COUNCIL OF EUROPE

CONSEIL DE L'EUROPE

Strasbourg, 27 May 2016 **T-PVS/Inf (2016) 9**
[Inf09e_2016.docx]

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

36th meeting
Strasbourg, 15-18 November 2016

9th MEETING OF THE GROUP OF EXPERTS ON BIODIVERSITY AND CLIMATE CHANGE

Mostar, Bosnia and Herzegovina, 31 May–1 June 2016

- NATIONAL REPORTS -

Compilation prepared by the Directorate of Democratic Governance

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ALBANIA / ALBANIE

REPUBLIC OF ALBANIA
MINISTRY OF ENVIRONMENT

ALBANIA COUNTRY REPORT

Expert group meeting on biodiversity and climate change
Mostar, 31 May-2 June 2016

Prepared by Directorate of Biodiversity and Protected Areas
Ministry of the Environment

Implementation of the Recommendation No. 159 (2012) of the Standing Committee, adopted on 30 November 2012, on the effective implementation of guidance for Parties on biodiversity and climate change

1. ***Urgently implement the practical conservation measures that have been recommended by the Group of Experts and encourage appropriate national bodies involved in nature conservation to adopt and use them as resources permit; urgent action should more particularly focus on implementing adaptive management practices and strategies, enhancing the adaptive capacity of vulnerable species (rare/endemic/threatened), minimising pressures and threats on species and habitats that are most vulnerable to climate change, and implementing monitoring of, inter alia; species' population trends, species behaviour, including phenology, and climate change impacts upon critical areas;***

   A medium size project building the resilience of Kune - Vaini Lagoon through ecosystem-based adaptation (EbA) (GEF-UNEP) has started to be implemented since March 2016 for a 4 year period. The project objective is increase the resilience of the Kune-Vaini Lagoon system and communities living nearby it through the implementation of a portfolio of adaptation measures with focus on ecosystems.

   The proposed project will contribute to overcoming the above barriers by promoting the following: (i) increased adaptive capacity to address climate change risks through the application of the EbA approach at national and local level in coastal area; (ii) reduction of ecosystem vulnerability to climate impacts through identification and demonstration of adaptation focused on the use of ecosystems as means for adaptation; (iii) promotion of alternative livelihood for protection of local economic activities such as agriculture, fisheries in buffer areas; (iv) knowledge capture and transfer to local communities of the benefits of EbA; and (v) EbA integration into national and local policies/plans in coastal areas.

   The implementation of pilot measures will provide substantive lessons learned regarding climate impact and adaptive practices. Their dissemination, public education and outreach initiatives will ensure ongoing and effective knowledge exchange of accrued adaptive expertise. It will be of significant value to the government's future adaptation strategy and development programs in the coastal Protected Areas, regional governments and neighbor Mediterranean countries.

2. ***Take further steps to develop ecological networks, to promote and enhance the permeability of landscapes generally, and also enhance their protected areas networks, as appropriate, by increasing the extent of existing sites, designating new sites and establishing buffer zones, and ensuring they are sustainably and adaptively managed;***

The NBSAP document was updated and approved by the DCM 31, dated 20.01.2016. In this strategy (Document of Strategic Policies for Protection of Biodiversity) are proposed measures for the conservation of biodiversity and habitats in Albania through expansion of the system of protected areas in Albania, through encouraging the formulation of action plans for the conservation of species of wild flora and fauna and natural habitats.

3. Take an appropriately long-term view, based on adaptive management methodologies, when formulating management plans and strategies for protected areas management

A pilot case consisting on the elaboration of a supplement to the management Plan for Kune-Vain Managed Nature Reserve was completed in 2013, in the course of the GEF-UNDP project on Drin-Mat river Deltas.

5. Adopt measures that encourage biodiversity conservation to be embedded across other sectors and taken into account when formulating policies or strategies for those sectors, also by informing policy-makers across the Parties about the opportunities for win–win solutions, for instance through the development and use of ecosystem-based approaches, when developing strategies for adaptation to climate change by their sector as well as for mitigation measures;

6. Undertake knowledge transfer activities using existing mechanisms, to encourage awareness by other stakeholders and the general public of the challenges posed and opportunities presented by climate change when considering biodiversity conservation, including its links to other sectors and the opportunities for win–win solutions;

For the Recomandation *5. and 6*. The Strategic Document of Biodiversity Protection has addressed this recommendation by introducing the approach of biodiversity mainstreaming into sectoral policies.

This is considered during the process of Third National Report to UNFCCC and the National Climate Strategy for Albania which is still in the preparatory phase and will be completed by the end of 2016.

7. To take account of the potential increased risk of wildfires as a result of climate change and embed, as appropriate, mitigation measures for consideration of this risk into protected area management plans:

A GEF-UNDP project on adaptation and mitigations measures has started few months ago in Kune-Vaini wetland, in the same time a Managed Nature Reserve.

OTHER DEVELOPMENTS SINCE THE LAST REPORT INCLUDE:

- ***Strategic Document On Biodiversity Policy, Approved By Government Decree No. 312, Of 20.1.2016***

The goals include:

- Achievements (EU, WHO) regarding the standards of air quality, water supply and waste water treatment, noise, urban waste and protected areas, with the goal of improving the quality of life;
- Reduction of greenhouse emissions and ozone depleting substances, in order to contribute in the prevention of climate changes.

Objective III - Review and monitoring of threatening effects and activities

Maintenance of the ecosystem service, and sustainable utilization of ecological resources may be attained by preventing biological organisms from extinction, and increasing biodiversity through systematic protection of wildlife and their habitats. The main process that pose a threat or may have important adverse impact on biodiversity are provided in session 2.6 above (main threats against biodiversity). Threatening processes and activities that have a direct impact on biodiversity should be further investigated, and their effects should be monitored through sampling and other techniques. Their causes should be identified and monitored regularly.

Specific targets

Investigation and monitoring of threatening effects, causes, activities and process for the biodiversity components in Albania

Review and monitoring of climate change effects on biodiversity and ecosystem services.

Climate changes may lead to extinction of endangered species, and may have a major impact on our environment. Changes in the vegetation patterns, loss of biological resources, unforeseen spread of foreign species and changes in sources of Pisces could represent some of the most important challenges for the globe currently. In addition, climate changes have an impact on the increase of foreign invasive species.

In order to prevent, or limit serious damage on the environment, society and economy it is important to have in place adaptability strategies for the affected systems. These should include:

1. Conduct of studies on the selection and management of inductive species for climate changes;
2. Evaluation of the health and vitality of forests
3. Selection and monitoring of forest insects indicative for climate changes
4. Long-term monitoring of changes in the forestry ecosystems
5. Projections for future changes in the distribution and diversity of species that are sensitive to climate changes.
6. Systematic improvement of species which are sensitive to climate changes. Introduction of new varieties, appropriate for climate changes.

ARMENIA / ARMÉNIE

REPORT
BIODIVERSITY AND CLIMATE CHANGE
REPUBLIC OF ARMENIA

The works about biodiversity and climate change in Republic of Armenia was done as a scientific research under the National Academy of Sciences of Armenia NAS of Armenia and in the framework of the different projects.

1. FOREST PLANT DIVERSITY OF SOUTH ARMENIA AND GLOBAL CLIMATE CHANGE

(G. M. Fayvush, A. S. Alexanyan, Institute of Botany of National Academy of Sciences of Armenia)

Armenia is situated at the junction of Caucasian and Armeno-Iranian floristic provinces. The peculiarity of each province, enhanced by vertical zoning, is the cause of the great variety of the country's flora and vegetation. About 3600 vascular plant species and almost all Caucasian vegetation types occur on its territory. The Red Book of Armenia (2010) includes 452 species of vascular plants, 150 of which grow in woody areas (forests, open forests, juniper forests, shibliak). From these species 90 are growing in South Armenia.

Most of them (64 species) grow in forests, 31 – in shibliak, 20 – in arid open forests, and 9 – in juniper forests. According to forecasts of climate change (Armenia's Second National Communication on Climate Change under the UNFCCC, 2010) the annual temperature in South Armenia will increase by 2-4°C, and precipitation–by 30% by 2100. This change will lead to redistribution of territories with different ecosystems. For example, forest area in lower mountain belt will decrease by 3000-4000 ha by 2030, and will be occupied by shibliak. There will be no change in forest areas in middle mountain belt, whereas the forest areas may increase in sub-alpine belt. However, according to expert judgments, it is not likely that it will occur in the nearest 30-50 years.

Besides, the increase of precipitation could lead to the decrease of areas with arid open forests. These changes will affect the populations of rare plant species. We can expect the decrease of areas of distribution of typical forest and open arid forest species, and there will be opportunity for wider distribution of shibliak species. It should be noted, that now GEF/UNDP is carrying out a pilot project on adaptation of forest ecosystems to climate change, and it is recommended to expand the project activities to the whole territory of Armenia.

The climate change forecast

The climate change in the territory of Armenia is mostly conditioned by the influence of Global climate change. Climatologists have estimated possible temperature changes and amount of precipitation in the republic territory for the case scenarios of the greenhouse gas A2 and B2 emission for the period of 2030, 2070 and 2100 using MAGICC/ SCENGEN (5.3v2) and PRECIS softwares. It was shown that average temperature in Armenia increased on 0,85°C, and precipitation decreased on 6% during last 80 years. It was forecasted that by the end of 21st century the average temperature depending on the scenario can increase from 4,8 to 5,7°C. Moreover the highest increase of the temperature is expected to be in the spring-summer period in the Southern and Central regions of the republic. The precipitation change forecast remains greatly indefinite – its decrease is supposed to be 1-27%. Meantime greater decrease of precipitation is expected in summer period. In fall-winter-spring period precipitation decrease is expected in foothills, but slight increase is expected in mountains. In Syunik region temperature increase to 2-4°C and precipitation increase to 30% by 2100 are forecasted.

Habitats change forecast

Climate forecasts allow supposing the shift of the current ecological conditions up to 300-400 meters in the mountain profile and to the increase of the aridity both the whole republic territory and especially its foothills and lower regions. The climate change here will also allow disturbances in the sustainable natural ecosystems. This change will lead to redistribution of territories with different ecosystems. In South Armenia, forests mainly will be vulnerable along the lower boundary of their areas (starting from 600 m). Serious changes in forest ecosystems are not expected at altitudes of 1200-1800 m, since in those conditions forests have a big potential for adaptation, and changes in climate conditions are within the ecological limits of the main force generating species. In addition to the worsening conditions for forest growth, the intensive penetration of semi-desert plant species into forest areas is expected. The expected temperature rise and decline in precipitation (in spring-summer seasons) will have a negative impact on the seeds regeneration in forests. Along the upper boundary (2600 m and higher), a small expansion of forest ecosystems is possible at the expense of meadow ecosystems. But currently, economic activity, and primarily the intensive use of sub-alpine meadows, as pastures and hay-fields, does not allow forest ecosystems to shift in the mentioned direction. The expected climate change can have a negative impact on forest ecosystems also by worsening sanitary conditions, mass spread of pests and diseases and increased fire hazards. On our estimation, forest area in lower mountain belt will decrease by 3000- 4000 ha by 2030, and this area will be occupied by shibliak. It is expected that the area of shibliak and arid open forests will expand primarily at the expense of the lower parts of the steppe and forest ecosystems. These changes will affect the populations of rare plant species. It should be noted, that now GEF/UNDP is carrying out a pilot project on adaptation of forest ecosystems to climate change in Syunik region, and it is recommended to expand the project activities to the whole territory of Armenia.

Rare plant species distribution forecast

As already mentioned, Armenia's territory is divided into two floristic areas – humid Caucasian and arid Armeno-Iranian provinces. Climate change will have a different impact on biodiversity in those provinces. Increased aridity of the climate will contribute to the infiltration of desert and semi-desert plant species from arid areas of Iran and Turkey into the southern regions of Armenia. The area of a number of mesophilous species currently growing in the high mountainous belt of the mentioned areas will shrink and might even disappear. In the humid Caucasian province, one might expect intensive spread of xerophilous species, including weeds and invasive species, as well as shrinking in the area of mesophilous species. In addition, temperature rises can result in intensive spread of heat loving species in mesophyte and hygrophyte habitats, which are currently limited to the lower mountainous belt. Climate change will have a large impact on rare species with small ecological amplitudes. Using the DIVA-GIS computer software (Bioclim model) specially created for assessing plant genetic resources, the possible impact of climate change on some Armenia's rare plant species was assessed. Those species are growing in forests and shibliak communities of South Armenia. We can expect decrease of areas of distribution of typical forest and open arid forest species, and there will be opportunity for wider distribution of shibliak species.

Habitats of some species (for example, *Arum conophalloides* Kotschy ex Schott, *Atropa bella-donna L.*, *Botrychium lunaria (L.)* Sw., *Cephalanthera kurdica* Bornm. & Kraenzl., *Elymus transhyrcanus* (Nevski) Tzvelev, *Erysimum lilacinum* E. Steinb., *Festuca drimeja* Mert. et W. D. J. Koch, *Galanthus artjuschenkoae Gabrielian*, *Geranium albanum* M. Bieb., N*ectaroscordum tripedale* (Trautv.) Grossh., *Ophioglossum vulgatum L.*, *Pteridium tauricum* V. Krecz. Ex Grossh., *Scilla mischtschenkoana* Grossh., etc.) will degrade, and consequently area of distribution of these species will decrease. The category of threat will be worsened, and they can come to the point of extinction. From another hand, the growing conditions of some species (for example, *Amygdalus nairica* Fed. et Takht., *Calendula persica* C.A.Mey., *Cercis griffithii* Boiss., *Colutea komarovii* Takht., *Coronaria coriacea* (Moench) Schishk. & Gorschk., *Iris lineolata* (Trautv.) Grossh., *Lycium anatolicum* A.Baytop. & C.Mill., *Ophrys apifera* Huds., *Paeonia tenuifolia L.*, *Platanus orientalis L.*, *Sternbergia fischeriana* (Herb.) M.Roem., *Steveniella satyrioides*

Conclusion

According preliminary estimations, climate change may have very big influence on biodiversity and main forest and woody ecosystems of South Armenia. Several plant species and plant communities could be under threat of extinction or decreasing of their area of distribution. It is necessary to carry out specialized scientific investigations on risk assessments for rare species, monitoring of populations and ecosystems conditions, to elaborate and implement special measures for their adaptation and conservation in-situ and ex-situ.

2. CLIMATE CHANGE AS THREAT TO PLANT DIVERSITY OF ARMENIA

G. M. Fayvush, A. S. Alexanyan, Institute of Botany of National Academy of Sciences of Armenia

The article discusses the forecasted climate change of Armenia as one of the major threats for plant diversity of the country. The possible changes of main ecosystems of Armenia were assessed due to climate change forecasts. On this basis, was carried out the vulnerability of rare plant species included in the Red Book of plants of Armenia. According to the results of this evaluation it was indicated that for 239 plant species from 452 included in the Red Book of plants of Armenia (Tamanyan et al., 2010) the expected climate change will not be a serious threat to their existence. These are species with relatively wide ecological amplitude and adapted to ecosystems, which can be changed to a minor extent. For 139 species the climate change could be a positive factor, they can even extend their areals on the territory of Armenia. They are mostly heat-loving species growing in the ecosystems of the lower and middle mountain belts. For 74 species the climate change could be a very serious threat, as the changed conditions do not allow them to adapt and find suitable habitat in the country. These are mainly mesophilous species of sub-alpine and alpine belts.

