verkhovna Rada of Ukraine adopted the Law No. 601-VI that sets special incentives ("green tariffs") designed to encourage the use of alternative environmentally sound energy sources.

On 19 November 2008, the Cabinet of Ministers of Ukraine passed the Resolution No. 1446-r to approve the Concept of the 2010-2015 State Energy Efficiency Programme, which includes the following activity areas of relevance to climate change:

- Bringing the national legislation on energy efficiency and energy saving in line with the relevant EU laws;
- Providing a discouraging climate for the use of inefficient and obsolete production technologies/equipment and sale of energy-intensive technologies/equipment;
- Introducing new power generation technologies relying on renewable energy sources, and adopting/maintaining an energy-efficiency certification (attestation) for businesses and industries.

As part of implementing the Ukraine-EU Action Plan approved by the Resolution of the Cabinet of Ministers of Ukraine of 6.8.2008 No. 1072-r, the Ministry of Environmental Protection of Ukraine has taken the following steps:

Initiating the negotiation process for the establishment of the Regional Ecological Centre in Ukraine;

- Ensuring the proper implementation of the National Environmental Protection Strategy;
- Ratifying the Protocols to the UNECE Convention on Long-Range Transboundary Air Pollution;
- Implementing recommendations provided under a number of environmental conventions (Espoo Convention, Aarhus Convention, Bern Convention and Ramsar Convention) concerning the restoration of the Bystre Navigation Route in the Ukrainian part of the Danube.

9. UNITED KINGDOM / ROYAUME-UNI

UK NATIONAL REPORT ON BIODIVERSITY AND CLIMATE CHANGE

Climate change legislative framework/background

- The **Climate Change Act 2008** (http://www.opsi.gov.uk/acts/acts2008/ukpga_20080027_en_1) and **Climate Change (Scotland) Act** made the UK the first country to introduce a long-term legally binding framework to tackle climate change with targets in legislation and five yearly carbon budgets. The Acts also introduced a framework for adaptation including a UK-wide Climate Change Risk Assessment (CCRA) every five years with an initial report within three years, and a National Adaptation Programme (to cover England) to be laid before Parliament after the first CCRA to address the most pressing impacts.
- Government also requires public authorities and ‘statutory undertakers’ (companies such as water and energy utilities) to report to Government on how they have assessed and will address climate change risks. Around 90 priority organisations have been instructed to report in 2010-11 and further 60 have been invited to report. The first in a series of **Climate Change Plans** by UK Government Departments emphasising the importance of sustainable adaptation were published in March 2010.
- **Defra’s plan** (<http://www.defra.gov.uk/environment/climate/documents/climate-change-plan-2010.pdf>) is supplemented by *Natural Environment: Adapting to Climate Change* (<http://www.defra.gov.uk/environment/climate/documents/natural-environment-adaptation.pdf>) which sets out an approach to sustaining the benefits from the natural environment in the face of a changing climate and highlights the crucial importance of a healthy natural environment in enabling society to adapt.
- For Scotland **The Climate Change (Scotland) Act 2009** received Royal Assent on the 4th August 2009. It created the statutory framework for greenhouse gas emissions reductions in Scotland by setting an interim 42 per cent reduction target for 2020, which can be varied according to expert advice, and an 80 per cent reduction target for 2050. To help ensure the delivery of these targets, the Act requires Scottish Ministers to set annual targets, in secondary legislation, for Scottish emissions from 2010 to 2050. The Act includes other provisions, including adaptation, forestry, energy efficiency and waste reduction. Scottish Natural Heritage (SNH) have produced: “**Climate Change and the Natural Heritage - SNH's Approach and Action Plan**” which sets out their strategic priorities and key actions, for delivering them over the next few years.
- The *UK Climate Change Projections 2009*, published in June 2009 set out the latest scientific evidence base: <http://ukclimateprojections.defra.gov.uk/>

Adaptation Measures taken for Biodiversity in face of Climate Change

- The majority of the **forestry actions** are outlined in Defra’s Climate Change Plan in the sections on forestry and green infrastructure. Further actions will flow from the Climate Change Risk Assessment for forests and forestry in England (due end of 2010). This sector level Risk Assessment will feed in to the National Climate Change Risk Assessment (for 2012). Forestry actions on Biodiversity and Climate Change to date include:
 - Public consultation on new **forestry Climate Change Guidelines** – planned for November 2010
 - Drafting of **Practice Guidance for Ancient Native Woodlands** – publication planned for summer 2010
 - Publication of the **Read Report: Combating Climate Change** in November 2009 <http://www.forestry.gov.uk/forestry/infd-7y4gn9>
 - An internal review of grants and regulations in the context of climate change has established where the EU co-financed English Woodland Grant Scheme (eWGS). This will feed into a comprehensive review of eWGS – to be published in 2011.
 - A **Climate Change Action Plan for the Public Forest Estate in England** – to be published in summer 2010
 - Promotion of tree planting and peri-urban woodland through eWGS to adapt the urban environment to climate change and provide new habitat for wildlife

- The England Biodiversity Strategy (EBS) workstream on climate change adaptation is working with the England Woodland Biodiversity Group to embed adaptation principles for biodiversity delivery.
- In March 2009, Natural England published assessments of the **likely implications of climate change for the natural environment in four English landscapes**: the Norfolk Broads, Cumbria High Fells, Shropshire Hills and Dorset Downs – <http://naturalengland.etraderstores.com/NaturalEnglandShop/Search.aspx>. These aim to improve our understanding of vulnerability to climate change and how to develop adaptation strategies for conservation over large areas. The approach has now been refined and extended to eight new study areas (with reports to be published in 2010).
 - Assessment of the vulnerability of species, habitats and ecosystems and the implications for biodiversity is an important part of all these studies. The potential consequences for wildlife are identified as well as potential adaptation actions.
- As part of the same project, Natural England is **developing and testing practical methods to estimate relative vulnerability** of the terrestrial natural environment, to help inform our conservation efforts in a changing climate. This is being done in three regions in England, covering a wide variety of habitat types:
 - In the South East region using a GIS grid model to undertake a spatial analysis
 - In the North West, the approach evaluates the vulnerability of the 29 individual landscape areas ('National Character Areas') in the region
 - In Warwickshire, West Midlands, vulnerability assessment is part of a larger study to identify areas for potential habitat expansion.
 - Reports on these studies will be published in 2010.
- **Assessment of climate risks to conservation objectives** – Natural England has begun a programme to assess climate threats and opportunities and identify possible actions across all its work. In 2009/10 Natural England identified the risks and possible responses for land management and is now considering how adaptation actions that benefit biodiversity can be implemented through schemes such as Environmental Stewardship (an agri-environment scheme funded under the Rural Development Regulation). Other risk assessments are being undertaken in 2010.

Scientific publications and Research

- The UK statutory conservation agencies (JNCC, CCW, SNH, NE and NIEA) published in May 2010 a booklet: "[Biodiversity and Climate Change - a summary of impacts in the UK](#)"
- **The National Ecosystem Assessment**, covering the terrestrial, freshwater and marine ecosystems across the UK has now released its first chapters, reviewing the past and current status of the services provided by the UK's ecosystems, for extensive scientific peer review. These chapters will be finalised in September 2010 and will include a specific chapter covering biodiversity. The National Ecosystem Assessment is currently assessing how ecosystems and the services they provide may change in future in response to a number of drivers, including climate change, and will consider how society may respond to those possible changes. The final report of the National Ecosystem Assessment will be published in spring 2011.
- **Adaptation research and monitoring of environmental change** – Natural England has a series of research and monitoring projects that address some crucial questions for biodiversity conservation in a changing climate:
 - **Long term monitoring of environmental change** - this project is establishing a series of sites where the impacts of climate change can be monitored and identified through producing long term time series of a range of environmental variables. This is currently being set up and is intended to be a long term project.
 - **Evaluation of adaptation measures in response to climate change** - this aims to collate information about implementation and effectiveness of proposed adaptation measures, including testing with long term datasets where these are available. It will also develop a framework for assessing the outcome of adaptation schemes. Results will contribute to policy development including new agri environment schemes. Initial work will be completed in March 2011.

- **Resilience to climate change: what is it and what makes ecosystems and landscapes resilient?** This project will summarise current understanding of what makes ecosystems, landscapes and habitats resilient so we they can be managed to achieve resilience to environmental change.
- The Environment Agency has implemented a plan *Freshwater Ecology Climate Change Adaptation Action Plan 2009-2011* based on the England Biodiversity Partnership Climate Change Adaptation Principles <http://www.defra.gov.uk/environment/biodiversity/documents/ebs-ccap.pdf>. The plan is a response to an assessment of the risks and opportunities presented by a changing climate. This plan is currently being updated and extended in scope to cover freshwater and marine biodiversity. Examples of some of the work contributing to this plan can be found at <http://www.environment-agency.gov.uk/research/planning/108363.aspx>
- Defra and the Department for Communities and Local Government commissioned through the Foresight unit in the Office of Science a report on *Land use Futures: Making the most of land in the 21st century*, published in February 2010. It revealed that pressures on land are increasing because of climate change (both mitigation and adaptation), population increase, other demographic change, economic growth, societal preferences for living alone and new technology. Foresight is now engaging in a one-year follow up process. It recommended a more integrated land use framework based on a consistent method of establishing best value working at all levels of Governance. It identified biodiversity as one of the factors that would need to be addressed in a framework, and suggested a flexible approach to designated areas and connecting habitats. <http://www.foresight.gov.uk/OurWork/ActiveProjects/LandUse/lufoutputs.asp>
- **RCEP report on adapting to climate change** - The Royal Commission on Environmental Pollution published its 28th report on *Adapting Institutions to Climate Change* on 30 March 2010. The report explores the challenges of climate change and existing UK institutional arrangements for three exemplar areas: freshwater, biodiversity and nature conservation, and coastal zones.
- Defra has commissioned a number of scientific studies:
 - **Adaptation at a landscape scale** – using landscape permeability models, UKCP09 climate change projections, expert opinion and other research – will produce a series of case studies showing application of England Biodiversity Strategy Adaptation Principles at the end of June 2010.
 - **Bicconet** – the purpose is to detect signals of responses to climate change based on investigating existing species monitoring data sets for relationships with climate variables: www.bicco-net.org . Due to report March 2011
 - **Chainspan** – using UKCP09 climate change projection models to assess the possible impacts of climate change on the ornithological interest of Special Protected Areas (SPAs) in the UK. Due to report March 2011
 - **Developing Tools** – Identifying the potential threat of sea level rise to the English wetland coastal habitats using UKCP09 and National Flood Risk Assessment modelling – and examining the potential to re-create threatened habitats on land. It is developing tools for the assessment and working closely with a parallel Environment Agency project examining impacts below the mean high-water tide mark. Due for completion at the end of June 2010.
 - **Protected sites, Priority Habitats and Climate Change** – an integrated review of possible implications of climate change in three parts
 - ✓ Investigation of whether existing legislation eg designation, is climate change proof;
 - ✓ Common Standards Monitoring, to review the methodology to assess condition and set site objectives;
 - ✓ The contribution of Priority Habitats to mitigation of Climate Change. The outputs (due in March 2011) will produce an integrated analysis across all three elements and inform policy guidance.
 - ✓ **Environmental Change Network** – monitoring and data analysis to detect and distinguish signals of Climate Change impacts on Biodiversity www.ecn.ac.uk . Annual Report due in December
 - ✓ **Development of an indicator of habitat connectivity** – development of the method and an indicator based on functional connectivity using data from the c 600km squares used in the periodic Countryside Survey across UK. An existing set of biodiversity indicators for the

UK is available at JNCC website: www.jncc.gov.uk/biyp, includes an existing connectivity indicator <http://www.jncc.gov.uk/page-4249> . Final Report to be published in summer 2010.

- **UK Overseas Territories – Darwin Initiative BAP for the Cayman Islands** – the project “In Ivan’s Wake” carried out an assessment of the key biodiversity elements of the Cayman Islands; and helped to create the capacity for its future monitoring and conservation, while increasing environmental awareness – which reported in October 2008 <http://darwin.defra.gov.uk/project/14051/>

Appendix 4



Strasbourg, 6 July 2010
[tpvs06erev_2010.doc]

T-PVS (2010) 6 revised

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

30th meeting
Strasbourg, 6-9 December 2010

Draft comments of the Standing Committee of the Bern Convention on Recommendation 1918 (2010) of the Parliamentary Assembly of the Council of Europe on “Biodiversity and climate change”

*Secretariat Memorandum
prepared by
the Directorate of Culture and Cultural and Natural Heritage*

CONTENTS

Appendix 1

Draft Comments of the Standing Committee

Appendix 2

Recommendation 1918 (2010) of the Parliamentary Assembly of the Council of Europe,
on “Biodiversity and climate change”

1. At its 1086th meeting on 26 May 2010, the Committee of Ministers of the Council of Europe examined Recommendation 1918 –(2010) of the Parliamentary Assembly on “Biodiversity and Climate Change” (see appendix 2) and agreed to communicate it to the Convention on the Conservation of European Wildlife and Natural Habitats for information and possible comments by 15 September 2010.
2. The Bureau is invited to examine the draft recommendation found in appendix 1, which has been already examined and amended by the Group of Experts on Biodiversity and Climate Change. The Bureau is invited to submit the enclosed opinion to the Committee of Ministers of the Council of Europe if appropriate.