Table 1. Plant species included in the Red Book of plants of Armenia, for which the expected climate change is not a threat for existence or will act as positive factor

Species	Category in the Red Book of Armenia	Ecosystems
Pteridium tauricum V.Krecz.	CR B 1 ab(iii) + 2 ab(iii)	Fringes, riversides
Allium akaka S.G.Gmel.ex Schult. et Schult.	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids, stony places
Sternbergia fischeriana (Herb.) M.Roem.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Fringes, shibliak
Actinolema macrolema Boiss.	EN B 1 ab(ii,iii,iv) + 2 ab (ii, iii, iv)	Semi-desert
Aphanopleura trachysperma Boiss.	EN B 1 ab(ii,iii) + 2 ab(ii, iii)	Semi-desert
Bupleurum pauciradiatum Fenzl ex Boiss.	VU* B 1 ab(ii,iii) + 2 ab(ii,iii)	Shibliak, open arid woodlands
Dorema glabrum L.	CR B 1 ab(i,ii,iii,iv,v) + 2 ab(i,ii,iii, iv,v)	Phryganoids
Eryngium wanaturii Woronow	EN B 1 ab(ii,iii,iv,v) + 2 ab(ii,iii,iv,v)	Steppes, meadow-steppes
Falcaria falcarioides (Bornm. et H.Wolff) H.Wolff	CR* B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Wetlands, saline soils
Ferula szowitsiana DC.	VU* B 1ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Semi-deserts
Hohenackeria exscapa (Stev.) Kos.-Pol.	EN B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Semi-deserts, dry steppes
Oenanthe silaifolia M. Bieb.	CR B 2 ab(ii,iii,iv)	Wetlands, saline soils
Peucedanum pauciradiatum Tamamsch.	CR B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Phryganoids
Szovitsia callicarpa Fisch. et C.A.Mey.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert, dry steppes
Aristolochia iberica Fisch. et C.A.Mey. ex Boiss.	EN B 1 ab(i,iii,iv) + 2 ab(i,iii,iv)	Forests

Asphodeline lutea Rchb.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Forests, fringes
Asphodeline taurica (Pall.) Kunth	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes, meadow-steppes, steppe shrubs
Amberboa amberboi (L.) Tzvel.	CR B 1ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Amberboa iljiniana Grossh.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert
Amberboa moschata (L.) DC.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert, dry steppes
Amberboa sosnovskyi Iljin	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert, phryganoids
Amberboa turanica Iljin	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Calendula persica C.A.Mey.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert, shibliak, open arid woodlands
Carpesium abrotanoides L.	EN* B 1 ab(ii,iii) + 2 ab(i,ii,iii)	Wetlands
Centaurea alexandrii Bordz.	EN B 1 ab(ii,iii) + 2 ab(i,ii,iii)	Phryganoids, open arid woodlands
Centaurea arpensis (Czer.) Wagenitz.	EN B 1 ab(ii,iii) + 2 ab(i,ii,iii)	Phryganoids, open arid woodlands
Centaurea erivanensis (Lipsky) Bordz.	VU* B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-dert, steppes, phryganoids, traganth communities
Centaurea vavilovii Takht. et Gabrielian	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes, meadow-steppes
Cousinia erivanensis Bornm.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids, open arid woodlands
Cousinia gabrieljanae Takht. et Thamanjan	EN B 1 ab(i,ii) + 2 ab(i,ii)	Shibliak
Cousinia megrica Takht.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Shibliak, open arid woodlands
Cousinia qaradaghensis Rech. fil.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Open arid woodlands
Cousinia tenella Fisch. et C.A.Mey.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Crupina intermedia (Mutel) Walp.	VU* B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Open arid woodlands
Echinops polygamus Bunge	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids
Lactuca takhtadzhianii Sosn.	EN B 1 ab(ii,iii) + 2 ab(ii,iii)	Semi-desert, steppes
Rhaponticoides hajastana (Tzvelev) Agababian et Greuter	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Steppes
Rhaponticoides tamanianae (Agababian) Agababian et Greuter	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes, steppe shrubs
Scorzonera gorovanica Nazarova	EN B 1 ab(iii) + 2 ab(iii)	Semi-desertt, sandy desert
Tomanthea carthamoidos (DC.) Takht.	CR A 2abc; B 1 ab(i,ii,iii,iv,v) + 2 ab(i,ii,iii,iv,v); C 1 + 2(i); D	Semi-desert, phryganoids
Tomanthea daralaghezica (Fomin) Takht.	EN B 1 ab(ii,iii) + 2 ab(i,ii,iii)	Steppes, phryganoids, open arid woodlands
Tragopogon collinus DC.	EN B 1 ab(iii) + 2 ab(iii)	Semi-desert, phryganoids
Tragopogon tuberosus K. Koch.	VU B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes, meadow-steppes, steppe shrubs
Leontice armenica Belanger	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Nonea polychroma Selvi et Bigazzi	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Nonea rosea (Bieb.) Link.	VU* B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Steppes, open arid woodlands
Rochelia cardiosepala Bunge	EN B 1ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Steppes
Crambe armena N. Busch.	CR B 1 ab(iii) +2 ab(iii)	Semi-desert

Diptychocarpus strictus (Fisch.) Trautv.	CR B 1 ab(ii,iii) + 2 ab(ii,iii)	Semi-desert
Hesperis persica Boiss.	EN B 1 ab(iii) + 2 ab(iii)	Steppes, phryganoids
Leptaleum filifolium (Willd.) DC.	EN B 1 ab(iii) + 2 ab(iii)	Semi-desert
Pachyphragma macrophyllum (Hoff.) N. Busch	CR B 1 ab(iii) + 2 ab(iii)	Forests
Peltariopsis grossheimii N. Busch.	CR B1 ab(iii) + 2 ab (iii)	Phryganoids
Pseudoanastatica dichotoma (Boiss.) Grossh.	EN B 1 ab(iii) + 2 ab(iii)	Phryganoids
Rorippa spaskajae V. I. Dorof.	CR B1ab(iii)+2ab(iii)	Wetlands
Sameraria glastifolia (Fisch. & C. A. Mey.) Boiss.	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids
Thlaspi umbellatum Stev.	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids, shibliak, open arid woodlands
Cercis griffithii Boiss.	CR B 1 ab(iii) + 2 ab(iii)	Semi-desert, phryganoids
Campanula propinqua Fisch. et C. A. Mey.	VU* B 1 ab(iii) + 2 ab(iii)	Phryganoids
Allochrusa takhtajanii Gabr. et Dittr.	CR B 1 ab(iii,v) + 2 ab(iii,v)	Semi-desert
Arenaria brachypetala (Grossh.) T. N. Popova	CR B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Semi-desert, phryganoids
Bufonia takhtajanii Nersesian	CR B 1 ab(ii,iii,iv,v) + 2 ab(ii,iii,iv,v)	Phryganoids
Dianthus libanotis Labill.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert, phryganoids
Gypsophila stevenii Fisch. et C. A. Mey. ex Fenzl	CR B 1 ab(ii,iii) + 2 ab(ii,iii)	Shibliak
Minuartia sclerantha (Fisch. et C. A. Mey.) Thell.	EN B 1 ab(iii) + 2 ab(iii)	Deserts, semi-desert, phryganoids
Beta lomatogona Fisch. et C. A. Mey.	CR B 1 ab(iii) + 2 ab(iii)	Steppes, semi-desert
Beta macrorrhiza Stev.	VU* B 1 ab(iii) + 2 ab(iii)	Steppes, meadow-steppes
Bienertia cycloptera Bunge	CR* B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Solonchaks
Halanthium kulpianum (K. Koch) Bunge	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Semi-desert
Halocnemum strobilaceum (Pall.) M.Bieb.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Solonchaks
Halostachys belangeriana (Moq.) Botsch.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Solonchaks
Kalidium caspicum (L.) Ung.-Sternb.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Solonchaks
Salsola aucheri (Moq.) Bunge ex Iljin	EN B 1 ab(iii) + 2 ab(iii)	Semi-desert
Salsola tamamschjanae Iljin	EN B 1 ab(iv) + 2 ab(iv)	Deserts, semi-desert
Salsola tomentosa (Moq.) Spach	EN B 1 ab(iii) + 2 ab(iii)	Semi-desert
Andrachne rotundifolia C.A.Mey.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids
Euphorbia aleppica L.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Argyrolobium trigonelloides Jaub. et Spach	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids
Astragalus achundovii Grossh.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert
Astragalus commixtus Bunge	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Phryganoids
Astragalus corrugatus Bertol.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Saline semi-desert
Astragalus guttatus Banks et Sol.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes
*Astragalus holophy*llus Boriss.	EN B 1 ab(i,ii) + 2 ab(i,ii)	Sandy desert, phryganoids
Astragalus montis-aquilis Grossh.	EN B 1 ab(iii) + 2ab(iii)	Petrophyton

Astragalus ordubadensis Grossh.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids
Astragalus paradoxus Bunge	EN B 1ab (i,ii,iii,iv) + 2ab (i,ii,iii,iv)	Deserts, semi-desert
Astragalus schelkovnikovii Grossh.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Deserts, semi-desert
Astragalus vedicus Takht.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Phryganoids
Colutea komarovii Takht.	CR B 1 ab(i,ii,iii,iv,v) + 2 ab(i,ii,iii,iv,v); C 2a; D	Phryganoids
Coronilla cretica L.	EN* B 1ab(i,ii,iii) + 2 ab(i,ii,iii)	Shibliak
Lathyrus setifolius L.	VU* 1 ab(i,ii,iii) + 2 ab i,ii,iii)	Shibliak, fridges
Lens ervoides (Brign.) Grossh.	VU* B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Phryganoids, steppes
Medicago arabica (L.) Huds.	VU* B 1ab(iii) + 2ab(iii)	Wetlands, fringes
Onobrychis hajastana Grossh.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Steppes, phryganoids
Onobrychis meschchetica Grossh.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Shibliak
Spaerophysa salsula DC.	VU* B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Salt marshes, wetlands
Trifolium angustifolium L.	EN* B 1 ab(iii) + 2 ab(iii)	Steppe shrubs, fringes
Trifolium grandiflorum Schreb.	VU* B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Shibliak, phryganoids
Trigonella astroides Fisch. et C.A.Mey.	EN 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Phryganoids
Frankenia pulverulenta L.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Salt marshes
Gladiolus szovitsii Grossh.	EN B 1 ab(iii) + 2 ab(iii)	Semi-desert, shibliak, open arid woodlands
Iris atropatana Grossh.	EN B 1 ab(iii) + 2 ab(iii)	Phryganoids, traganth communities
Micromeria fruticosa (L.) Druce	VU* B 1 ab(iii) + 2 ab(iii)	Phryganoids
Salvia spinosa L.	EN* B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Steppes
Salvia suffruticosa Montbr. et Auch. ex Bunth.	EN B 1 ab(iii) + 2 ab(iii)	Steppes
Teucrium canum Fisch. et C.A.Mey.	CR B 1 ab(iii) + 2 ab(iii)	Steppes
Tulipa sosnovskyi Achv. et Mirzoeva	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Open arid woodlands, petrophyton
Alcea karsiana (Bordz.) Litv.	EN B 1 ab(iii) + 2 ab(iii)	Steppes
Alcea sophiae Iljin	EN B 1 ab(iii) + 2 ab(iii)	Steppes
Malvella sherardiana (L.) Jaub. et Spach	EN B 1 ab(iii) + 2 ab(iii)	Semi-deserts, disturbed habitats
Nitraria schoberi L.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Saline semi-desert
Ophrys apifera Huds.	CR B 1 ab(ii,iii,v) + 2 ab(ii,iii,v)	Shibliak
Orchis punctulata Stev. ex Lindl.	VU* B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Forests, fridges, shibliak, steppe shrubs
Orchis stevenii Rchb. f.	EN B 1 ab(ii,iii,iv) + 2 ab(ii,iii,v)	Forests, meadows, wetlands
Orchis tridentata Scop.	EN* B 1 ab(ii,iii,iv) + 2 ab(ii,iii,v)	Forests
Steveniella satyrioides (Spreng.) Schlechter	EN B 1 ab (ii,iii,iv) + 2 ab(ii,iii,iv)	Open arid woodlands, fringes, glades
Cistanche fissa (C.A.Mey.) G.Beck	EN B 1 ab(i,ii,iii,iv)+ 2 ab(i,ii,iii,iv)	Salt marshes, saline semi-desert
Cistanche salsa (C.A.Mey.) G.Beck	EN* B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Saline semi-desert
Paeonia tenuifolia L.	CR B 1 ab(iii) + 2 ab(iii)	Shibliak, open arid woodlands

Acantholimon fedorovii Tamamsch. et Mirzoeva	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids
Acantholimon festucaceum (Jaub. et Spach) Boiss.	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids
Rhizocephalus orientalis Boiss.	VU* B 1 ab(iii,iv) + 2 ab(iii,iv)	Phryganoids, desert, semi-deserts, dry steppes
Asterolinon linum-stellatum (L.) Duby	CR B 1 ab(ii,iii) + 2 ab(ii,iii)	Phryganoids
Cyclamen vernum Sweet	VU* B 1 ab (ii,iii) + 2 ab(ii,iii)	Forests, fringes
Clematis vitalba L.	EN* B 1 ab(iii) + 2 ab(iii)	Fringes
Reseda globulosa Fisch. et C.A.Mey.	CR B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Phryganoids
Amygdalus nairica Fed. et Takht.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Open arid woodlands, phryganoids
Rubus takhtadjanii Mulk.	EN B 1 ab(i,ii) + 2 ab(i,ii)	Fringes, disturbed habitats
Rubus zangezurus Mulk.	EN B 1 ab(ii) + 2 ab(ii)	Forests, fringes, shibliak
Jaubertia szovitzii (DC.) Takht.	VU* B 1 ab(iii) + 2 ab(iii)	Phryganoids
Leptunis trichodes (J. Gay) Schischk.	EN* B 1 ab(iii) + 2 ab(iii)	Phryganoids
Verbascum atroviolaceum (Sommier et Levier) Murb.	EN B 1 ab(iii) + 2 ab(iii)	Steppes, shibliak
Verbascum erivanicum E.Wulf	CR B 1 ab(iii) + 2 ab(iii)	Phryganoids
Verbascum formosum Fisch. ex Schrank	EN B 1 ab(iii) + 2 ab(iii)	Fringes, glades, open arid woodlands
Verbascum megricum (Tzvel.) Huber-Morath	EN B 1 ab(iii) + 2 ab(iii)	Shibliak, open arid woodlands
Smilax excelsa L.	EN B 1 ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Fringes, open woodlands
Atropa belladonna L.	VU B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Forests, glades, disturbed habitats
Lycium anatolicum A.Baytop et C.Mill.	EN B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Phryganoids, disturbed habitats
Valerianella kotschyi Boiss.	CR B 1 ab(iii) + 2 ab(iii)	Steppes, phryganoids

On the other hand, according to a the conducted modeling of changes of ecosystems and habitats due to the climate change, for 74 species of vascular plants, included in the Red Book of plants of Armenia, this factor will be the one of threats to determine the possibility of their existence in Armenia (Table. 2).