Appendix 1

DRAFT COMMENTS OF THE STANDING COMMITTEE OF THE CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS (BERN CONVENTION) CONCERNING RECOMMENDATION 1918 (2010) OF THE PARLIAMENTARY ASSEMBLY OF THE COUNCIL OF EUROPE ON “BIODIVERSITY AND CLIMATE CHANGE”

The Standing Committee of the Bern Convention:

1. Welcomes Recommendation 1918 (2010) of the Parliamentary Assembly and agrees that climate change is having a serious impact on European species, habitats and landscapes, making them more vulnerable and posing a very serious threat to species and habitats protected by the Bern Convention;
2. Notes that a greater attention to biological diversity is necessary to mitigate climate change, as natural ecosystems including forests can act as carbon sinks and thus contribute positively to slow the increase of CO² in the atmosphere, which is believed to be one of the main causes of climate change;
3. Notes that climate change is a supplementary reason to further the world and European biodiversity agenda, as other unrelated phenomena having an impact on biodiversity (such as pollution, fragmentation of natural and semi-natural areas, intensification of agriculture and forestry, a growing urbanisation of the rural space and coastlines may reduce the natural ability of natural systems in Europe to adapt to the new climate conditions;
4. Considers that ecosystem-based adaptation is fundamental to link biodiversity and climate change policies and provide multiple benefits at comparatively low cost, and that appropriate conservation and sustainable use of ecosystems has to be an important part of any adaptation strategy because biodiversity and ecosystem services help societies adapt to the adverse effects of climate change;
5. Notes that the Bern Convention has pioneered European work on the issue of biodiversity and climate changes as it decided in 2006 to set up a Group of Experts to provide information and guidance to Parties in understanding climate change impacts and threats and to provide Parties with tools and support in developing appropriate adaptation measures in national policies regarding the species and habitats protected under the Bern Convention;
6. Supports efforts in the framework of the UN Convention on Biological Diversity to address the common drivers of biodiversity loss and climate change and understand, monitor and assess on the interlinkages between biodiversity climate change, land degradation and sustainable developments, encouraging ecosystem-based approaches to adaptation and mitigation to fully exploit co-benefits and promoting also education, public awareness, capacity building on the topic;
7. Invites governments to carefully consider the impacts of mitigation on biodiversity, as some of the measures proposed (such increase of windfarms and other non-carbon energy plants or biofuel cultures) may threaten biodiversity protected by the Bern Convention;
8. Invites governments to support Council of Europe work on conservation and sustainable use of biodiversity, in particular under the Bern Convention, as particularly relevant to help States better adapt to the challenges of climate change;
9. Invites governments to support increased synergies between the Framework Convention on Climate Change and biodiversity-related conventions;
10. Invites the Russian Federation and San Marino to consider ratifying the Bern Convention, thus joining the other Council of Europe Member States in their work on climate change and biodiversity..



Appendix 2

Parliamentary Assembly **Assemblée parlementaire**

Recommendation 1918 (2010)

Biodiversity and climate change

1. Depletion of biological diversity is currently taking place much faster than natural extinction.
2. Human activities are the main cause of this depletion, both directly (soil and marine pollution and the introduction of invasive species, etc.) and indirectly (exponential increase in climate change brought on by various activities).
3. The smooth functioning of ecosystems is vital to the well-being of humankind, as they provide free services such as water resources, soil fertility, firewood and timber, food, medicines, fossil, solar, wind and geothermal energy and climate regulation.
4. Global warming is a well established fact and an unprecedented challenge for biodiversity. Worldwide, it is also reflected in an increase in average air and sea temperatures, extensive snow and ice melt and rising average sea levels.
5. According to some experts, average temperatures on the Earth's surface could increase by 1.4 to 5.8° C by the end of the 21st century, with greater increases on land and in the high latitudes than at sea or in the tropics. Sea levels could rise by between 0.09 and 0.88 m and even, according to certain experts, much more. Precipitation is also expected to increase in the high latitudes and equatorial regions and to fall in the subtropics, with an increase in high rainfall. It is predicted that 20% of coastal wetlands could disappear by 2080 because of rising sea levels.
6. Modelling changes in biodiversity is difficult. However, it is obvious that climate change has serious repercussions for animal populations, the distribution of species and ecosystems. This also has an impact on the length of seasons, reproduction periods, animal and plant growth, animal migration, the geographical distribution of species and density of populations, the frequency of parasitic infestations and diseases, etc.
7. Changes in biological diversity in ecosystems and landscapes, which are caused by climate change or other phenomena (such as deforestation and forest fires) also, in turn, affect the climate by altering the absorption and emission of greenhouse gases in particular. In addition, changes in the structure of the biological communities in the upper layers of the oceans could alter their absorption of CO₂ or affect weather conditions and climate change. This is therefore a spiral-like process which could have disastrous results at global level.
8. The Parliamentary Assembly notes that there is very good evidence of the impact of climate change on species and habitats, making them all the more vulnerable. It underlines the fact that uncertainties concerning the precise effects of climate change on biodiversity should not be a reason for deferring concrete action to preserve ecosystems and that the principle of precaution must be applied.
9. The Assembly underlines the need for the full and immediate implementation of the objectives of the Convention on Biological Diversity adopted at the Earth Summit in Rio de Janeiro in 1992.
10. It points out that in April 2002, at the sixth meeting of the Conference of the Parties to the Convention on Biological Diversity, organised under the aegis of the United Nations Environment Programme (UNEP), the governments undertook "to achieve by 2010 a significant reduction of the

current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth” (2010 Biodiversity Target).

11. The Assembly also draws attention to its Recommendation 1823 (2008) on global warming and ecological disasters, Resolution 1406 (2004) on global warming: beyond Kyoto, Recommendation 1883 (2009) and Resolution 1682 (2009) on challenges posed by climate change, Recommendation 1885 (2009) on drafting an additional protocol to the Convention on Human Rights, concerning the right to a healthy environment and [Recommendation 1862](#) on environmentally induced migration and displacement: a 21st-century challenge.

12. The Assembly also draws attention to Recommendation No. 135 (2008) of the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, ETS No. 104) on addressing the impacts of climate change on biodiversity, which calls on the contracting parties and observer states to address and communicate, as a matter of urgency the impacts of climate change on biological diversity and its conservation, inter alia, and to its Recommendation No. 143 (2009) on further guidance for parties on biodiversity and climate change, which calls inter alia on increasing efforts to improve understanding of the linkages between biodiversity and climate change.

13. It points out that the environment ministers of the G8 and emerging countries, meeting in Syracuse (Italy) in April 2009, adopted the Syracuse Charter on Biodiversity, making biodiversity a major global cause on a par with the fight against global warming and underlining the close link between the two.

14. The Assembly therefore recommends that the Committee of Ministers calls on the governments of Council of Europe member and observer states to take account of the opportunities offered by the International Year of Biodiversity in 2010 to:

14.1. improve the interface between science and politics, particularly with regard to biodiversity, whose importance still seems to be underestimated by some policy makers and by a large proportion of the public;

14.2. devise appropriate policies and take concrete measures to promote the conservation of biological diversity and reduce the impact of climate change on biodiversity;

14.3. develop evaluation systems to improve our knowledge of how biological diversity interacts with ecosystem structure and functioning and deepen our understanding of how biodiversity reacts to climate change factors and other exogenous pressures;

14.4. encourage synergy and interaction between national, regional and local environmental projects and policies on climate change and the objectives of international treaties such as the Convention on Biological Diversity;

14.5. promote a more efficient transfer of best practices in preventing biodiversity loss, which is very important in ensuring that a co-ordinated response can be devised and implemented at European level;

14.6. develop education, information and participation programmes targeting the public and policy-makers concerning the value of biodiversity and the importance of the conduct of individuals, businesses and the authorities in preserving it and mitigating the impact of climate change.

14.7. step up the fight against illegal trading in fauna and flora;

14.8. fully respect the status of protected areas, extend them as far as possible and establish environmental corridors to link them, while focusing in particular on cross-border areas which are more vulnerable because of the considerations of territorial sovereignty that affect them;

14.9. ensure that the networks of protected areas and the environmental corridors between them improve possibilities for flora and fauna to adapt to climate change by means of migration;

- 14.10. not allow large infrastructure projects that would cut through, and thus destroy, the above-mentioned environmental corridors;
- 14.11. protect all old-growth forests, functioning wetlands and permanent grasslands/pasture lands as carbon stores and sinks and important habitats;
- 14.12. adapt forestry techniques in the forests used for economic purposes so as to reduce impacts on climate and biodiversity;
- 14.13. facilitate transition to sustainable agriculture which would produce quality products, maintain high nature value habitats and landscapes, and have low climate impact;
- 14.14. support the renewable energy developments that have a real effect on reduction of green-house gas emissions and no negative impacts on biodiversity, and in no way support “green-wash” projects;
- 14.15. co-ordinate the responses to climate change and biodiversity loss by different sectors to achieve synergy and avoid conflicting actions and duplication of efforts;
- 14.16. implement Recommendation No. 135 (2008) of the Standing Committee of the Bern Convention on addressing the impacts of climate change on biodiversity, which sets out detailed guidelines for concrete action at all levels;
- 14.17. identify, on the basis of the experience acquired in the context of the activities conducted with a view to achieving the “2010 Biodiversity Target”, a common strategy for a common framework of activities “post-2010”.

Appendix 5



Convention on the Conservation of European Wildlife and Natural Habitats

Standing Committee

Draft Recommendation No. ... (2010) of the Standing Committee, adopted on ... December 2010, on guidance for Parties on biodiversity and climate change in mountain regions

The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention;

Having regard to the aims of the Convention to conserve wild flora and fauna and its natural habitats;

Recognising that climate change affects biological diversity in the territory covered by the Convention, including species, habitats and the Areas of Special Conservation Interest of the Emerald Network;

Recognising the need to adapt conservation work to the challenges of climate change so as to minimise its impacts on the species and natural habitats protected under the Convention;

Bearing in mind that uncertainties surrounding the precise nature of future climate change and its impacts on biodiversity should not delay practical conservation action;

Noting that the biodiversity of mountain regions in Europe is particularly vulnerable to climate change as many species, particularly those in the upper parts of mountains are going to experience important reductions in their distribution area as the climate warms up;

Noting that biodiversity of European mountain systems is to be more affected than other mountain ranges of the world as migration of species Northwards following temperature increase will not be possible because of their West-East orientation;

Noting that many European mountain ranges have a high degree of habitat fragmentation and can be considered “evolutionarily isolated ecosystem”, which increases the vulnerability of their biodiversity to climate change;

Recalling CBD COP Decision on the in-depth review of the work on Biodiversity and climate change;

Recalling Recommendations No. 135 (2008) and No. 143 (2009) of the Standing Committee, on addressing the impacts of climate change on biodiversity;

Welcoming and bearing in mind the report “*Impacts of climate change on Mountain Biodiversity in Europe*” by Ms Eva Spehn [doc.T-PVS/Inf (2010) 8];

Recommends Contracting Parties to the Convention and invites Observer States to:

1. Address and communicate the impacts of climate change on mountain biological diversity and its conservation,
2. Carry out specific national and European research or, as appropriate, reinforce existing research on the mountain areas habitat types and species that will be most affected by climate change, monitoring their change and co-operating as appropriate with neighboring states in shared mountain ranges; promote sharing of information on research carried out in different mountain ranges of Europe,

3. Develop specific climate change adaptation policies and action for mountain biodiversity, taking due account of the proposed guidance set out in the Appendix to the present recommendation;

Further recommends Contracting Parties of the Convention on the Protection of the Alps and Convention on the Protection and Sustainable Management of the Carpathians and invites their observer States to help implement this recommendation in their respective frameworks.

APPENDIX

Guidance

This guidance draws on the expert report commissioned by the Council of Europe and discussed by the Group of Experts on Biodiversity and Climate Change at its meeting in 2010.

Measures that may be considered as appropriate for addressing the impacts of climate change on biodiversity, for the purposes of the application of the Convention, are listed for consideration by Contracting Parties. These measures are offered as examples of action that may be taken by authorities at all levels of governance to address this issue. Other complementary measures may be identified by governments as equally appropriate to their particular circumstances and concerns. Notwithstanding these adaptation measures, there is an urgent need for climate change mitigation actions at local, regional, country and global levels. Effective mitigation is crucial to contain climate change to levels within which we may have a reasonable chance of achieving effective adaptation. Although these recommendation focus on the adaptation to climate change, it is important to bear in mind that, on the one hand, climate change mitigation activities may be harmful to biodiversity and, on the other hand, the conservation and restoration of certain ecosystem types in particular forests and wetlands have to play an important role in the overall mitigation effort.

The effects of climate change on mountain ecosystems and their biological communities are complex. The impacts of a changing climate on the species and habitats protected by the Bern Convention may differ widely, depending on the species and the interactions with other species and/or their habitats, as well as according to location. The effects that climate change mitigation and adaptation measures, taken in other sectors, can have on species and habitats should also be considered in order to avoid negative impacts.

Mountains and climate change

Changes in the environmental factors of European mountains caused by climate change are already visible. There is a decrease in mountain glacier area, an increased annual precipitation with changing seasonality in the Alps, less predictability of rainfall and temperatures in Mediterranean mountains and a marked migration of species “uphill” as mean temperatures rise.

Mountain forest plants have been found to climb between 25 and 93 meter per decade since the 1950's and a number of other groups (carabids, fungi, birds, molluscs and spiders) have also shown a marked variation along an altitudinal gradient.

Mountain ecosystems are also naturally vulnerable because of their relatively smaller extension, the risk of erosion and the extreme conditions of many mountain habitats.