Table. 2. Plant species included in the Red Book of plants in Armenia, for which climate change can be expected as the main threat for existence

Species	Category in the Red Book of Armenia	Ecosystems
Athyrium discentifolium Tausch ex Opiz.	EN* B 1 ab(iii) + 2 ab(iii)	Rhodorets
Botrychium lunaria (L.) Sw.	VU* B 1 ab(iii) + 2 ab(iii)	Meadows
Polystichum lonchitis (L.) Ruth.	EN B 1 ab(iii) + 2 ab(iii)	Meadows
Ophioglossum vulgatum L.	CR B 1 ab(iii, iv) + 2 ab(iii, iv)	Forests
Thelypteris palustris Schott	CR B 1 ab(iii) + 2 ab(iii)	Wetlands
Acanthus dioscoridys L.	CR B 1 ab(iii) + 2 ab(iii)	Meadow-steppes
Acorus calamus L.	EN B1 ab(i,ii,iii,iv) + 2 ab(ii,iii)	Wetlands
Sagittaria sagittifolia L.	CR B 1 ab(ii,iii,iv) + 2 ab(i,ii,iii,iv)	Wetlands
Sagittaria trifolia L.	CR B 1 ab(ii,iii,iv) + 2 ab(i,ii,iii,iv)	Wetlands

Allium derderianum Regel	EN B 1 ab(iii) + 2 ab(iii)	Petrophyton
Allium egorovae Agababian et Ogan.	CR B 1 ab(iii) + 2 ab(iii)	Meadows
Sternbergia colchiciflora Waldst. et Kit.	EN B 1 ab(ii,iii,iv) + 2 ab(i,ii,iii,iv)	Semi-desert, dry steppes
Antennaria caucasica Boriss.	EN B 1 ab(iii) + 2 ab(iii)	Meadows
Anthemis caucasica Chandjian	EN B 1 ab(iii) + 2 ab(iii)	Meadow-steppes, meadows
Centaurea elbrusensis Boiss. et Buhse	EN* B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Meadows
Centaurea schelkovnikovii Sosn.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Meadows, petrophyton
Centaurea takhtadzianii Gabrielian & Tonjan.	CR B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Steppes, disturbed habitats
Echinops ritro L.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii); D	Meadow-steppes
Grossheimia caroli-henricii (Gabrielian et Dittr.) Gabrielian	CR B 1 ab(iii) + 2 ab(iii)	Fringes, disturbed habitats
Inula acaulis Schott et Kotschy ex Boiss.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Meadows, wetlands
Sonchus araraticus Nazarova et Barsegian	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Salt marshes
Tanacetum zangezuricum Chandjian	EN B1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Paracaryum laxiflorum Trautv.	CR B 1 ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Steppes
Didymophysa aucheri Boiss.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Draba araratica Rupr.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Draba hispida Willd.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Eunomia rotundifolia C.A.Mey.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Isatis takhtajanii V.Avet.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Physoptychis caspica (Habl.) V.Boczantzeva	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Pseudovesicaria digitata (C.A.Mey.)Rupr.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Dianthus cyri Fisch. et C.A.Mey.	EN B 1 ab(ii,iii) + 2 ab(ii,iii)	Salt marshes, shibliak
Silene eremitica Boiss.	EN B 1 ab(ii,iii,iv) + 2 ab(ii,iii,iv)	Semi-deserts
Silene meyeri Fenzl. ex Boiss. et Buhse	EN B 1 ab(i,iii,iv,v) + 2 ab(ii,iii,iv,v)	Alpine petrophyton
Silene raddeana Trautv.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Microcnemum coralloides (Loscos et Pardo) Font-Quer	EN B 1 ab(iii,iv) + 2 ab(iii,iv)	Salt marshes
Salsola soda L.	EN B 1 ab(iii) + 2 ab(iii)	Wet solonchaks
Colchicum ninae Sosn.	EN B 1 ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Wetlands
Merendera sobolifera Fisch. et C.A.Mey.	CR* B 1 ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Salt marshes
Carex oligantha Steud.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Carex pendula Huds.	EN* B 1 ab(iii) + 2 ab(iii)	Forests, wetlands
Carex pyrenaica Wahlenb ssp. micropodioides (V.I.Krecz.) Kandjan	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Eriophorum latifolium Hoppe	VU* B 1 ab(iii) + 2 ab(iii)	Meadows
Kobresia persica Kuek. et Bornm.	CR B 1 ab(iii) + 2 ab(iii)	Meadows
Cephalaria nachiczevanica Bobr.	CR B 1 ab(iii) + 2 ab(iii)	Sub-alpine meadows
Rhododendron caucasicum Pall.	EN B 1 ab(iii,iv) + 2 ab(iii,iv)	Rhodorets
Vaccinium uliginosum L.	EN B 1 ab(iii) + 2 ab(iii)	Meadows
Astragalus agasii Manden.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Alpine petrophyton
Astragalus divaricatus Boiss.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Meadows

Astragalus globosus Vahl	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Meadows
Astragalus grammocalyx Boiss.et Hohen.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Meadow-steppes, open arid woodlands
Astragalus schuschaensis Grossh.	CR B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Petrophyton
Trigonella capitata Boiss.	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Wetlands
Vavilovia formosa (Stev.) Fed.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Lomatogonium carinthiacum (Wulfen) A.Br.	VU* B 1 ab(iii) + 2 ab(iii)	Wetlands
Erodium sosnowskyanum Fedor.	CR B 1 ab(i,ii,iii,v) + 2 ab(i,ii,iii,v)	Meadows
Scilla rosenii K. Koch	EN B 1 ab(i,ii,iii,iv) + 2 ab(i,ii,iii,iv)	Wetlands
Iris grossheimii Woronow ex Grossh.	EN B 1 ab(iii) + 2 ab(iii)	Steppes, open arid forests, meadow-steppes
Iris sibirica L.	VU* B 1 ab(iii) + 2ab(iii)	Wetlands
Juncus acutus L.	EN B 1 ab(i,ii,iii) + 2 ab(i,ii,iii)	Wetlands
Dracocephalum botryoides Stev.	EN B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Nepeta lamiifolia Willd	EN B 1 ab(iii) + 2 ab(iii)	Petrophyton
Linum barsegianii Gabrielian et Dittr.	CR B 1 ab(ii, iii) + 2 ab (i,ii,iii)	Salt marshes
Menyanthes trifoliata L.	VU* B 1 ab(iii) + 2 ab(iii)	Wetlands
Chamaenerion dodonaei (Vill.) Kost.	EN* B 1 ab(iii) + 2 ab(iii)	Wetlands
Amblyopyrum muticum (Boiss.) Eig	CR B 1 ab(iii) + 2 ab(iii)	Steppes
Bromopsis gabrielianae Ogan.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Bromopsis zangezura Ogan.	EN B 1 ab(iii) + 2 ab(iii)	Steppes, meadows
Triticum araraticum Jacubz.	VU* B 1 ab (iii) + 2 ab (iii)	Steppes
Triticum urartu Tumanian ex Gandilyan	EN B1ab(iii)+2ab(iii)	Steppes
Asperula affinis Boiss. et Huet	EN B 1 ab(iii) + 2 ab(iii)	Steppes, steppe shrubs
Cruciata sosnowskyi (Manden.) Pobed.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton
Thesium compressum Boiss. et Heldr.	CR B 1 ab(iii) + 2 ab(iii)	Salt marshes
Thesium procumbens C.A.Mey.	EN* B 1ab(iii) + 2 ab(iii)	Meadows, fringes
Viola caucasica Kolenati ex Rupr.	CR B 1 ab(iii) + 2 ab(iii)	Alpine petrophyton

This group of plants includes, first of all, species adapted to mesophilic conditions of subalpine and alpine zones, for which climate change will lead to a dramatic reduction of area and diversity of these ecosystems and habitats. These species are, for example, *Botrychium lunaria*, *Antennaria caucasica, Eriophorum latifolium, Rhododendron caucasicum, Lomatogonium carinthiacum, Scilla rosenii* and others. This group of plants includes also the inhabitants of freshwater wetland habitats of the lower and middle mountain belts, the areas of this kind of habitats will be clearly reduced due to decreasing of precipitation and increasing of temperature (*Carex pendula, Trigonella capitata, Thelypteris palustris* and others). In addition, the threat of climate change is real for mesophilic species of steppes, meadow-steppes and meadows, populations of which are small in number or are isolated from habitats, which will be available in a result of climate change. This group includes *Acanthus dioscoridys, Sternbergia colchiciflora, Grossheimia caroli-henricii, Cephalaria nachiczevanica* and others. As we have noted above, for all of these species climate change will be one of the major threats for existence, but it should be remembered, that for most of them there are other no less serious threats also, in particular, that most of them are growing in areas of intensive economic activities and negative impact of anthropogenic factor, which can be decisive.

Conclusions

Forecasted climate change will cause a change of nearly all ecosystems of Armenia, which will affect on the status of populations and distribution of many rare and endangered plant species included

in the Red Data Book in Armenia. In some cases, these changes will have a positive impact and will contribute to the improvement of the status of populations and the wider dissemination of rare species.

In other cases, it will have a clearly negative impact, and in extreme cases, can lead to complete disappearance of some species from the territory of the republic. The main adaptation measures for rare plant species to climate change are the following.

1. For conservation of rare and endangered species in in-situ conditions should have healthy natural ecosystems as much as possible, to apply restoring measures for disturbed ecosystems, deal with problems of restoration of natural ecosystems on the places with completely destroyed vegetation.
2. On specially protected natural areas should have as much as possible diversity of ecosystems, habitats and microclimatic conditions. This will allow the rare and endangered species to find refuge in conditions of changing climate. That is, the network of protected areas of the country should include the most possible diversity of ecosystems and habitats, and in the planning and allocation of new protected areas, this factor should be considered mandatory (Dudley et al., 2015).
3. It's necessary to continue research of the status of populations of rare plant species of Armenia and organization of effective system of monitoring to detect the first signs of degradation and to adopt necessary measures for their conservation.
4. It should be given more attention to the abilities to save rare and endangered plant species in ex-situ conditions as living collections, seed and gene banks, on specialised plantations.

3. SOME EVIDENCES OF CLIMATE CHANGE IMPACT ON THE FLORA AND VEGETATION OF ALPINE BELT OF ARMENIA AND FORECASTS OF MAIN ECOSYSTEMS CHANGE

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Using forecast for climate change in Armenia (temperature and precipitation) forecast for main ecosystems change was elaborated. This forecast supposes aridisation as the main direction for all ecosystems, but in some cases other options are possible. Field observations during last 20-25 years show some changes in the flora and vegetation of alpine vegetation in Armenia: 1. Change in the vegetation – alpine carpets are changing by alpine meadows. 2. Change of area of distribution – some Atropatenian species (growing mainly in the North-West Iran) are spreading to the North (to the Caucasus, including Armenia and Nakhichevan). 3. Change in altitudinal distribution - some species from lower belts are going up to alpine belt. From other side, some species are widening their altitudinal distribution from up to down (from alpine to sub-alpine belt). 4. Under influence of overgrazing especially in vicinities of summer camps some not fodder plants are spreading intensively in alpine communities, they became dominants here.

Introduction

The territory of the Republic of Armenia is part of one of the most important "hotspots" of the World biodiversity – Caucasus. Though occupying a relatively small part of the Caucasus this country shows very high biodiversity. Armenia is generally a mountainous country, having its lowest point of 375 *m* above sea level and culminating at 4095 *m* with an average altitude of 1850 *m*. With a territory of 29740 sq. *km* about 3800 species of vascular plants are registered, more than 500 species of vertebrates and more than estimated 17000 species of invertebrates. Almost all main types of vegetation in Caucasus (excluding flora of wet subtropics) are present in Armenia. In some few parts, as well as in other countries of the Caucasus still territories with scarcely influenced nature exist. Currently the Republic of Armenia faces the very acute problem of preserving such ecosystems. One of these problems is global climate change, which gain great importance causing ecosystems change, species migration and even their disappearance. There are some evidences of change in vegetation and in distribution of some species during last decades, which are most notable in the alpine and sub-alpine belts of Armenia.

Short characteristic of the natural conditions in Armenia

Landscape:

The mountainous nature of Armenia results in a series of highly diverse landscapes with varying: geological substrate, terrain, climate, soils, and water supply. There are seven distinct landscape types described for Armenia: deserts, semi-deserts, dry steppes, steppes, woodlands, sub-alpine and alpine lands. The great diversity of ecosystems and vegetation types is correlated with the variety of landscapes, ranging from sand deserts and semi-deserts situated at 400 m above sea level to alpine meadows and turfs at 3000 m, from xeric mountain formations to wetland vegetation, or from mesophilous forests to feather grass steppes.

Vegetation:

The diversity of landscapes and orography is an important determinant of Armenia's diverse vegetation. The lower mountain belt (480–1200 m) is covered by semi-desert (or phryganoid) formations, gypsophilous or halophilous vegetation. There are salt marsh areas as well as the Transcaucasian sand desert. The middle and upper mountain belts (1200–2200 m) are characterized by various kinds of steppe and forest vegetation, meadow-steppes, shrub steppes and thorny cushion (tragacanth) vegetation. The altitudinal span of the forest belt varies from 500 to 1500 (–2000) m depending of the region, and may be approaching to 2400 m when open park-like tree stands are included. The sub-alpine and alpine belts (2200–4000 m) are covered by meadows and turf.

Phytogeography

Armenia is situated between two very distinct phytogeographical domains: the Boreal and Ancient Mediterranean Subkingdoms and at the junction of two floristic provinces - Caucasian and Armeno-Iranian [5]. The peculiarity of each, enhanced by vertical zonation, is the cause of the great variety of the country's vascular flora and vegetation. About 3600 vascular plant species occur on its territory. The floristic regions within Armenia can be found in the "Flora of Armenia" [6].

The climate change forecast

The climate change in the territory of Armenia is mostly conditioned by the influence of Global climate change. According to the meteorological observations, during 1935-2011 the average temperature in Armenia increased on 1,01°*C*. Climatologists have estimated possible temperature changes and amount of precipitation in the republic territory for the case scenarios of the greenhouse gas A2 and B2 emission for the period of 2030, 2070 and 2100 using MAGICC/SCENGEN (5.3v2) and PRECIS softwares. It was shown that by the end of 21st century the average temperature depending on the scenario can increase from 4,8 to 5,7˚*C*. Moreover the highest increase of the temperature is expected to be in the spring-summer period in the Southern and Central regions of the republic; the temperature increase in the North and East will be mild. The precipitation change forecast remains greatly indefinite – its decrease is supposed to be 1-27%. Meantime greater decrease of precipitation is expected in summer period. In fall-winter-spring period precipitation decrease is expected in foothills, but slight increase is expected in mountains.

Results

The main ecosystem's change forecast

By using Holdrige's "Life zones" [4] scheme the vulnerability of the main natural ecosystems in Armenia was evaluated and their possible change forecasts were given.

Alpine meadows

The prediction on bioclimatic conditions change shows that the general way of the conditions change is envisaged not towards the sub-alpine meadows, which can be assumed, but towards the expansion of sub-alpine tall grasses and wetland areas.

Sub-alpine meadows

Their transfer into meadow-steppes is predicted; in the current meadow area an expansion of forest ecosystems is possible. In the forest areas the upper border of the forest will rather increase, while in the no forest areas a transfer into meadow steppe ecosystems will most probably be.

Forests

In the middle altitudinal belt "humid" forests more probably the xerophytisation processes will be observed, for instance, penetration of the typical plants of steppes, arid open forests and shibljak into forest ecosystems. A partial xerophytisation of the "wet" forests will lead to their transformation into "humid" forests. The modern forests of the sub-alpine belt will be replaced with ordinary "wet" forests over time; an increase of the forest vegetation upper border will take place.

Meadow-steppes

It is more expected a transfer into a steppe ecosystems, in some cases (in some areas in case of the precipitation amounts increase) a development of the sub-alpine tall grasses is possible, as well as sometimes an expansion of forest ecosystems into current meadow areas is possible.

Steppes

The xerophytisation is the ecosystem change general direction. In this way, the modern dry steppes can be replaced by phryganoids, the tragacanth steppe area should be extended. The modern, comparably mesophilous steppe ecosystems can be replaced by more dry options.

Semi-deserts

Basically, the semi-desert vegetation conservation is supposed to be with the expansion of phryganoid areas. An expansion of desert ecosystem areas, particularly saline deserts and "solonchaks" is also expected.

Shibljak and open forests

Overall, these ecosystem conditions will be maintained and will even a little bit expand, but the growth of the trees and bushes can deteriorate and over time these ecosystems, especially in the middle mountain belt, can be replaced by phryganoids.

Discussion

In comparison with 20-30 years old observations one can find out some changes in flora and vegetation of alpine belt of Armenia. The main impact of global climate change in alpine belt in Armenia is revealed in four main directions. At the same time it has to be noticed, that changes in flora and vegetation are results from very complicated processes, including changes in anthropogenic presses. For example, economic crisis, change in political and economical schemes including land privatization, change in demographic situation (decrease of population) have lead to great decrease of livestock in Armenia. If in Soviet time the population of livestock (mainly cattle and sheep) reached to 6,000.000, now according official data it is about 1,200.000. First of all, this decrease leads to undergrazing of alpine and sub-alpine pastures which are located rather far from settlements. We have to take in account this synergy effect of climate change and change pressure on pastures, when we estimate changes in flora and vegetation of alpine belt of Armenia.

1. Change in the vegetation – during last 20-25 years the area of alpine carpets (*Campanula tridentata, Taraxacum stevenii, Ranunculus dissectus, Astragalus incertus* dominants) significantly decreased, they were changed by alpine meadows (*Nardus stricta, Festuca brunnescens, Bromopsis variegata* dominants). We consider that these changes are connected with change in grazing schemes. Dominants of alpine carpets are mainly not fodder plants, and their wide distribution in the past was connected with overgrazing of alpine pastures. Now the succession is directed to re-establishment of meadows.
2. Change of area of distribution – some Atropatenian species are spreading to the North (*Allium derderianum, Heracleum schelkovnikovii, Crepis sahendi*, *Campanula bayerniana,* and others). These species migrate to the North mainly along Zangezur range, and during the last 20-25 years they enlarged their areas of distribution by 50-80 *km*. We can suppose that this migration is

connected with climate change, but this statement needs to be checked by comparison of climate conditions in different parts of area of distribution of these species.

3. Change in altitudinal distribution - some species from lower belts are going up to alpine belt (*Centaurea cheiranthifolia, Helichrysum plicatum, Campanula stevenii, Artemisia fragrans, Poa bulbosa,* and others). On our opinion this change may be connected only with climate change, because it can be observed in all regions of Armenia and is not connected with differences in grazing schemes. From other side, some species are widening their altitudinal distribution from up to down. For example, *Delphinium foetidum* (Caucasian endemic, rare species included in the Red Data Book of Armenia) grows in alpine belt of two floristic regions of Armenia at the altitudes 2700-3600 *m* above sea level [7]. In the last 2-3 years we observed that its populations increased significantly in number and density, and even more – some samples were found at the altitude 2400-2500 *m* above sea level. It is difficult to explain, why this alpine species is going down to more hot conditions. Probably this species has more wide ecological amplitude, and now, when ecosystems of lower belts are changing because of climate change and anthropogenic influence, it finds here appropriate eco-niches.
4. Under influence of overgrazing especially in vicinities of summer camps some not fodder plants are spreading intensively in alpine communities, they became dominants here (*Tripleurospermum caucasicum, Cirsium cosmelii,* and others).

In addition, new populations of some rare species were found in Armenia (*Potentilla porphyrantha, Pseudovesicaria digitata, Physoptychis caspica*) in the last 10 years. This findings may be result of more intensive floristic investigations in this time period, but as well it is possible that these species are spreading in connection with climate change.

PROJECTS

1. "TRANSFORMATION OF FOREST PLANTATIONS IN THE SOUTHERN CAUCASUS TO INCREASE THEIR RESILIENCE TO THE IMPACTS OF CLIMATE CHANGE"

(The project implementation by WWF in all 3 Caucasus countries, the project *implementation in Armenia by WWF-Armenia).*

The project was implemented during 2011-2014 with funding from the EU in the framework of the Environment and Sustainable Management of Natural Resources including Energy Thematic Programme.

Forests cover 4 million hectares of the southern Caucasus countries, which constitutes 22% of the countries' combined land and inland water surfaces: Armenia 332 thousand hectares (11.17%), Azerbaijan 990 thousand hectares (11.4%), Georgia 2,793 thousand hectares (40.7%) (FAO, 2010a). The region's wide variety of climatic zones in combination with variation in soils and relief has provided conditions for the development of a wide variety of forest formations.

The region's forests are important for a number of reasons

Biodiversity

The southern Caucasus is part of the Caucasus ecoregion - one of WWF's 35 "priority places" and one of 34 "biodiversity hotspots" identified by Conservation International as being the richest and at the same time most threatened reservoirs of plant and animal

life on Earth. Forests are the region's most important biome for biodiversity, harbouring many endemic and relic species of plants and providing habitats for globally rare and endangered animals.

Carbon storage, soil and water, forest products and culture and health

Objectives and expected results

The project was designed to contribute to the overall objective of increasing the resilience of forest ecosystems in the southern Caucasus against climate change impacts and to improve biodiversity and livelihoods of local populations. Objective is that two years after completion of the project the national governments will have adopted and started to implement policies that will make forests and the services they provide highly resilient to climate change.

The specific objective of the project, i.e. the objective which was to be achieved by the end of the project, contributes to the overall objective by establishing the necessary conditions for the forest administrations in southern Caucasus countries to develop and implement strategies for transforming monoculture forest stands into highly resilient, "close to nature" forest stands.

The expected results of the project were:

1. Selected forest stands vulnerable to climate change have been transformed into highly resilient "close to nature" forest stands;
2. Silvicultural guidelines for the transformation of monoculture stands into more resilient stands are elaborated, published in national and English languages and made available for relevant officials and experts;
3. The capacities of forest administration experts to develop silvicultural strategies to transform monoculture stands into stable, site-adapted forests are increased;
4. The awareness of local communities about the importance of forest rehabilitation with regardto mitigating negative biotic and abiotic impacts of climate change is improved.

Planned activities

The planned activities were structured into four work packages as follows:

1. **Research and demonstration package** – the development and piloting of silvicultural measures for transforming forest stands that are vulnerable to climate change into resilient forest stands and provision of practical experience in the target countries which could be used as a basis for training materials and as demonstration sites;
2. **Dissemination package** for the forest administrations in the target countries, including information and materials on forest transformation measures that could be applied to all forest stands vulnerable to climate change in the target countries. The envisaged materials were silvicultural guidelines, a popular report describing activities implemented by the project (this report), results and lessons learned from the Project, and training modules;
3. **Capacity-building package**, designed to train staff of the forest administrations to develop and implement strategies for transforming forest stands more widely in the target countries after the action had been completed, and to create the supportive policy environment for the forest administrations to be able to develop and implement strategies for making forests more resilient to the impacts of climate change;
4. **Awareness raising package,** aimed at building the awareness in the communities adjacent to the pilot sites and local NGOs and CBOs active in the locality of the pilot sites about the impacts of climate change on forests and forest services and at involving them in the implementation of the action at the pilot sites.

Activities implemented by the project

- overview of the forests of Armenia, Azerbaijan and Georgia, their importance, and the pressures and threats that they face.
- information about changes in the climate in the region up to the present day and predicted future changes from modelling studies.
- description of the impacts of changes in the climate on forests generally and the impacts that we should expect on forests in the South Caucasus.

- description of strategies for mitigating the impacts of climate change on forests including adaptation of forests to climate change.
- discussion of resilience and close to nature forest management and recommended process for elaborating transformation plans for the pilot sites.
- outlook for the pilot sites in the face of the uncertainty surrounding the predictions about the future climate.

Site selection

Two sites in each of the project's target countries were selected for demonstrating transformation measures. The main precondition for site selection was to identify monoculture forest stands. The sites were selected based on the criteria elaborated in collaboration with the forest authorities of the target countries before starting to search for sites (Box 2). The six sites were selected by the project partners together with the forest administrations responsible for assigning the pilot sites to the action (in Armenia the "Hyantar", in Georgia the Municipality of City of Tbilisi and the Natural Resources Agency of the newly established Ministry of Energy and Natural Resources, in Azerbaijan the Forestry Department of the Ministry of Ecology and Natural Resources).

The total area of the selected sites is 443.47 hectares, of which 151.80 ha are located in Armenia, 148.00 in Azerbaijan and 144.07 in Georgia.

Conclusions

Climate change in the southern Caucasus threatens the health of the region's forests and the ecosystem services that they provide. The threat can be mitigated by implementing measures that will make forests more resilient to climate change. The FTSC project demonstrated a limited set of measures to enhance the resilience of monoculture plantations by planting and supporting natural regeneration to increase species diversity and carrying out supporting measures such as fencing and weeding. The measures are directly transferable to other plantations and to degraded natural and semi-natural forests; however, the measures are expensive. The high cost of materials (fencing in Azerbaijan, seedlings in Georgia) were contributing factors; so too were the small sizes of the areas on which measures were actually implemented in relation to the total areas of the demonstration sites and the resulting lengths and therefore cost of the perimeter fences. Forestry administrations should therefore be cautious about implementing the same measures in other forests and should consider alternatives to the measures demonstrated by the FTSC project.

2. "UTILISING STREAM WATERS IN THE SUPPRESSION OF FOREST FIRES WITH THE HELP OF NEW TECHNOLOGIES"
(Ministry of Nature Protection Republic of Armenia, <<Zikatar>> Environmental Center)

The project entitled "Utilizing Stream Waters in the Suppression of Forest Fires with the Help of New Technologies" with the acronym "Streams-2-SUPPRESS-Fires" will conclude all its activities by November 30th, 2015. The project started on April 1st 2013 and its total duration was 32 months.

The project was funded under the EU INTERREG IV "Black Sea Basin Joint Operational Programme 2007-2013" framework. The lead partner was Eastern Macedonia and Thrace Institute of Technology (EMaTTech) from Greece. Five more institutions from the Black Sea Region were involved. Specifically, Artvin Coruh University from Turkey, Braila Prefecture from Romania, Eco-TIRAS International Association of River Keepers from Republic of Moldova, the National University of Life and Environmental Sciences from Ukraine and Zikatar Environmental Center from Armenia.

The project's overall objective was to develop a holistic and complete approach for wildfire suppression with an emphasis on protected areas for the Black Sea Region and to demonstrate its implementation on 6 pilot areas of the region. To accomplish this ambitious objective many and different activities were implemented during the lifespan of the project.

A Neighborhood Network was developed to increase the stakeholders' involvement. The meetings were online through the Acrobat CONNECT system with participants from all six partner countries. Participants were from the Fire Brigades, Forest Services, National Parks, Ministries, Municipalities, NGOs, Prefectures and general public. Workshops were held in Drama Greece, Yerevan Armenia, Chisinau Moldova and Odessa Ukraine with more than 250 participants. Conferences were conducted in Kastamonu Turkey and Kavala Greece with more than 350 participants. In addition, newsletters (total of 5) were produced to inform people on the progress of the project.

The project also produced fire fuel models, fire fuel maps and fire risk maps for the pilot areas. This information allowed to identify the areas that had the greatest fire risk. A hydrologic model was also calibrated to the characteristics of the region and maps with potential stream flows were created for the pilot areas. This allows the sustainable utilization of stream waters by the land fire vehicles. Finally, the number and location of water reservoirs was estimated, while also determining the optimal routes for land vehicle to reach the water reservoirs. These tools were used for the first time in the pilot areas and in some of the participating countries, while the information produced did not previously exist for the pilot areas.

Overall through this project, new, innovative and user friendly tools were developed, while the awareness on fire suppression and protected areas throughout the region was enhanced.

3. EU-FINANCED AND UNDP-IMPLEMENTED CLIMA EAST PILOT PROJECT "SUSTAINABLE MANAGEMENT OF PASTURES AND FOREST IN ARMENIA TO DEMONSTRATE CLIMATE CHANGE MITIGATION AND ADAPTATION BENEFITS AND DIVIDENDS FOR LOCAL COMMUNITIES" (Clima East Pilot Project United Nations Development Programme, Republic of Armenia)

The mountain forest and rangeland ecosystems are an important productive asset for Armenia's population 50 percent of which lives in rural communities, thus depending on ecosystem goods and services. The latter ensure population well-being and economic development, including agriculture (23 percent of GDP). However, high level of rural poverty rate, poor economic conditions and destruction of infrastructures, along with weak institutional and management capacities in governing structures create cumulative negative impact resulting in degradation of ecosystems, including the loss of vulnerable habitats and species, reduction of ecological functionality and the growing insecurity of ecosystem services.

The current status of natural rangelands covering around 1,244,000 ha in Armenia is extremely unsatisfactory. Almost half of the pastures are exposed to degradation and their biological productivity fell by 1.5 - 2 times compared with 1950s. Only 10.4 percent of Armenia's territory is forest covered. The continued forest degradation leads to forest ecosystem integrity and resilience reduction.

The factors behind are both anthropogenic and natural. Armenia is among the most sensitive countries in the Europe and Central Asia region in regard to climate change. Unsustainable forest management and land use, poor agricultural practices accompanied with climate aridisation result in the depletion of carbon sinks and storages.

The Clima East Pilot Project aims to demonstrate sustainable natural resource management model in degraded mountainous pastures and forests of Armenia to increase climate change adaptation and ecosystems capacity for carbon sequestration, at the same time retaining biodiversity and economic values.

The main target area of the project is Vardenis sub-region of Armenia's Gegharkunik Marz.

The project promotes integration of environmental and social concerns into the successful management model of rangelands and forest through:

- Demonstrating rehabilitation and sustainable management of degraded mountain rangeland (2000 ha) and forest (60 ha) to adapt to the climate change and increase the carbon stock;
- Incorporating climate change risks into multi-year community development plans;

- Promoting the establishment of national carbon inventory and monitoring system.

Forest rehabilitation and restoration pilots:

Rehabilitation measures of degraded natural forest were successfully carried out through coppicing in 2015 on total of 25.8 ha area in Juniper-Oak Sanctuary in Tsapatagh and Daranak communities to increase adaptive capacity to climate change and carbon sequestration in mountain ecosystems.

Establishment of two new forest belts on total of 33.2 ha in Tsovak community and Sevan National Park is underway since 2015 to restore forest losses in Lake Sevan basin. Seedlings of different species (incl. feral fruits) were planted to establish mixed forest stands more resilient to climate change. Innovative water absorbent gel applied to seedlings planted on 4 ha area for the first time to test its efficiency in forest plantation under dry climate conditions. Measures to ensure natural regeneration of degraded forest vegetation on 7 ha area in Sevan National Park were also carried out.

Pasture rehabilitation pilots:

Pilots aimed at improving access to summer pastures of five target communities in order to significantly reduce burden on winter pastures and avoiding summer pasture degradation due to under-grazing.

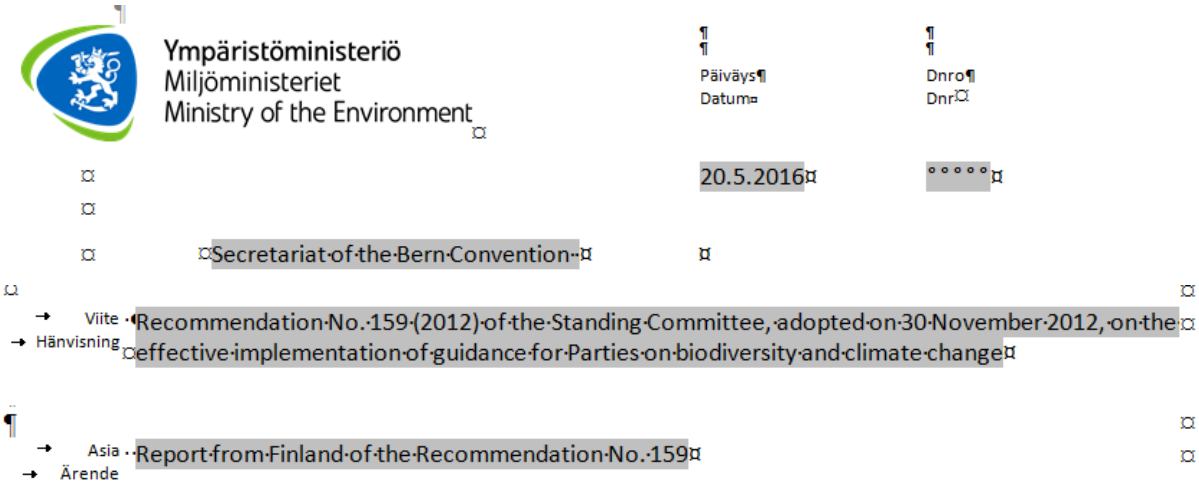
Rotational grazing plans for target communities were developed, approved by the Community Elderly Councils and followed up by the trainings in implementation of the plans.