Mountains exhibit the most pronounced climatic gradients and, in evolutionary and biographical terms, they can be compared to islands, archipelagos of high elevation habitats, isolated by the lowlands. As such isolated ecosystems they host a very high proportion of endemic species that are at great risk of extinction because of the unprecedented speed of present climate change and the West-East orientation Europe's mountain ranges, which hinders North-bound migration possible in other mountain ecosystems of the world (for instance in the Americas). Particularly threatened will be species confined to summits or the plains, late successional plant species, species with small restricted population and species with relative low mobility, as some amphibians. Other species (in mix-altitudinal ranges) are also likely to see their habitats reduced as they are displaced uphill, thus becoming more vulnerable to extinction.

PROPOSED ACTIONS

Improve Protected Areas in mountains: Re-evaluate management goals of protected areas, ensure continued protection and appropriate management of existing protected areas. Increase the effective size of the protected area where and when possible (e.g., enlarged core protection zone and buffer zone with nature-friendly land use) and/or create new protected areas. Protect altitudinal

gradients avoiding further fragmentation. Cooperate to develop common approaches with adjacent or nearby protected areas.

Connect: The safeguard of latitudinal and altitudinal ecological continuums will be a crucial element in adaptation to changing conditions for many species and populations, mainly in areas of actual or potential tree line and in urbanised areas in the Alps. However, improving ecological connectivity also facilitates the dispersal of disease and invasive alien species along corridors. More research is needed on how ecological connectivity improves biodiversity and ecological persistence.

Permeable landscapes: Enhance existing incentive schemes promoting lower intensity land management and the development of greater landscape heterogeneity. Retain as many patches of “semi-natural habitats”, especially in urbanised or intensively used areas.

Reduce anthropogenic stresses: minimize localised human-caused disturbances (e.g. fragmentation, nitrogen addition or other pollution) that hinder the ability of species or ecosystems to withstand climatic events. It can also mean to keep traditional land use in regions where this has been the predominant management, in order to preserve species diversity and sensitive ecosystems.

Protect key ecosystem features: manage to maintain structural characteristics, organisms or areas that support the overall system, such as keystone organisms. Protect variant forms of a species or ecosystem so that, as climate changes, there may be populations that survive and provide a source for recovery. Maintain or establish more than one example of each ecosystem or population within a management systems, such that if one area is affected by disturbance, replicates in another area may reduce risk of extinction and provide a source for recolonisation. Sustain the slow variables (e.g., soil resources and the species’ pool) that accumulate slowly and provide buffers. Sustain both ecological legacies (e.g., old forest growth, woody debris) and cultural legacies (e.g. people’s connection to land) (.).

Restoration: restore ecosystems that have been lost or degraded. Restore or facilitate recovery of missing keystone species (e.g., wolf, beaver).

Identify refugia: use areas that are less affected by climate change than other areas as sources for recovery or as destinations for climate sensitive migrants and maximise populations of rare and threatened species.

Relocation: relocate where appropriate and necessary organisms from one location to another in order to bypass a barrier (e.g. urban area). This may involve translocation of genotypes, species or soil invertebrates or microbes, if appropriate, captive breeding programs and ex-situ conservation programmes of the genetic diversity of threatened mountain plants.

Build communication and scientist-manager-public partnerships: Create interdisciplinary teams of economists, climatologists, land use experts and modellers with the mission to carry out integrative research combining conservation planning climate change, adaptive capacities, human livelihoods that may offer further guidance.

Appendix 6



Convention on the Conservation of European Wildlife and Natural Habitats

Standing Committee

Draft Recommendation No. ... (2010) of the Standing Committee, adopted on ... December 2010, on guidance for Parties on wildland fires, biodiversity and climate change

The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention;

Having regard to the aims of the Convention to conserve wild flora and fauna and its natural habitats;

Recognising that climate change affects biological diversity in the territory covered by the Convention, including species, habitats and the Areas of Special Conservation Interest of the Emerald Network;

Recognising the need to adapt conservation work to the challenges of climate change so as to minimise its impacts on the species and natural habitats protected under the Convention;

Bearing in mind that uncertainties surrounding the precise nature of future climate change and its impacts on biodiversity should not delay practical conservation action;

Recognising that fire is a major factor in shaping vegetation and that it may trigger important permanent ecosystem change in a context of climate change;

Aware that both many natural and seminatural habitats and forest plantations may be more prone to burn if rainfall decreases and temperatures rise with climate change in some parts of Europe;

Conscious that nature conservation and forestry policies need to take into account and be adapted to changing patterns of fire that will accompany climate change;

Recalling CBD COP Decision on the in-depth review of the work on Biodiversity and climate change;

Recalling Recommendations No. 135 (2008) and No. 143 (2009) of the Standing Committee, on addressing the impacts of climate change on biodiversity;

Welcoming and bearing in mind the report "*Climate change, wildland fires and biodiversity*" by Mr Jose Manuel Moreno [doc T-PVS/Inf (2010) 10];

Recommends Contracting Parties to the Convention and invites Observer States to:

1. Assess how fire may affect biological diversity in a context of climate change, particularly in fire-prone areas; identify which areas may increase their risk of fire in different climate change scenarios and take precautionary measures; identify, in particular, areas that may be at risk of desertification in Europe by a combination of higher temperatures, repetitive fire and erosion;
2. Assess the changes required in land use and land management policies, including forestry, to make forests and other ecosystems more resilient to fires in a context of climate change;
3. Consider the role of fire in the implementation of Bern Convention guidance on biodiversity and climate change.

APPENDIX

GUIDANCE

This guidance draws on the expert report commissioned by the Council of Europe and discussed by the Group of Experts on Biodiversity and Climate Change at its meeting in 2010.

Measures that may be considered as appropriate for addressing the impacts of climate change on biodiversity, for the purposes of the application of the Convention, are listed for consideration by Contracting Parties. These measures are offered as examples of action that may be taken by authorities at all levels of governance to address this issue. Other complementary measures may be identified by governments as equally appropriate to their particular circumstances and concerns. Notwithstanding these adaptation measures, there is an urgent need for climate change mitigation actions at local, regional, country and global levels. Effective mitigation is crucial to contain climate change to levels within which we may have a reasonable chance of achieving effective adaptation. Although these recommendation focus on the adaptation to climate change, it is important to bear in mind that, on the one hand, climate change mitigation activities may be harmful to biodiversity and, on the other hand, the conservation and restoration of certain ecosystem types in particular forests and wetlands have to play an important role in the overall mitigation effort.

The effects of wildland fires on ecosystems and their biological communities are complex. The impacts of a changing climate on the species and habitats protected by the Bern Convention may differ widely, depending on the species and the interactions with other species and/or their habitats, as well as according to location. The effects that climate change mitigation and adaptation measures, taken in other sectors, can have on species and habitats should also be considered in order to avoid negative impacts.

Wildland fires, biological diversity and climate change

Fire has a complex impact on ecosystems. It helps shape vegetation and it can be a major factor of plant communities change in a climate change context. Mediterranean ecosystems have evolved in a world with fire, so numerous plant traits can be associate to a long evolution with fire.