Partial restoration of field roads is underway to facilitate access to summer pasture. Degraded winter pasture surface rehabilitation activities on 170 ha area are also launched in 2015.

Carbon monitoring and assessment in soil and vegetation*:*

Assessment of organic carbon stock was carried out on pilot forest and pasture rehabilitation areas beforehand through soil and vegetation sampling and lab analysis. The baseline data are made available for further assessment of carbon sequestration capacities in the pilot sites.

FINLAND / FINLANDE



Ympäristöministeriö
Miljöministeriet
Ministry of the Environment

Päiväys
Datum

Dnro
Dnr

20.5.2016

Secretariat of the Bern Convention

Viite
Hänvisning
Recommendation No. 159 (2012) of the Standing Committee, adopted on 30 November 2012, on the effective implementation of guidance for Parties on biodiversity and climate change

Asia
Ärende
Report from Finland of the Recommendation No. 159

We are thanking the Bern Convention for highlighting the importance of climate change and its links to biodiversity and urging to take all necessary steps to ensure that the importance of the issue of climate change on biodiversity is well recognized.

The Paris Agreement under the United Nations Framework Convention on Climate Change made a momentum when added pressure to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future and also recognized the importance of ensuring the integrity of all ecosystems and the protection of biodiversity.

WORK WITH OTHER MULTILATERAL ENVIRONMENTAL AGREEMENTS

Finland has taken actively part to the CBD processes related not only to climate change, but also importance of adding synergies with other multilateral environmental agreements.

Finland highlights the latest recommendation adopted by the Subsidiary Body on Scientific, Technical and Technological Advice (XX/10.) on Biodiversity and climate change. The recommendation and its background documents look beyond terrestrial forests and at all ecosystems, not only highlighting their role in adaptation but also in mitigation.

We would like the Bern Convention also to recognize the work done by the Conference of the Contracting Parties to the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) and to note resolution XII.11 at its twelfth session, entitled “Peatlands, climate change and wise use: Implications for the Ramsar Convention”, which highlights the role of peatlands in climate change not only in adaptation but also in mitigation. The resolution also noted that the Intergovernmental Panel on Climate Change (IPCC) has completed the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement) and the 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol, providing detailed guidance on methods for estimating anthropogenic emissions and removals of greenhouse gases from wetlands and drained soils including by rewetting and restoration of drained peatlands.

Finland is active member of the Ramsar Regional Nordic Baltic Wetlands -Initiative and took part to the project Peatlands and Climate in a Ramsar context - A Nordic-Baltic Perspective. The results of project were presented at UNFCCC side-event in Paris 2.12.2015. More information: http://www.norbalwet.org/ and http://www.norbalwet.org/news-and-events/peatlands-climate-regulation-and-biodiversity-film-is-launched-at-the-unfccc-paris-2.12.2015-/.

Regional climate strategies and programmes play a key role in the prevention of and adaption to climate change. The urgency of action to combat climate change is well recognized also in the Artic (especially in its biodiversity working group, Conservation of Artic Flora and Fauna, CAFF) and Barents cooperation (the working group on environment). Finland is preparing for its coming

presidency at Arctic Council after U.S. Chairmanship 2015-2017. Climate change is also one important driver with transboundary cooperation: Green Belt of Fennoscandia (GBF) is an ecological network situating in the territory of three countries: Finland, Russia and Norway. It extends from the Baltic Sea to the Arctic Ocean. GBF is part of European Green Belt -network.

EU -LEVEL

Finland is taking part the discussions about the Legal proposal on LULUCF (Land use, land use change and forestry), to define how to account for GHG emission/removals from land use (possibly including agriculture). Finland is as well taking part the discussion about sustainability of Bioenergy.

STRATEGY AND ACTION PLAN -LEVEL

National Biodiversity Strategies and Action Plans (NBSAPs) provide an important tool to integrate and include other sectors to enhance implementing international and national biodiversity targets. The CBD and its Biodiversity related Aichi targets as well as the Biodiversity strategy of EU is incorporated into the Finnish NBSAP. The need for climate change actions is recognized in Finnish NBSAP.

Finland is at the moment updating its National Climate and Energy Strategy (http://www.tem.fi/en/energy/energy_and_climate_strategy/strategy_2013) and there is possibility to strengthen its links to biodiversity by underlining impacts to the biodiversity and ecosystem services and also providing information and best practices of nature-based solutions.

According to national Climate Act Finland is preparing its long-term climate plan until 2030 covering transport, agriculture and waste management as well as the LULUCFC sector.

Finland has also made National Strategy for Adaptation to Climate Change

(http://www.mmm.fi/attachments/mmm/julkaisut/julkaisusarja/5entWjJIi/MMMjulkaisu2005_1.pdf) and Ministry of the Environment is on the process of updating its sectorial adaptation plan, where current actions for biodiversity and ecosystem services are listed.

There is need to better mainstream biodiversity into other sectors strategies.

NATURE PROTECTION AREA NETWORK -LEVEL

Almost all protected areas of Finland are situated on state-owned lands and waters. Within Metsähallitus, the Parks & Wildlife Finland (former Natural Heritage Services) is responsible for the management of these areas: their species, habitats and cultural heritage as well as recreational services. Metsähallitus Parks & Wildlife Finland follows the guidelines called the Protected Area Management Principles (updated in 2014, also available in English, 2016). The guidelines define the protected area types on state-owned lands, their protection goals and the general principles to be followed in the protected area management (adaptive management and restoration measures).

Updated guidelines note that climate change presents new challenges in the planning and management of protected areas.

The working group for ecological restoration and management in Finland, known as the the Finnish Board on Ecological Restoration (FBER), is a nationwide cooperation body established by Metsähallitus. More information about the activities of FBER:

- International co-operation: Society for Ecological Restoration (www.ser.org)
- Restoration of damaged ecosystems in the Nordic countries – ReNo (www.reno.is)
- Guide books •Ecological restoration in drained peatlands (www.julkaisut.metsa.fi , published in 2014.
- Ecological restoration and management in boreal forests - best practices from Finland (pdf, 5 MB, www.julkaisut.metsa.fi), published in 2012.
- Videos Back to Nature (www.youtube.com): Habitat restoration work by man and machine.

- Preserving Heritage Landscapes (www.youtube.com): Continuous work with traditional methods keeps biodiversity flourishing.
- A Change for the Better (www.youtube.com): Results of the Green Belt LIFE Project in northeastern Finland.

FURTHER STUDIES WHICH INCLUDES CLIMATE CHANGES CONSIDERATIONS

Finland is updating the Assessment of threatened habitat types in Finland in 2016-2018, the habitat types are assessed for the second time. The total number of habitat types included is slightly higher, c. 430 in the second assessment. The national experts are organized in eight teams to carry out the assessments: the Baltic Sea, its coast, inland waters and shores, mires, forests, rocky habitats, traditional rural biotopes and fell habitats. The methodology is also revised and the assessments are based on the new international criteria, IUCN Red List Criteria for Ecosystems.

Also the threat status of Finnish species will be evaluated in 2017-2018 for the fifth time (most recently in 2010). The results of the assessment are published in the Red List of Finnish Species, listing Regionally Extinct, Threatened, Near Threatened and Data Deficient species.

The prestudy of Protected Area Network evaluation in relation to the climate change has just started by the Finnish Environmental Institute. The preliminary evaluation will propose possible analysis methods and existing data sources that can be used to evaluate the efficiency of the Protected Area Network and the performance of it in changing climate.

Kristiina Niikkonen
Environment Counsellor

ICELAND / ISLANDE

ICELAND REPORT TO THE GROUP OF EXPERTS ON BIODIVERSITY AND CLIMATE CHANGE UNDER THE BERN CONVENTION

Mostar, Bosnia Herzegovina, 31 May and 1 June 2016

Reporting by Parties

Governments of Contracting Parties are kindly requested to submit written reports on their relevant actions on biodiversity conservation and climate change, particularly in the light of Recommendation No. 159 (2012) of the Standing Committee on the effective implementation of guidance for Parties on biodiversity and climate change. National reports should be sent to the Secretariat (veronique.decussac@coe.int), in electronic Word format by 20th May 2016 at the latest.

BACKGROUND:

Iceland's overall strategy on climate change and mitigation actions is presented in ***Iceland's Climate Change Strategy*** https://eng.umhverfisraduneyti.is/media/PDF_skrar/Stefnumorkun_i_loftslagsmalum_enlokagerd.pdf

The Strategy sets forth a long-term vision for the reduction of net emissions of greenhouse gases by 50-75% until the year 2050, using 1990 emissions figures as a baseline.

The Strategy sets forth the Icelandic government's five principal objectives with respect to climate change, which aim toward the realisation of the above-described long-term vision:

- The Icelandic government will fulfil its international obligations according to the UN Framework Convention on Climate Change and the Kyoto Protocol.
- Greenhouse gas emissions will be reduced, with a special emphasis on reducing the use of fossil fuels in favour of renewable energy sources and climate-friendly fuels.
- The government will attempt to increase carbon sequestration from the atmosphere through afforestation, revegetation, wetland reclamation, and changed land use.
- The government will foster research and innovation in fields related to climate change affairs and will promote the exportation of Icelandic expertise in fields related to renewable energy and climate-friendly technology.
- The government will prepare for adaptation to climate change.

The Strategy contains provisions for measures that will be adopted in order to achieve these objectives.

To follow up on the Strategy an implementation plan/action plan was published in 2010, *Aðgerðaráætlun í loftslagsmálum, Umhverfisráðuneytið október 2010*. https://www.umhverfisraduneyti.is/media/PDF_skrar/Adgerdaaaetlun-i-loftslagsmalum.pdf

The action plan is revised as needed and latest revision was in 2015 https://www.umhverfisraduneyti.is/media/PDF_skrar/220915-Skyrsla-um-adgerdaaaetlun-2015-ENDANLEG.pdf

In November 2015 the Icelandic Government accepted a special action plan with emphasis on 16 objectives where three of the objectives are directly connected to biodiversity, V*erkefni í sóknaraætlun í loftslagsmálum*. The government decided to increase support to afforestation, soil conservation and wetland restoration. https://www.umhverfisraduneyti.is/frettir/sextan-verkefni-i-soknaraaetlun-i-loftslagsmalum.

BIOLOGICAL DIVERSITY AND CLIMATE CHANGE

In August 2008 the Icelandic Government accepted a policy document on implementation of the CBD, *Líffræðielg fjölbreytni, Stefnumörkun Íslands um framkvæmd Samningsins um líffræðilega fjölbreytni*, https://www.umhverfisraduneyti.is/media/PDF_skrar/liffjolbreytni.pdf

An action plan for the above implementation plan came in to force in December 2010, *Stefnumörkun Íslands um líffræðilega fjölbreytni – framkvæmdaáætlun.* https://www.umhverfisraduneyti.is/media/PDF_skrar/CBD-framkvaemdaaaetlun.pdf

One of the objectives in the action plan was to revise law on nature conservation with the aim to improve protection of biodiversity. New Nature Conservation Act no 60/2013 came in to force in November 2015.

In July 2008 the Ministry for the Environment published a report on global climate change and its environmental impact in Iceland, *Hnattrænar loftslagsbreytingar og áhrif þeirra á Íslandi, Umhverfisráðuenytið júlí 2008,* https://www.umhverfisraduneyti.is/media/PDF_skrar/visindanefndloftslagsbreytingar.pdf

The report contains chapters on observed changes and trends in biodiversity that can be related to climate changes. The report is now under revision and a new report is due to be published later this year. The new report will focus more on adaptation and/or mitigation methods.

ICELANDIC LEGISLATION AND PRIORITIES FOR CONSERVATION OF SPECIES, HABITATS AND HABITAT TYPES

The Icelandic policy and priorities for conservation of species and habitats is mainly reflected in two legislations. Laws on Protection, Conservation and Hunting on Wild Birds and Wild Mammals no 64/1994 and the Nature Conservation Act no 60/2013 which came into force in November 2015. Law no 64/1994 is in full compliance with the Bern Convention on protection on species, birds and mammals as game (exception are due to reservations Iceland made when signing the convention) and hunting methods but are relatively week regarding habitat protection. The law itself do not reflect climate change as specific driver but it is relatively easy to protect species, e.g. for hunting, for instance if there is a considerable decline in some bird populations, as have happened for some of the seabird populations, most likely as a result of climate change.

New law on nature conservation include for the first time all major definitions, implementation objectives and criteria for protection of species, habitats and habitat types in context with e.g. the biodiversity convention, Bern Convention and the Ramsar Convention. This includes e.g. the precautionary rule and the concept favourable conservation status of species, habitats and habitat types. In the explanatory text with the law climate change is discussed as one of the drivers for changes in nature and nature protection. The new Nature Conservation Act have all elements needed for protection of biodiversity including in connection with climate change, e.g. in context with introduction of non-native species. The new Nature Conservation Register is the main instrument for protection and its ideology, construction and implementation is in compliance with the Bern Convention / Emerald Network.

At the moment there are no specific actions plans in force for individual species or for habitats as a consequence of climate change.

Since 1999 the Icelandic Institute of Natural History, IINH, have been working on habitat type mapping of Iceland. In 2010 IINH published habitat types for highland areas. In 2012 IINH was granted an IPA-grant in connection with Iceland's application to join the EU. The grant was meant to prepare Iceland for implementation of the Habitats Directive and the Birds Directive. Since 2012 IINH have been working on, in a research project called Natura Iceland, habitat type mapping of the whole country (land, freshwater and coastal) as well as selecting important bird areas. This also includes better estimation of bird population sizes and revision of red lists for birds. The work is still in progress, although in its final stages, but will not be published until this autumn. The follow up of the

research project will include evaluation and selections of important bird areas, habitats, and habitat types and will be the foundation for a tentative list of Emerald Network sites in Iceland. In the process one of the criteria for selection of important sites will be based on threats including climate change as appropriate.

Monitoring

The results of the Natura Iceland project will not only be selection of important bird areas and habitat types - Emerald Network sites, but will also be foundation for future monitoring of species and habitats and habitat types e.g. palsa mires. In the Nature Conservation Act, no 60/2013 for the first time one institute, IINH, has been made responsible for monitoring of key elements in Icelandic nature. This excludes monitoring that have been assigned/obligated to others. Monitoring will be carried out in cooperation with other institutes or entities as appropriate. IINH will be responsible for comprehensive monitoring plan for the country as whole and to make monitoring plans for protected areas in cooperation with the Environment Agency.

At the moment there is no comprehensive monitoring plan for species or habitats only based on climate change. There are though several monitoring plans for individual species and group of species that have climate change as one of the main driver. Just to give an example we can mention seabirds such as puffin, *Fratercula arctica*, thick-billed-murre, *Uria lomvia* and common murre/guillemont, *Uria aalge* and others. Monitoring scheme for moths and butterflies have been running for several year as well as for fish species as Arctic charr, *Salvelinus alpinus.* For mammals the arctic fox is well documented in Iceland where monitoring includes well documented hunting statistic and the non-native reindeer in Iceland is monitored on a yearly basis. Tree pollen season has been observed and monitored in Iceland since 1988.

Land use - afforestation

The Bern Convention adopted Recommendation No. 96 (2002) on conservation of natural habitats and wildlife, especially birds, in afforestation of lowland in Iceland. Iceland has reported on the matter several times; the latest report was in 2014. After Iceland signed the AEWA convention the convention has also been interested in afforestation vs. habitats for birds in Iceland.

In Iceland there is special law on afforestation, which is subsidised by the state. As afforestation is also used as a mitigation method to bind carbon dioxide there can come up conflicts between land use for planting trees for carbon segregation and habitat protection. This calls for active policy in selection of sites for protection vs. planting as well as monitoring of changes. As a result of much less sheep grazing in Iceland in the last decades a long with climate changes native birch and willows as well as none native tree species are changing many habitats.

Afforestation plans are not solely a climate change issue, despite using afforestation as mitigation method. In the near future habitat type mapping of Iceland will hopefully solve some of the conflicts regarding land use for afforestation both in context with climate change and common forestry.

LATVIA / LETTONIE

REPORT BY LATVIA

1. The State Program for Environment Monitoring (2015-2020) containing subprogram Biodiversity monitoring. The three main parts of Biodiversity subprogram:

a. Natura 2000 sites monitoring (monitoring in all Natura 2000 sites)

- Mammals monitoring (Bats, Big mammals)
- Birds monitoring
- Reptiles and amphibians monitoring
- Fish monitoring
- Invertebrates monitoring
- Plants monitoring
- Habitats area monitoring
- Habitats quality monitoring

b. Background monitoring (distribution of species, quality of species habitats)

- Mammals monitoring (small mammals, bats, brown bear, otter, game species)
- Nesting birds monitoring (day birds, night birds in agriculture lands, raptors, waterfowl, sea coast birds, birds colonies, nesting bird's atlas)
- Census of wintering waterfowl and areal census of wintering waterfowl in sea area
- Birds in passage monitoring
- Fish monitoring
- Invertebrates monitoring
- Reptiles and amphibians monitoring
- Habitats and umbrella species monitoring

c. Special monitoring

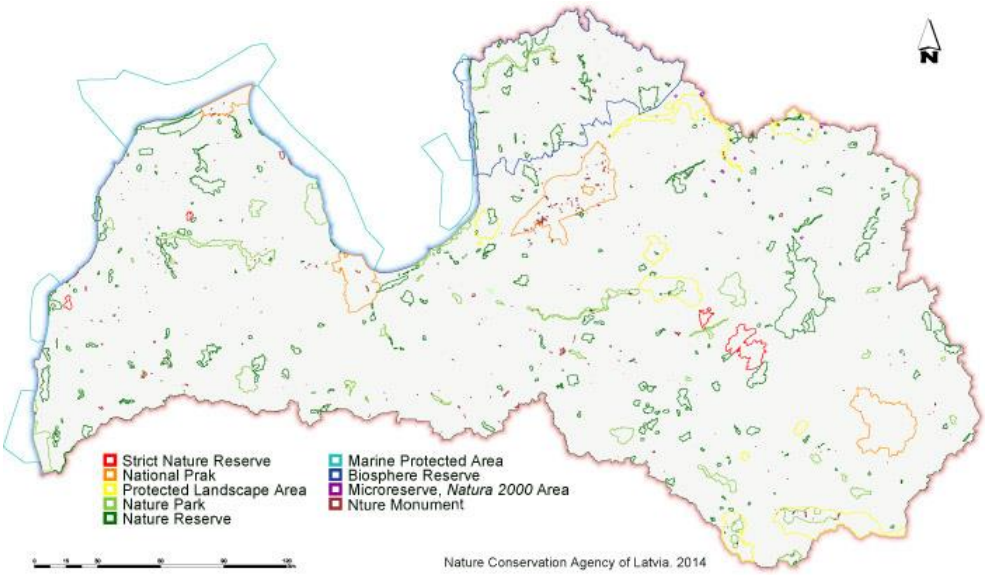
- Lesser spotted eagle monitoring
- Black stork monitoring
- White stork monitoring
- Salmon monitoring
- Monitoring of migratory birds species
- Monitoring of migratory bats species
- Large carnivores monitoring
- Marine coastal habitats monitoring
- Monitoring of the swift rivers

2. Specially protected natural areas are geographical territories, that are under special state-level protection, in order to safeguard and maintain biodiversity of nature – rare and typical ecosystems, habitats for rare species, landscapes, that are peculiar, beautiful and characteristic for Latvia, geological and geomorphological formations, as well as territories, significant for recreational and educational purposes.

The protected areas are classified according following categories: strict nature reserves, nature parks, nature reserves, national parks, biosphere reserves, natural monuments, areas of protected landscapes

Altogether in Latvia there are 683 specially protected nature areas certified by law or regulations of the Cabinet of Ministers on Specially Protected Nature Territories.

- ✓ 4 national parks. National parks are broad areas which are characterized by outstanding nature formations of national significance, landscapes and cultural heritage landscapes untouched by human activities or nearly natural, a diversity of biotopes, abundance of cultural and historical monuments, and peculiarities of cultural environment.
- ✓ 1 biosphere reserve. Biosphere reserve are broad territory in which landscapes and ecosystems of international significance are located. The goal of establishing biosphere reserves is to ensure the preservation of natural diversity and to promote sustainable social and economic development of the territory.
- ✓ 42 nature parks. Nature parks are territories that represent the natural, cultural and historical values of a particular area, and that are suitable for recreation, education and the instruction of society. Organization of recreation and economic activities in nature parks shall be carried out by ensuring the preservation of the natural, cultural and historical values located in such parks.
- ✓ 9 protected landscape areas. Protected landscape areas are territories remarkable for original and diverse landscapes and special beauty. The goals of such territories are to protect and preserve the cultural environment and landscapes characteristic of Latvia in all their diversity, as well as to ensure the preservation of environment appropriate for recreation of society and for tourism, and use of environment friendly management methods.
- ✓ 261 nature reserves. Nature reserves are nature territories little transformed or transformed in varying degrees by human activities, which territories include habitats of specially protected wild plant and animal species, and specially protected biotopes.
- ✓ 4 strict nature reserves. Strict nature reserves are territories untouched by human activities or nearly natural, in which territories unhindered development of natural processes shall be ensured in order to protect and study rare or typical ecosystems and parts thereof. Strict nature reserves shall have zones in which all natural resources are completely excluded from economic and other activities.
- ✓ 7 marine protected areas. Marine protected areas are locations in the territorial sea, exclusive economic zone or continental shelf of the Republic of Latvia, which are established for the protection of protected biotopes and specially protected species habitat, as well as migratory bird significant feeding and wintering places.
- ✓ 355 nature monuments. Nature monuments are separate, isolated natural formations: protected trees, dendrological plantings, avenues, geological and geomorphological nature monuments and other natural rarities having scientific, cultural and historical, aesthetic or ecological value.



3. Specially protected nature areas nature protection plans (management plans) are made for a specified period (usually 7-15 years) and are approved by the Minister of the Environmental Protection and Regional Development. Management plans are intended to harmonize environmental protection, utilization of natural resources, regional development and other interests, it would be to preserve the natural values.

Nature Protection Plans set out the necessary conservation and levels of economic activity, according to the specially protected nature areas zoning.

18 nature protection plans (management plans) adopted in time period from 2011 till 2015. 12 new nature protection plans are in the stage of elaboration right now.

4. Species and habitats management plans.

a. Management plans for 3 species (*Dryomys nitedula, Leucorrhinia caudalis, Coronella austriaca*) and for habitat *(Fenoscandian wooded meadows/wooded pastures (6530*/9070)* adopted by Minister Order during period 2014-2016.

b. Management plans for 3 species (*Ciconia nigra, Heliaeetus albicilla* and *Bonasa bonasia*) are in the stage of elaboration.

5. Projects

European Commission LIFE + programme Project "National Conservation and Management Programme for Natura 2000 sites in Latvia" (2012-2017) with objectives:

- ✓ to develop and publish a National Conservation and Management Programme for Natura 2000 sites in Latvia in order to adopt and implement a programmatic approach to the long term conservation and management of the Natura 2000 network;
- ✓ to promote effective and unified habitat management by elaborating comprehensive, tested and up-to-date common Guidelines for all habitat types and species;
- ✓ to increase awareness of public authorities, nature conservation experts, NGOs, municipalities, local entrepreneurs, land owners and other stakeholders about appropriate nature conservation and management measures and financial resources available for the management of Natura 2000 sites.

European Commission LIFE+ programme Project "Assessment of ecosystems and their services for nature biodiversity conservation and management" (2014-2018) with objectives:

- ✓ to adopt the international practices and experiences in economic valuation of ecosystems and their services for different scenarios in Latvia, creating a clear, comprehensive assessment system;
- ✓ map the ecosystems and their services in the selected pilot areas in Jaunķemeri and Saulkrasti in order to determine the current situation;
- ✓ elaboration and evaluation of the development scenarios for the selected pilot implementation areas;
- ✓ incorporate the results and recommendations of the scenario evaluations into Spatial Development Plan of the Municipality of Saulkrasti and Nature Conservation Plans for the Ķemeri National Park and the Piejūra Nature Park;
- ✓ make recommendations for applying the new approach in municipal decision-making and spatial-planning processes;
- ✓ to promote the new methodological approach for the economic evaluation of the ecosystems and their services by information and communication.

European Commission LIFE+ programme Project "Restoration of hydrology of EU importance wetland habitats are carried out from 2011 till 2016 in Kemeri National Park NATURA 2000 site" (2011-2016) with objectives:

- ✓ elaboration of a hydrological restoration programme for priority areas within the Kemeri National Park, serving as an example for hydrological modelling in the region;
- ✓ implementation of hydrology restoration measures aiming at improvement of conservation status of bog woodland and swamp forest habitats, raised bog habitats and riparian meadow habitats;
- ✓ adaptation of airborne remote sensing data interpretation methods for hydrological modelling, habitat conservation status assessment and hydrology restoration planning, and distribution of know-how to other countries;
- ✓ awareness rising and attitude change of the local society about hydrology restoration measures targeting habitats of EU importance.

European Commission LIFE+ programme Project "Forest Habitat Restoration within the Gauja National Park" (2011-2015) with objectives:

- ✓ elaboration of the long-term forest habitat restoration and management programme for selected priority species and habitat types;
- ✓ demonstration and promotion of innovative habitat restoration and management measures aiming at improvement of conservation status of forest habitats;
- ✓ adaptation of airborne remote sensing technologies for forest habitat distribution evaluation and conservation status assessment as well as for restoration and management planning;
- ✓ increased knowledge and awareness of nature conservation specialists, local municipalities and local residents on restoration and management measures of the forest habitats of EU importance.

Norwegian Financial Mechanism 2009-2014 Programme „Capacity – Building and Institutional Cooperation between Latvian and Norwegian Public Institutions, Local and Regional Authorities" Project "Integration of specially protected nature territories of Latvia in spatial plans" with objectives:

- ✓ developed conceptual solutions and methods of specially protected natural areas protection and use of the integration of local area plans;
- ✓ increase of involvement of local governments in the management of SPNT by establishing public and private partnership;

- ✓ -increase of public understanding about nature protection plans;
- ✓ project will be implemented in 15 specially protected nature territories.

Project is financed by EEA financial mechanism/Norwegian financial mechanism "Climate language" (2015-2016).

This is cooperation project between the employees of the Centre of Geological Processes Research and Modelling of the Department of Geology of the Faculty of Geography and Earth Sciences of the University of Latvia. Norwegian agricultural and environmental research institute "Bioforsk", the Latvian Fund for Nature, and NGO "Latvijas Mazpulki".

The project will be implemented within the framework of information campaigns regarding the issues of climate change and adaptation.

The aim of the project:

- ✓ to increase the knowledge, understanding, and expertise of Latvian pupils as well as develop their skills and attitudes towards climate variability and tackling climate change and moving towards low-carbon development, as well as adaptation to climate change by developing and implementing interdisciplinary practical work in the fields of formal and informal education and involving the society in the observation of natural adaptation processes;
- ✓ the development of climate-change-related interdisciplinary practical work and its integration in science and geography lessons of school curricula as well as teacher education programmes;
- ✓ the implementation of experiments as events of informal education, including the preparation and publication of videos, inviting young people to explore the natural processes independently, on the Internet;
- ✓ the implementation of seasonal phenomenon observation on the nature observation system (dabasdati.lv) and observation as an example for natural adaptation.

Everyone is welcome to share their observations in nature – report on wild plants and animals on Nature observations portal Dabasdati.lv (www.dabasdati.lv)

LIECHTENSTEIN / LIECHTENSTEIN

FOLLOW-UP OF RECOMMENDATION NO. 159 (2012) IN LIECHTENSTEIN

Liechtenstein is currently in the process in elaborating a climate change adaptation strategy. Within this strategy biodiversity is widely addressed and has been identified as one the key issues.

Biodiversity is important in Liechtenstein as the Rio Convention on Biological Diversity (CBD) was ratified on 18 September 1997 and the Bern Convention on 30 October 1980 with entering into force on 1 June 1982. Within the framework of the CBD Liechtenstein pledged to manage und preserve biodiversity and reports periodically on the state on biodiversity.

In the inventory of Nature Priority Areas 15% of the country are recognized as worthy of protection habitats. More than half of these areas are in the alpine Greater biotope „Drei Schwestern - Garselli - Zigerberg". In the Rhine Valley, the remains of the original large-scale marshes are important sanctuaries. The most important fens are the Ruggeller Riet and "Schwabbrünnen-Äscher". Smaller marshes are important as well in ensuring the interconnection between the existing fens. Furthermore, dry low-nutrient habitats, like extensively used dry grasslands, important sites of high biodiversity.

The Red List of endangered species according to the latest surveys comprises 25% of plants, 40% of birds, 62% of fish, 67% of reptiles and 75% of amphibians. Apparently amphibians show a negative development. On the contrary, the situation of fishes in Liechtenstein has improved slightly.

However, the ecological state of the Alpenrhein is still partly deficient according to the latest surveys of fish fauna.

The most important factors for the increasing threats to biodiversity are the destruction of habitats by increasing human settlements and the spread of alien species.

Climate change affects the living conditions and thus the dispersion of species. This development might affect already endangered species additionally. Biodiversity can also be affected by adaptation measures in other sectors, such as in an increased extraction from watercourses for agricultural irrigation. It is therefore important that trade-offs with other sectors are identified and addressed early. Adaptation measures in other sectors should be designed in a way to minimize the negative impacts on biodiversity. Conversely, functioning ecosystems may contribute to climate change adaptation.

Some of the existing activities are described below.

Development and implementation of measures to conserve particularly affected habitats (aquatic and wetland habitats, alpine habitats). Almost all wetland areas are already secured by the contractual nature conservation. Activities to preserve existing fens are thus already in implementation.

Concept controlling neophytes: Liechtenstein developed a concept defining the problematic plant species and an action plan with appropriate recommendations for action. Currently, the concept has not been adopted by the Government yet, as the responsibilities and the financing of the measures are still unresolved. To combat ailanthus a government decision is already existent. Liechtenstein monitors using a Web-GIS tool the distribution areas of invasive species. This concept includes as list of species to combat (black list) as well as a list of species which are being monitored (watch list). The included action plan contains recommendations for certain measures.

Ecological minimum requirements for water withdrawals: To ensure that increased agricultural irrigation does not adversely affect biodiversity, appropriate provisions are necessary. For example, in places where an environmentally sustainable water extraction is not reasonable, groundwater pumping for water management without direct water withdrawal from water bodies should be provided. In conservation areas water withdrawals are already banned.

Renaturation: As required by the Water Framework Directive the status of all major rivers must be monitored constantly. The ecological status is recognized on the basis of different indicator species. Currently, in many areas along the Binnenkanal and the Alpine Rhine there is need for action. For example, the slope toe is largely obstructed. In Liechtenstein different sections of watercourses were already restored to improve the ecological condition.

For further questions, please contact me by e-mail (oliver.mueller@llv.li).

Oliver Müller
Nature and Landscape

MONACO / MONACO

Direction de l'Environnement

Gouvernement Princier
PRINCIPAUTÉ DE MONACO

Dans le cadre des missions affectées au Gouvernement Princier sous l'impulsion de Son Altesse Sérénissime le Prince Albert II, des actions en faveur du développement durable sont menées visant principalement la conservation de la biodiversité, la préservation des ressources, la réduction des émissions de gaz à effet de serre et la gestion d'une ville durable.