Fires do not burn the landscape at random, and tend to affect certain vegetation types more often than others, and occur at certain locations. Fires burn through natural protected areas as well. During the last three years, of all the area burned in the largest EU Mediterranean countries nearly 1/3 was part of the Natura 2000 network. Areas close to or at intermediate distance to roads or towns are the ones that burn most frequently. These elements of fire risk are important for conservation areas.

Although many ecosystems of Southern Europe and the Mediterranean can be considered to have evolved under fire, the current fire regime is different from what it might have been in the past. Changes in fire regime, such as increased frequency and severity of fires, threatens ecosystem stability and, in some areas, favours degradation loops that impedes the recovery of the vegetation towards more mature stages.

Postfire regeneration usually follows the autosuccessional pattern. Plants are able to withstand fires mainly by surviving the blaze and resprouting or by germinating from seeds that survive the fire as well and, in many instances, require heat-related stimuli to germinate. In a few years after fire the plant community resembles that before the burn. However, direct regeneration is not always warranted, especially if the climatic on soil conditions have changed. Furthermore, there are many emblematic species that do not regenerate well after fire.

It is not excluded that, with climate change, parts of Southern Europe and the Mediterranean become more arid and that many areas of Central and Northern Europe where fire does not affect at present large surfaces may see more frequent fires as temperatures rise and rainfall patterns change.

Difficult as it is to project future impacts of climate and other global changes on the vegetation and species composition of any system in the first type, much more difficult it is to do so in Southern Europe and the Mediterranean areas. Restoration has no easy models to use them as a reference, and many ideas need to be revisited at the light of new paleo-ecological evidence. Given the threats of

changes in fire and other climate and global changes over the values at hand, not the least its distinct and rich biodiversity, the challenge of conserving these territories under the ongoing climate and land-use/land cover changes and other global changes is paramount.

PROPOSED ACTIONS

1 Include the role of fire in conservation of species and habitats in fire prone areas

Fires have been occurring, and will most certainly occur within many protected areas in southern Europe and in the landscape matrix that surrounds them. Fires are generally considered as a threat, and fire suppression is the dominant policy throughout SEM. There are enormous skills and capacities to fight fires. Yet, when they break out inside or around protected areas they will burn through them. But since the main/only policy is to fight them, provisions to understand how they directly or indirectly affect protected areas and species once burned are, for the most part, lacking. Until now, the ecological role of fire is ignored. Consequently, when they occur there is no contingency plan as to how the affected system will be impacted. Therefore, even without any climate change, biodiversity conservation plans need to consider how fires will affect species and habitats throughout the territory. Fire ecology is a must in all management and conservation plans, and strategies to incorporate this knowledge must be enacted.

2. Identify the role of natural fire or prescribed burning in conservation

Some ecosystems and species depend on fire or can benefit from it. Identifying them might be critical since current policies will jeopardize their persistence. In these cases, plans for introducing fire, either by prescribed burning, or, when appropriate, with wild fires within acceptable conditions to avoid other risks must be made. Because the prevailing view is that fires are undesired, and the risks that entail managing fires is great, conservation plans in need of fire must be implemented with great care to avoid accidents that would stop the continuation of needed plans with the concurrence of fire.

3. When drawing up conservation plans aimed at specific target species, consider how fire will affect them

Species or groups of species are impacted by fire differently, depending of fire characteristics and other factors. In the case of protected areas whose objective is one or a group of particular species, the viability of their conservation in a context of fire needs to be specifically considered. Management plans that address the possible impacts of fire need to be species or group specific, since different species are likely to respond differently to fire.

4. Assess the vulnerability of the protected areas network to fire

Corridors and stepping stones are important elements for insuring population persistence and species migration, more so in view of the impending threats. These elements, however, may be subject to fire. When these components are formed by forest, fire can alter their functioning capacity for long. Since it is very likely that some of these more isolated elements are in areas with greater human influence, their susceptibility to fire and repeated fire might be rather great and needs to be quantified since its long-term persistence may be severely threatened. As with the rest of the protected areas, the impact of fire needs to be known in advance in order to better evaluate their capacity to continue playing their role. Robust network designs, capable of not succumbing to a single fire, are needed to allow these places continue playing their vital service.

5. Ensure, where urban developments and roads are near protected areas, that measures are taken to extreme fire vigilance

Most fires are lit by people. Towns and roads are the main sources of ignitions. However, the probability of burning is still high at some intermediate distance to roads and towns since fire can travel long distances. Protected areas within these domains are at higher risk of fire than those further away. Urban developments into the wildlands and near protected areas can be a threat to these due to increase ignition probability and subsequent fire. Also, the network of roads crossing protected areas, in addition to other perils, can clearly add risk. These two elements must be cautiously considered when declaring protected spaces and be particularly monitored during the time of high fire risk.

Eventually, specific restrictions might have to be put in place to minimize risks. Risk mapping of protected spaces taking into consideration proximity to roads and towns is critically needed.

6. Identify synergies/conflicts between fire and conservation

Fire fighting includes, among other, fire break lines or fire-break areas. These can provide open space and hence favour species persistence different to those in the preserved matrix, particularly when these are forest. The role of such areas and corridors as sources of rapid colonization after fire needs to be appraised. These areas can serve as colonization points but there are positive or negative elements (increasing potential for invasive species) that need to be fully considered. The advantages and disadvantages of these areas in the event of fire need to be taken into consideration.

7. Assess changes in the landscape matrix through fire

Abandonment will continue in response to changes in socioeconomics and with climate change. Abandonment modifies the landscape matrix towards homogenization and that can threaten the persistence of many species. Fires can open up space and introduce large changes in the landscape matrix. Not all organisms will be equally affected but such changes in the landscape structure. Some, through the openings made by fire, will be favoured. Others will be negatively affected. Conservation plans must therefore contemplate the landscape scale changes that are introduced by fire.

8. Assess future risks

Changes in fire frequency, intensity/severity, size and season must be specifically contemplated for conservation areas under scenarios of climate and land-use/land cover change. This must be done for current areas with fires and for those in which fires were not present but that are likely to occur due to the changes in climatic conditions and other factors. Each of the parameters that define the fire regime can differentially affect the various species. Changes in fire season, particularly when migrant species are concerned, need to be cautiously considered. Consequently, the impact of each of them needs to be assessed in general or for the particular species or group of species that are of interest.

9. Assess how drought and other stresses may increase fire risks when drawing management plans for biodiversity

Conservation scenarios that include fire must take into consideration the level of stress being endured by the various species since, little by little, they will inhabit areas that are more stressful for them due to changes in climate among other stressors. The capacity of particular species or groups to respond to fire under such circumstances and to changes in fire regime needs to be appraised. As fires might occur under extreme conditions not seen until now (drought being the most relevant) this type of interactions need to be fully taken into consideration in future management plans for biodiversity conservation. Additional stresses due to more frequent and intense heat waves, particularly in the open habitats of the first years of regeneration after fire, must also be known.