Conscient que les changements climatiques constituent un des enjeux majeurs de nos sociétés, S.A.S. le Prince Souverain appuie l'adoption d'une stratégie d'adaptation au changement climatique comportant un volet relatif à la transition énergétique.

Ainsi, la politique du Gouvernement en faveur du développement durable s'est inscrite dans le long terme et s'appuie sur quatre piliers :

- la gestion du patrimoine naturel et la protection de la biodiversité ;
- la mise en œuvre du Plan Energie Climat ;
- les actions en faveur d'une ville durable ;
- la mobilisation de l'état et de la communauté monégasque.

Pour ce qui concerne la réglementation, si le Code de l'Environnement est toujours en cours de finalisation, les différentes instances administratives prennent en compte ces préoccupations et les dispositions des différents instruments internationaux auxquels la Principauté est Partie, dont la Convention sur la Diversité Biologique et la Convention sur le Changement Climatique.

Dans ce contexte, la politique menée par le Gouvernement Princier comporte des volets relatifs à la gestion du patrimoine naturel et à la prise en compte du changement climatique. Ces deux volets sont présentés ci-après en rappelant qu'ils sont en interaction.

POLITIQUE DE GESTION DU PATRIMOINE NATUREL

La politique de gestion du patrimoine naturel instaurée à Monaco repose sur trois grands axes :

- Les inventaires,
- Les cartographies,
- Les suivis d'indicateurs biologiques.

De nombreux inventaires ont été engagés en s'appuyant notamment sur les recommandations des différentes conventions internationales auxquelles la Principauté est Partie.

Les inventaires d'espèces et d'habitats sont des outils de connaissance, de sensibilisation, mais également d'aide à la décision pour l'État dans la mise en œuvre de sa stratégie de surveillance et de protection de la biodiversité marine et terrestre et de sa politique d'aménagement du territoire.

Les inventaires représentent la base de la connaissance du milieu. Ils permettent un recensement précis des espèces et participent à la valorisation du patrimoine naturel de la Principauté. La réalisation d'inventaires réguliers rend possible le suivi dans le temps de ce patrimoine.

N'étant pas seulement une liste exhaustive, ils permettent d'identifier les espèces utilisables en tant qu'indicateur biologique. Le recensement de ces populations et l'étude de leur dynamique rendent également compte de l'efficacité des mesures de protection ou de restauration en cohérence avec une politique de conservation des écosystèmes.

Le rôle des bio-indicateurs est de détecter les perturbations de l'environnement marin, de mesurer les effets de ces perturbations et d'apprécier les modifications des conditions environnementales. Ils constituent des outils de prédiction, d'aide à la décision et de communication et sont indispensables à l'établissement d'un diagnostic écologique.

Ces indicateurs biologiques sont basés sur l'utilisation d'espèces clés ou de modèles biologiques sensibles aux perturbations du milieu (pollutions, invasions, changement global).

Cette démarche sert de base à la gestion du milieu et peut être un outil essentiel dans l'adaptation de la réglementation.

La Direction de l'Environnement a mis en place depuis une dizaine d'années des suivis d'indicateurs biologiques portant sur des paramètres démographiques et dynamiques, et des indices de vitalité et de nécrose (gorgonaires, échinodermes, ...).

En matière d'aménagement du territoire, la prise en compte de l'environnement dans l'élaboration de projets urbanistiques se traduit par la réalisation d'Etudes des Incidences sur l'Environnement. Ces études visent à prévenir les impacts négatifs d'un projet sur l'environnement (naturel et anthropique) et à mettre en œuvre des mesures compensatoires.

En application du Code de la Mer, l'Ordonnance Souveraine n° 3.647 du 9/09/1966 concernant l'urbanisme, la construction et la voirie, modifiée, rend obligatoire la réalisation d'une étude des incidences, directes et indirectes, d'un projet sur l'environnement marin.

1. Gestion de la biodiversité marine

En matière de biodiversité marine, la Principauté a instauré deux zones protégées :

- La réserve du Larvotto d'une surface de 33 hectares, créée en 1978, est principalement destinée à la conservation et à la valorisation d'un herbier de posidonies. Elle dispose d'un statut de protection renforcé. Seule est autorisée la pratique des bains de mer, et sous certaine condition les sports nautiques, la recherche scientifique et la plongée sous-marine. Toute autre activité est interdite. Une partie de la réserve est inscrite sur la liste des zones humides au titre de la Convention RAMSAR (Convention sur les zones humides d'importance internationale).
- La réserve des Spélugues, dite « tombant à corail », créée en 1986, est principalement destinée à la protection d'habitats et d'espèces emblématiques de la Méditerranée, telles que le corail rouge, des éponges, des gorgones et des mérous. Sous certaines conditions, la navigation, la pêche professionnelle, la plongée et la recherche scientifique peuvent être autorisées. Les autres activités sont interdites.

La politique gouvernementale prévoit la mise en place d'outils de gestion performants comme l'installation de récifs artificiels le long du littoral monégasque. L'immersion des premiers récifs à Monaco s'est déroulée il y a plus de trente ans au sein de la Réserve marine du Larvotto. L'objectif est de permettre une valorisation biologique de certains fonds.

Ces structures peuvent avoir différentes fonctions dont celle de conservation et de développement de la biodiversité par la mise en place de modules de tailles et de formes différentes. Généralement positionnés à proximité de zones naturellement riches, sur des fonds sableux offrant peu d'habitats pour les espèces fixées et les poissons, ces modules peuvent offrir de nouvelles disponibilités d'habitat et donc un accroissement du nombre d'individus. Ils peuvent également avoir une fonction plus ludique pour le développement des activités de plongée sous-marine.

L'immersion de ces récifs permet donc de valoriser la biodiversité qui s'y développe. Cette volonté a été illustrée en 2014 par le financement du déplacement de l'épave « le Toulonnais » sous le Musée Océanographique.

Une étude faisant un bilan de l'efficacité des récifs immergés en Principauté a été réalisée en 2014 et 2015 dans le but d'identifier les pistes potentielles d'amélioration et de contribuer à une définition rationnelle des futurs projets de ce type.

1.1 Inventaires

Une attention particulière est apportée aux espèces patrimoniales ou protégées (posidonies, grandes nacres, mérou brun, corail rouge, gorgone, ...), aux habitats remarquables (Tombant coralligène, Roches St Martin, Roches St Nicolas, …) et aux aires marines protégées (Larvotto et Spélugues).

- L'exploration des Roches Saint Martin situées au large de la grande digue sur des profondeurs de 60 m, a permis d'inventorier des bouquets de grands bryozoaires, des amas d'éponges, de grandes colonies de gorgones ainsi que du corail rouge. Les peuplements des Roches Saint Martin présentent un parfait état de vitalité, grâce, notamment, au bénéfice d'un régime d'eau froide et agitée.
- En 2006, l'inventaire ichtyologique (poissons) a permis d'identifier 224 espèces de poissons dans les eaux monégasques, réparties en 87 familles.

  Cet inventaire a été complété, en 2009, par un inventaire des mérous bruns (*Epinephelus marginatus*), espèce protégée en Principauté avec 105 individus répertoriés. En comparaison, 12 individus avaient été repérés en 1998 et 83 en 2006. Cette augmentation spectaculaire de la population de mérou brun a démontré l'efficacité des mesures de protection mises en place en Principauté. La Direction de l'Environnement réalise des mises à jour de cet inventaire et un suivi de la population du mérou brun. La campagne de 2015 confirme cette tendance avec 193 spécimens recensés. L'augmentation du nombre de mérous bruns est marquée par un changement dans la structure démographique de la population, avec l'observation de 58 juvéniles. Ce qui est synonyme d'une reproduction locale et confirme l'efficacité des mesures de protection.
- Espèce emblématique de la Méditerranée, la grande nacre (Pinna Nobilis) est une espèce vulnérable. En raison de ses caractéristiques physiques, fixée sur le fond et pouvant dépasser 50 cm, la grande nacre est facilement cassée par les chaines de mouillage ou les lignes de pêche. Elle est par ailleurs très sensible à la qualité de l'eau et constitue ainsi un bon indicateur du milieu. Sa présence révèle une bonne santé de l'environnement marin côtier.

L'état des herbiers de posidonies, la biodiversité des peuplements de poissons, de l'endofaune benthique et de la macrofaune benthique peuvent être utilisés comme des indices écologiques de l'état du milieu marin.

1.2 Cartographies

Les cartographies des biocénoses marines permettent de recueillir de nombreuses informations quant à la répartition spatio-temporelle des espèces. Ces études permettent un positionnement précis des différents types de fonds, d'habitats ou d'espèces et donnent aussi des informations sur les aires de répartition des individus.

Elles aident à évaluer qualitativement et quantitativement l'état de santé et la richesse du monde vivant.

Dès 2002, une cartographie des biocénoses marines de la Réserve du Larvotto a permis de positionner la limite inférieure de l'herbier de posidonies, de cartographier les différentes biocénoses de part et d'autre de cette limite et de recenser les différents types d'habitats présents.

48 balises permanentes ont été positionnées sur toute la limite inférieure de l'herbier de posidonie, permettant ainsi d'effectuer un suivi à long terme de son état de vitalité. Cet herbier, dont l'état de vitalité est relativement stable, témoigne de la bonne qualité du milieu marin en Principauté. En 2015, une nouvelle campagne d'évaluation de la limite inférieure de l'herbier de posidonie a été menée. Les premières conclusions permettent de confirmer une stabilité globale de celle-ci, avec cependant des zones de régression sur la partie Est de la réserve. Parallèlement, une zone de progression de cet herbier a pu être identifiée en bordure ouest de la réserve.

Un travail de cartographie des grandes nacres a débuté fin 2007 et a rassemblé en novembre 2008 plus de 50 plongeurs, réunis pour identifier plus de 350 nacres dans ce qui représente un tiers de la surface de la Réserve du Larvotto.

Les prospections se sont poursuivies jusqu'en 2013 et ont permis d'identifier et de positionner précisément 644 nacres, réparties sur 13,5 hectares de fond variant de 8 à 35 m de profondeur.

En 2010, la Direction de l'Environnement a réalisé une cartographie sonar des fonds marins se situant entre 0 et 100 m de profondeur. Cette cartographie dont l'objectif était de combler le déficit de connaissance sur certaines zones du territoire a été couplée d'une bathymétrie 3D comprenant la caractérisation de la nature des fonds marins de tout le littoral monégasque.

Cette cartographie a permis de visualiser les reliefs composant ces fonds et d'identifier plusieurs zones ayant un fort potentiel écologique, notamment un important peuplement coralligène situé à l'Est de la Principauté.

En 2015, dans le cadre de l'Accord Ramoge, des investigations plus précises des roches profondes du Larvotto ont pu être menées avec l'appui d'un navire océanographique italien équipé d'un ROV. Ces plongées ont permis d'identifier un véritable hot spot pour la biodiversité avec un affleurement rocheux qui héberge des colonies de Corail noir (*Antipathella subpinnata*), de Corail rouge (*Corallium rubrum*) et de gorgones (*Paramuricaea clavata* et *Eunicella verrucosa*).

1.3 Indicateurs biologiques.

Parmi les grandes nacres (*Pinna Nobilis*) répertoriées au sein de la Réserve du Larvotto, un certain nombre d'individus « sentinelles » a été marqué pour leur suivi dans le temps (croissance et mortalité) afin de pouvoir suivre l'état de santé de ce peuplement à long terme. Sensibles à la qualité de l'eau, cette espèce représente un bon indicateur de la qualité du milieu marin.

Plus de 600 nacres ont déjà été positionnées et mesurées dans les zones ouest et centrale de la Réserve durant la période 2008-2013, constituant une population de référence représentative de l'ensemble du peuplement. Le peuplement total de la Réserve, incluant la zone profonde située autour du Sporting et tout l'est de celui-ci, est estimé à plus d'un millier de nacres.

Les campagnes de prospection et de positionnement réalisées de 2007 à 2010 ont montré qu'il serait trop coûteux de vouloir cartographier la totalité du peuplement. Il a donc été décidé de focaliser les efforts de suivi des nacres dans deux zones de référence, délimitées par des quadrats permanents. La campagne de prospection de l'hiver 2010 a donc consisté à définir et positionner deux quadrats permanents de 50 x 50 m de côtés (2500 m²) dans lesquels les nacres seraient plus spécifiquement suivies à moyen terme (5 ans).

Une campagne de prospection est menée en 2016 à l'intérieur de ces quadrats, avec un effort plus particulier consacré au recensement des très petites nacres dont le suivi de la croissance peut ensuite être envisagé sur de longues périodes (> 20 ans).

Les habitats offerts par la contre-jetée du port de la Condamine ayant révélé des cavités obscures susceptibles de constituer des milieux adaptés à l'installation d'une faune cavernicole font l'objet d'un programme de suivi à long terme de la dynamique de leur colonisation depuis 2005.

2. Gestion de la biodiversité terrestre

La gestion de la biodiversité terrestre bénéficie d'une attention soutenue et les inventaires se poursuivent. La création d'une première zone protégée terrestre concernant la falaise du Rocher est toujours à l'étude. Cette zone représente en effet un espace riche en termes de biodiversité justifiant de pouvoir bénéficier d'un statut de protection qui permettra la mise en place d'un programme de gestion.

Dans le cadre des programmes de coopération internationale, une Convention de partenariat entre le Gouvernement Princier, le Parc National du Mercantour, le Parc Naturel Alpi Marittime et la Fondation Prince Albert II de Monaco, a été signée en 2008. Ces deux parcs constituent un patrimoine naturel exceptionnel aujourd'hui menacé, notamment par le changement climatique. Ces deux parcs se sont unis pour former le premier parc naturel européen.

L'ambitieux projet initié en 2008 de réaliser l'inventaire de l'intégralité du territoire de ces deux espaces naturels (soit près de 2450 km²) a pu aboutir. Un tel inventaire exhaustif est une première du genre en Europe et le deuxième au niveau mondial. Plus de 350 taxonomistes, professionnels et amateurs passionnés, venus de toute l'Europe se sont rassemblés pour permettre la concrétisation de ce projet. Il a permis de mettre en exergue les groupes les plus méconnus (insectes, mollusques, mousses, lichens, …) et des milieux peu étudiés (milieux souterrains). Au total, 9391 espèces ont pu être identifiées dont près de 6000 invertébrés. Pour exemple, le groupe des arthropodes a vu son nombre d'espèces recensées de 2000 à environ 7000. Plus d'une trentaine d'espèces d'invertébrés répertoriées n'avaient jamais été observées et sont nouvelles pour la science.

Un ouvrage a été édité compilant les résultats de cette aventure scientifique et naturaliste.

C'est aussi et surtout le prélude à la mise en place d'une gestion raisonnée, avec notamment les « réservoirs de biodiversité », et d'un échange d'informations considérables.

2.1 Inventaires

Les inventaires initiés sur le domaine terrestre ont permis de révéler une richesse insoupçonnée dans un territoire fortement urbanisé, permettant plusieurs découvertes remarquables.

L'originalité de Monaco, en tant que pays urbain permettant le maintien voire le développement de cette biodiversité terrestre semble tenir à certaines particularités spécifiques :

- La réglementation favorable à la conservation de la faune locale. La chasse est interdite sur tout le territoire depuis 1880.
- La configuration géologique et urbanistique du territoire. Les falaises du Rocher constituent de véritables refuges où peuvent se maintenir ou se développer une vie sauvage à l'abri de toute pression anthropique.
- Les « confettis verts » (jardinets, terrasses, murs végétalisés, ...).
- Les espaces verts entretenus de façon écoresponsable représentent des oasis de verdures pour la faune.