10. Include worst case scenarios in conservation plans

Although the great majority of fires are of small size, some of them can attain very large sizes, in the order of thousands of hectares. In Spain, the maximum size of any fire recorded is around 30.000 ha, and the maximum length is 45 km (Moreno et al. 1998). The potential for one fire to spread over a whole protected area at once is not negligible. Smaller and homogeneous areas in a matrix of high fire risk are the most threatened. The prospect of increasing fire size under future conditions further adds to this. Consequently, worst case scenarios that include burning a large portion or even the whole protected area when these do not exceed several thousands of hectares needs to be contemplated. The role of buffer zones in this context needs to be equally appraised.

11. Examine how fires may bring opportunities to accommodate species to the new climate

Fires, by opening new space, and by having reduced competition among organisms in the early phases can open new space for species to move upwards or northwards in search of suitable climate. But this can also be used for invaders. Differentiating the new colonizers that are now attuned to the new conditions from those invading is important. Identifying the potential for fire to act as stepping stones must also be considered.

12. Identify species at greater risk

Species of late successional stages, thus requiring longer time to colonize burned areas, are probably the ones at greater risk in scenarios of increased fire frequency. Moist sites should regenerate quicker than more xeric sites, but their rate of recovery will be delayed with the onset of reduced precipitations under future climate for large parts of SEM. Consequently, their recovery period will be extended and the probability of burning again in earlier stages of regeneration indicates that species proper of mature successional stages might suffer. Studies should emphasize determining which groups of species enter at which state of the postfire succession and on the time needed for their recovery.

13. Identify which species may never recover after fire

Among those species most likely to suffer from fire are those of reduced distribution that are linked to particular systems that are fire sensitive. That is, those that do not regenerate after fire. A fire, particularly a large one, can sever these populations for long, making its recovery difficult. Identification of bottle-necks and deadly-traps among organisms and their systems in the event of fire is critical for those species that may be most threatened.

14. Promote research in the ecological links between species that may suffer a mismatch by the combination of fire and climate change

Climate change is producing mismatches among species (in pollination, in dispersal). Furthermore, fire can contribute to alter them. Identifying mismatches that are enhanced by the combination of fire and climate change might be of relevance for the maintenance of species that may already be in danger.

15. Examine risk of fire in possible changes in the protected area network

With climate change, the size of the protected areas will have to be increased to achieve the same conservation objectives. Until now, fire has not been taken into consideration in the design of the network of protected areas. Yet, its effectiveness can vary. Consequently, future modifications must consider how fire would affect its effectiveness. Since it is likely that the protected areas of the current network are those in a better state of conservation, which, presumably, are those further away from human influence, it is likely that new additions will be closer to human habitations, thence with higher risk of fire. Risk of fire must be included at the time of modifying the network of protected areas.

16. Improve awareness on the ecological role of fire

Fire is commonly seen as something negative, but it can play a dual role in the conservation of biodiversity. Fire, for the most part, hardly receives any attention in education, even in university programs, or not as much as its relevance demands. Every effort must be done to form and inform the general public and students at all levels about the role of fire in ecosystems and biodiversity conservation.

17. Promote research in how wildland fires affect biodiversity in a context of climate change

Knowledge on how fire affects the various groups of organisms across gradients is still a must. Long term observation sites, where the main groups of are studied jointly should be established.

Large fires, particularly large fires episodes, are laboratories that should be explored in depth for their role on biodiversity. Since many of these fires occur along gradients, these are opportunities that should not go by unexplored.

Maps with fire history are now possible for the last decades. These offer opportunities to study the impact of repeated fires on biodiversity across groups and across landscapes.

Protected areas are not static and will change with climate change. Modelling their fate and their vulnerability under scenarios of climate and fire change are crucial to understanding their future role in biodiversity conservation.

Appendix 7



Convention on the Conservation of European Wildlife and Natural Habitats

Standing Committee

Draft Recommendation No. ... (2010) of the Standing Committee, adopted on ... December 2010, on guidance for Parties on biodiversity and climate change in European islands

The Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention;

Having regard to the aims of the Convention to conserve wild flora and fauna and its natural habitats;

Recognising that climate change affects biological diversity in the territory covered by the Convention, including species, habitats and the Areas of Special Conservation Interest of the Emerald Network;

Recognising the need to adapt conservation work to the challenges of climate change so as to minimise its impacts on the species and natural habitats protected under the Convention;

Bearing in mind that uncertainties surrounding the precise nature of future climate change and its impacts on biodiversity should not delay practical conservation action;

Recalling CBD COP Decision on the in-depth review of the work on Biodiversity and climate change;

Recalling the “*Message from Reunion Island*” issued at the conference “The European Union and its Overseas Entities: Strategies to Counter Climate Change and Biodiversity Loss” (July 2008) and the exceptional importance of the biodiversity of the EU’s Overseas Countries and Territories and Outermost Regions and their vulnerability to climate change;

Recalling Recommendation No. 99 (2003) of the Standing Committee on the European Strategy on Invasive Alien Species;

Recalling Recommendation No. 91 (2002) of the Standing Committee on Invasive Alien Species that threaten biological diversity in Islands and geographically and evolutionary isolated ecosystems;

Recalling Recommendations No. 135 (2008) and No. 143 (2009) of the Standing Committee, on addressing the impacts of climate change on biodiversity;

Noting that European islands are home to many species and habitats of conservation concern, that they contain a large number of endemic species (particularly in the Mediterranean and Macaronesian Regions), many of which are listed in Appendices I and II of the Convention as strictly protected species;

Noting that often, due to their geographical characteristics, many islands biodiversity is already vulnerable because of their limited space in islands and the high concentration of human activities affecting natural ecosystems, particularly in their costs;

Noting also that island biodiversity, because of its endemism, the reduced possibilities in increasing habitat connectivity and the reduced distribution area of many species, is particularly vulnerable to climate change and the risk of spread of invasive alien species;

Noting that, following the report of the Group of Experts on European Islands Biological Diversity [*document T-PVS (2009) 13*], the geographic scope of this recommendation is restricted to islands in the

Mediterranean and Black Seas, the Baltic Sea, the Arctic and East Atlantic (from Iceland to Ascension Island);

Welcoming and bearing in mind the report “*Climate change and the biodiversity of European islands*” by Ms Cordula Epple [document T-PVS/Inf (2010) 9];

Recommends relevant Contracting Parties to the Convention and invites relevant Observer States to:

1. Address and communicate the impacts of climate change on island biological diversity and its conservation with a special attention to coastal and marine biodiversity in the waters surrounding islands;
2. Carry out inventories and specific national and European research on island biodiversity that will be most affected by climate change, monitoring their change, identifying in particular species that may go extinct in the next decades, and propose solutions for the conservation of their genetic diversity;
3. Carry out a special effort to create more coastal and marine reserves in islands, ensuring their functionality and better integrating biodiversity concerns in tourism and development policies;
4. Develop specific climate change adaptation policies and action for island biodiversity, taking due account of the proposed guidance set out in the Appendix to the present recommendation.

APPENDIX

Guidance

This guidance draws on the expert report commissioned by the Council of Europe and discussed by the Group of Experts on Biodiversity and Climate Change at its meeting in 2010.

Measures that may be considered as appropriate for addressing the impacts of climate change on biodiversity, for the purposes of the application of the Convention, are listed for consideration by Contracting Parties. These measures are offered as examples of action that may be taken by authorities at all levels of governance to address this issue. Other complementary measures may be identified by governments as equally appropriate to their particular circumstances and concerns. Notwithstanding these adaptation measures, there is an urgent need for climate change mitigation actions at local, regional, country and global levels. Effective mitigation is crucial to contain climate change to levels within which we may have a reasonable chance of achieving effective adaptation. Although these recommendation focus on the adaptation to climate change, it is important to bear in mind that, on the one hand, climate change mitigation activities may be harmful to biodiversity and, on the other hand, the conservation and restoration of certain ecosystem types in particular forests and wetlands have to play an important role in the overall mitigation effort.

The effects of climate change on island biodiversity are complex. The impacts of a changing climate on the species and habitats protected by the Bern Convention may differ widely, depending on the species and the interactions with other species and/or their habitats, as well as according to location and, especially latitude. The effects that climate change mitigation and adaptation measures, taken in other sectors, can have on species and habitats should also be considered in order to avoid negative impacts.

Islands and climate change

Islands are more vulnerable than other territories as in many of them there has been an intensive human occupation and because some of them are small so that developments that would be environmentally feasible in the continent have greater impact on natural ecosystems. Pollution is often a problem in islands, linked with relatively high human density, and often not much water. Management of waste can be a challenge due to scarcity of land. The absence of long rivers in small islands has often lead in Mediterranean and Macaronesian islands to water scarcity, intensive use of ground water and sometimes saline intrusions. Invasive alien species have a strongest impact on island endemics than in flora and fauna elsewhere. This marked environmental fragility of island ecosystems is likely to be worsened by climate change.

European islands are home to many species and habitats of conservation concern, including endemic as well as threatened biodiversity. Endemism is largely concentrated on islands in the Mediterranean and Macaronesian region. There are significant knowledge gaps concerning current and potential future impacts of climate change on European island biodiversity. However, there is enough evidence to demonstrate that impacts already take place and are likely to increase in future. Processes related to climate change which are particularly relevant in the island context include sea level rise and the possibility of increasing incidence of invasive alien species. Available measures to support adaptation for biodiversity are similar to those recommended for other areas. However, possibilities to enhance connectivity beyond the individual island are limited so that a greater attention has to be paid to island unique ecosystems and their conservation.

PROPOSED ACTIONS

1. Applying general policy on climate change adaptation to islands

Fully implement previous Bern Convention recommendations relevant to the conservation of island biodiversity under climate change which have already been approved by the Standing Committee and should be applied in the island context as a matter of urgency.

These include:

- Bern Convention Recommendation 135 (2008) on addressing the impacts of climate change on biodiversity, and in particular the points of guidance on taking an integrated approach to climate change response activities, addressing non-climatic threats to vulnerable species, taking early action on the protection of island-endemic amphibian and reptile species, maintaining and restoring large intact habitats as well as ecosystem structure and function, establishing networks of interconnected protected areas, increasing protected area coverage where necessary to ensure that vulnerable species groups and habitats are included, establishing buffer zones around conservation areas, avoiding development in coastal areas, considering the role of species translocation and ex situ conservation, ensuring policy integration, using adaptive management and addressing invasive species issues.
- Bern Convention Recommendation 143 (2009) on further guidance for Parties on biodiversity and climate change, and in particular the points of guidance on minimising threats to vulnerable invertebrates and plants, including in Atlantic and Mediterranean islands, implementing appropriate protected area management to increase resilience and considering mechanisms for implementation of off-protected areas management.
- Bern Convention Recommendation 91 (2002) on invasive species that threaten biological diversity on islands and evolutionary isolated ecosystem which ask for special mechanisms to prohibit intentional introduction of alien species and special precautionary measures to avoid their unintentional introduction.
- The European Strategy on Invasive Species endorsed in Recommendation No. 99 (2003) which requests Contracting Parties to draw up and implement national strategies on invasive alien species taking into account that guidance.

2. Islands of special concern

- When developing adaptation measures, special consideration should be given to islands of the Mediterranean and Macaronesian regions because of their high rates of endemism and expected serious changes in precipitation regimes, and within these regions particularly to those sites hosting vulnerable or threatened endemic taxa, or unique habitat types; mountain habitats in both regions are under a double threat of being small, be particularly isolated and often, contain unique ecosystems or species that can migrate nowhere (like the high Canarian mountain) .
- Identify islands in other regions may also contain highly sensitive biota which require attention, as exemplified by the observed drastic declines in seabird populations of the North East Atlantic region.

3. Ensuring preservation of species that may lose their climate space

Because many island species have no or little possibility to migrate or extend their geographical range to other territories, and taking into account the high level of endemism on certain islands, special consideration should be given to the question of ex situ conservation and translocation for those species which are threatened with extinction in their current habitat, and unlikely to be able to reach other suitable habitat by natural dispersal. Although both ex situ and translocation measures are very resource-intensive strategies and not always feasible in practice, and translocation also carries a significant amount of risk to biota in the target area, where such options exist they may be the only way to ensure the survival of certain taxa.

4. Developing special financial and regulatory mechanisms for island biodiversity

Because islands gather, together with mountains, a very high proportion of Europe's endemic flora and fauna (see for instance that Appendix I of the Bern Convention had to be split in two parts, the second exclusively with Macaronesian flora) a special and solidarity effort has to be carried out at the European level to provide support to research and conservation in high diversity islands. Islands should receive the appropriate means to be able to cope with the responsibility of conserving such a rich common European heritage.

5. Island biodiversity research needs

In addition to research needs already identified in previous reports (including improving the information base on the vulnerability of Bern Convention species and habitats, and strengthening monitoring schemes) and by other Expert Groups (including the identification of knowledge gaps in European island threatened biodiversity and on invasive alien species on European islands), the following specific research needs should be addressed:

- improving knowledge about island endemic species in less well researched groups,
- monitoring climate change impacts on island biota (including impacts on migratory species),
- further development of appropriate approaches to assess the vulnerability of rare and endemic species to climate change, including trait-based assessment frameworks,
- improving climate projections at a resolution which is appropriate for consideration of climate change effects on islands,
- improving knowledge on species that depend both on islands and the marine environment to see how their survival may be affected by climate change.