L'ensemble des inventaires réalisés depuis 2006 a permis d'identifier :

- 2006 : la flore terrestre indigène du territoire de la Principauté. Cet inventaire a mis en évidence 5 habitats d'intérêt patrimonial, 346 espèces indigènes dont 6 espèces endémiques et 18 espèces à fortes valeur patrimoniales. Parmi elles, la présence de la Nivéole de Nice (*Acis nicaeensis*), espèce rare et très menacée, endémique de la région niçoise, a été localisée sur 4 stations de la Principauté. Les falaises du Palais Princier représentent un enjeu majeur de conservation : elles abritent 4 espèces endémiques, 12 des 18 espèces patrimoniales ainsi que 3 des habitats d'intérêt patrimonial.

  Un suivi annuel est effectué portant sur l'étude de la dynamique de la végétation après purge ou arrachage des espèces exotiques envahissantes.

- 2008-2011 : l'entomofaune (insectes). L'étude a porté sur les arthropodes de la Principauté, coléoptères et hétéroptères et comporte un aperçu sur les fourmis, les isopodes et les pseudoscorpions. Cet inventaire a montré des résultats particulièrement intéressants en dénombrant 330 taxons de Coléoptères (sans compter une dizaine de taxons d'Aleocharinae, staphylins d'identification très délicate) et 101 taxons d'Hétéroptères.

  Parmi les coléoptères, 2 espèces nouvelles pour la Science ont été recensées en Principauté :

  - un Anobiidae du genre Synanobium probablement d'origine tropicale, observé sur les glacis du Palais et à la Source Marie ;
  - un Curculionidae cavernicole dénommée *Otiorhynchus (Lixorrhynchus) monoecirupis n.sp* qui est certainement le 1er insecte endémique de la Principauté puisqu'il est exclusivement lié aux galeries creusées sous le Palais Princier.

Cet inventaire a également recensé de nombreuses espèces de coléoptères soit nouvelles pour la faune franco-monégasque, soit d'un grand intérêt patrimonial pour la Principauté puisqu'il s'agit souvent d'espèces méditerranéennes à fort enjeu de conservation. C'est le cas du charençon *Dichromacalles rolletii*, dont la présence a été montrée sur le Rocher.

Parmi les milieux étudiés, les glacis du Palais Princier représentent le biotope le plus riche et comprenant le plus grand nombre d'espèces d'intérêt patrimonial. La protection de ce milieu unique doit être considérée comme un objectif prioritaire.

- 2010-2012 : l'avifaune. Cet inventaire ornithologique a permis de comptabiliser 60 espèces d'oiseaux dont 10 bénéficient d'une protection au niveau européen et 7 sont considérées comme menacées (vulnérables ou quasi-menacées). Les falaises du Rocher se sont révélées très favorables aux oiseaux.

  2 espèces remarquables ont été recensées :

  - le Faucon pèlerin (*Falco peregrinus*), rapace diurne rupestre, espèce vulnérable : un couple nicheur et reproducteur a été observé sur la falaise du Rocher (3 jeunes en 2010) ;
  - Le cormoran huppé de Méditerranée (*Phalacrocorax aristotelis desmarestii*), espèce marine sédentaire, vulnérable : 6 individus dont 4 juvéniles ont été observés. Cette espèce fait l'objet d'un suivi et en 2014 la présence de 3 individus jeunes a été constatée.

- 2012-2013 : l'herpétofaune. Des populations d'Hémidactyle verruqueux (*Hemidactylus turcicus*) et de La Tarente de Maurétanie (*Tarentola mauritanica*) ont été recensées.

- 2014 : un suivi de l'inventaire de l'avifaune a été effectué se concentrant sur deux espèces en particulier :

  - Le cormoran huppé de Méditerranée (*Phalacrocorax aristotelis desmarestii*) : la présence de 3 individus jeunes a été constatée, aucun adulte. La preuve de la nidification n'a pu être relevée cependant cette présence (hiver, début de printemps) peut être considérée comme une bonne habitude avec la possible nidification dans des lieux alentours ;
  - Le Goéland leucophée (*Larus michahellis*) : une étude sur l'évolution démographique de la population de cette espèce est apparue nécessaire au regard notamment des nuisances et des impacts qu'elle engendre en site urbain tant pour les personnes que pour les autres espèces, les écosystèmes ou les infrastructures. Le recensement a révélé : 15 couples nicheurs, dont 12 reproducteurs de 24 poussins, une vingtaine d'individus en vol, soit une population théorique maximale de 60-70 individus avec une variation de 30-40 individus toute l'année et un pic d'une centaine d'individus au printemps et en été. Le constat est une diminution des effectifs.

    Cette étude présente également une réflexion sur la pertinence d'une intervention qui peut avoir des conséquences sur d'autres espèces ou qui peut provoquer l'éclatement de colonies, dispersant les individus et décuplant leurs impacts en occupant d'autres zones.

    Des moyens d'actions indirects (information de la population, protection renforcée du Faucon pèlerin, prédateur de l'espèce, effarouchement, …) et directs (stérilisation des œufs) sont préconisés.

- 2014-2016 : prolongation des opérations de suivis écologiques de la flore patrimoniale de la Principauté. Les résultats des précédents inventaires justifient un suivi de cet aspect de la biodiversité terrestre sur le moyen terme afin notamment d'apprécier les mesures pérennes de gestion à mettre en œuvre. Etude en cours.

- 2014-2015 : dans le prolongement de l'inventaire entomologique, une étude a été lancée sur la faune des sols des espaces verts aménagés de la Principauté. En effet, Monaco étant principalement une zone urbaine et les résultats du précédent inventaire étant encourageants, il est apparu utile de se concentrer sur les espaces verts aménagés et d'en estimer le contenu en termes de biodiversité. L'examen et l'analyse des nombreux échantillons prélevés sont difficiles et longues. Les premiers résultats confirment la bonne gestion effectuée puisque dans la famille des

Coléoptères, 69 espèces ont été recensés appartenant à 26 familles, dont 23 complètent l'inventaire initial de l'entomofaune présente à Monaco. Des espèces invasives ont également été observées.

- 2015 : étude sur la nidification du cormoran huppé de Méditerranée (*Phalacrocorax aristotelis desmarestii*) : cette campagne a permis d'apporter la preuve formelle de la nidification réussie de cette espèce à Monaco. 3 jeunes à l'envol ont en effet pu être observés. Ce site s'inscrit ainsi dans la continuité des sites des colonies italiennes et françaises.
- 2015 : bilan de 12 années de suivi des populations de la Nivéole de Nice (*Acis nicaeensis*, Alliaceae) – analyse des variations spatio-temporelles de la structure et de la dynamique des populations entre 2003 et 2014. Dès les premiers inventaires, il était apparu essentiel d'effectuer un suivi de cette espèce endémique patrimoniale. Le constat est que les populations restent globalement stables sur le plan démographique.
- 2015/2016 : inventaire des Lépidoptères hétérocères de la Principauté. Dans le but de compléter l'inventaire des insectes présents à Monaco, il est apparu intéressant de se focaliser sur une population méconnue et pourtant significative de la qualité de l'environnement : les papillons de nuit. Les premières sorties se sont montrées fructueuses. Etude en cours.
- 2016/2017 : en continuité des inventaires relatifs aux insectes, une étude spécifique va se concentrer sur la famille des Diplopodes (mille-pattes) qui jouent un rôle essentiel dans le métabolisme par les sols des matières organiques animales et végétales. Etude en cours.

2.2 Cartographies

Les différents inventaires sont analysés en vue d'établir les cartographies correspondantes pour la partie terrestre du territoire monégasque. Ces cartographies ne sont pas encore finalisées.

2.3 Indicateurs biologiques

Fin 2010, la Principauté a conclu une convention de partenariat avec l'Union Nationale de l'Apiculture Française (UNAF), visant la création d'un rucher à Monaco et apportant son soutien à la Charte *« Abeille, sentinelle de l'environnement »*. Six ruches ont été installées sur le toit terrasse du Musée des Timbres et des Monnaies à Fontvieille. Ce programme permet de mener des campagnes de sensibilisation auprès des scolaires de la Principauté. Le suivi des populations d'abeille se fait en parallèle avec l'analyse de l'évolution du climat.

Tous les ans, le Gouvernement organise des événements dans le cadre de la «Journée Nationale de l'abeille, sentinelle de l'environnement » APIdays - organisée par les apiculteurs de l'UNAF dans plus de 80 villes en France. Les scolaires de Monaco peuvent ainsi participer à des ateliers sur l'extraction du miel ou sur le rôle fondamental de l'abeille dans la pollinisation. Il est à noter que l'arrivée du Frelon asiatique a porté préjudice aux ruches de Monaco. En effet, ces Frelons s'attaquent aux abeilles et peuvent aller jusqu'à l'extermination d'une ruche. Des mesures de prévention (notamment recherche des nids) sont préconisées.

L'inventaire de la faune des sols des espaces verts aménagés a pour objectif également de contrôler la qualité de ces sols. En effet, la qualité horticole d'un sol est directement liée à la richesse de sa faune : la microfaune (bactéries, protistes, vers,…), la méso et la macrofaune sont nécessaires à l'écosystème du sol. Cela sera un excellent indicateur dans le cadre de la politique mené par le Gouvernement Princier de ne plus utiliser de produits chimiques et de favoriser d'autres méthodes.

LUTTE CONTRE LE CHANGEMENT CLIMATIQUE

La lutte contre le changement climatique repose sur deux aspects :

- La mitigation, qui vise à limiter les effets des changements climatiques en mettant en œuvre une politique de réduction des émissions de gaz à effets de serre.
- L'adaptation qui consiste à quantifier les changements à venir et à identifier les impacts sur l'homme, les activités humaines et les écosystèmes et à mettre en œuvre les mesures d'adaptation.

La politique de mitigation a constitué la priorité d'action gouvernementale en matière d'énergie et de climat pour Monaco.

Cette politique s'est traduite par la ratification de la Convention Cadre des Nations Unies sur les Changements climatiques et la définition d'objectifs de réduction des émissions de gaz à effets de serre, la mise en œuvre du plan Energie Climat qui fixe également des objectifs de réduction pour les consommations énergétiques et l'utilisation des énergies renouvelables.

La définition d'une stratégie d'adaptation aux changements climatiques doit permettre d'identifier et de prévenir des impacts des dérèglements climatiques sur les milieux, les personnes, le cadre de vie, les intérêts sociaux et économiques de la Principauté autour d'un diagnostic de vulnérabilité et de la mise en œuvre de mesures d'adaptation.

Les travaux qui sont entrepris doivent permettre la mise en perspective de mesures, qui ont déjà cours, et qui s'inscrivent pleinement dans une stratégie d'adaptation au changement climatique, et de définir les mesures complémentaires à réaliser pour assurer, dans le contexte territorial particulier de la Principauté, cette adaptation.

La Principauté a également ratifié le Protocole de Kyoto en 2006 et intégré le réseau de neutralité carbone du Programme des Nations-Unies pour l'Environnement en 2008 (CN Net).

La Principauté de Monaco a établi sa 6e Communication Nationale dans laquelle le chapitre 6 est consacré aux impacts du changement climatique, à la réalisation d'un diagnostic des vulnérabilités et à l'analyse des adaptations. Dans ce document, sont reportées les évolutions des températures, des précipitations et du niveau des mers afin de dégager des scenarii sur l'évolution bioclimatique de Monaco conformément aux dispositions du Protocole de Kyoto. Les extraits correspondants ont été joints au précédent rapport référencé ACR/DE-2014-007a du 7 juin 2014 et qui a été communiqué pour la 8e réunion du Groupe d'Experts sur la biodiversité et le changement climatique – Strasbourg, 19 juin 2014 (le document intégral peut être consulté sur le site de la Convention sur le changement climatique).

Dans la logique des dispositions du protocole de Kyoto, Monaco s'est fixé comme objectifs d'améliorer l'efficacité énergétique de 20 % et de consommer 20 % d'énergie finale provenant de sources renouvelables, d'ici à 2020.

Dans ce but, la mise en œuvre du Plan Énergie Climat comprend des actions techniques, réglementaires, financières et de sensibilisation.

Le Plan Energie Climat a pour finalité la lutte contre le changement climatique et l'adaptation du territoire à ces changements, dans une logique de développement durable. L'objectif est de construire un territoire résilient, robuste et adapté, au bénéfice de sa population et de ses activités.

A l'occasion de Sa participation à la 15e Conférence des Nations-Unies sur les changements climatiques en 2009 à Copenhague, S.A.S. le Prince Souverain a dévoilé les orientations pour la Principauté.

Monaco participera tout d'abord à l'effort de stabilisation de l'accroissement global de la température de la planète en réduisant ses émissions de gaz à effet de serre de 30 % en 2020 et de 80 % en 2050 (échéance à laquelle la Principauté atteindra la neutralité carbone) par rapport à la date référence de 1990.

En 2015, dans le cadre de la 21e Conférence des Nations-Unies sur les changements climatiques, la Principauté a annoncé un objectif intermédiaire de réduction des émissions de gaz à effet de serre de 50% à l'horizon 2030 par rapport à 1990.

Par ailleurs, le Gouvernement s'est engagé en 2012 dans un programme de labellisation de son Plan Energie Climat suivant la démarche European Energy Award (EEA), reconnue par la Commission Européenne et qui fédère 8 pays européens (Allemagne, Autriche, France, Italie, Luxembourg, Suisse et Monaco). Ce label récompense pour 4 ans les territoires engagés dans un processus de management par la qualité appliqué à la mise en œuvre de leur politique énergie climat. L'EEA est un instrument de pilotage et de contrôle qui permet d'identifier les actions mises en œuvre et le potentiel d'amélioration dans ces domaines.

L'évaluation nécessaire à l'obtention du label est organisée en 6 domaines :

- La planification du développement territorial ;
- Le patrimoine de la Principauté ;
- L'approvisionnement en énergie, eau, assainissement et la gestion des déchets ;
- La mobilité ;
- L'organisation interne de l'Administration ;
- La communication et la coopération.

La démarche de labellisation du Plan Energie Climat s'appuie sur un Comité de Pilotage (COPIL) et des ateliers auxquels participent différentes Directions et Services du Gouvernement. Au cours des années 2012 et 2013, la démarche EEA a permis d'établir un état des lieux de la politique énergétique et climatique monégasque.

A l'issue de cette période, un programme d'actions, destiné à renforcer les performances environnementales de la Principauté sous la forme de 55 fiches actions, a été élaboré.

L'étape de labellisation a été menée par un audit externe et indépendant en décembre 2013. En novembre 2014, la certification « European Energy Award » a été remise à la Principauté, encourageant ainsi la mise en œuvre du Plan Energie Climat.

Faisant suite à l'étude « *Analyse des tendances climatiques à l'échelle de la Principauté de Monaco, conséquence sur les populations de moustiques et moyens de prévention* » (Dr C. Roumieux, décembre 2013) qui a confirmé les effets des changements climatiques locaux et notamment leurs impacts sur le cycle de vie des moustiques, Monaco a souhaité la compléter.

Ainsi, une étude sur l'adaptation au changement climatique a été initiée.

Cette étude, menée par la Direction de l'Environnement avec le soutien de la société éQuiNéo a débuté en 2014 et s'est terminée en 2015.

Il en ressort la nécessité de bénéficier d'une meilleure information sur les tendances climatiques futures à court, moyen et long terme ainsi que sur les impacts potentiels de ces changements sur le territoire monégasque.

L'objectif est de s'approprier ses enjeux pour fournir des orientations structurantes aux politiques publiques concernées et construire la stratégie territoriale d'adaptation au changement climatique monégasque.

Cette étude s'est déroulée en 2 étapes :

- La première visait à définir un diagnostic de vulnérabilité découlant de la réalisation de deux études documentaires préalables et leur croisement avec la consultation des experts locaux. Cette consultation a permis de recueillir les perceptions et les connaissances des changements climatiques passés et futurs afin de compléter les éléments de constat et d'identifier les initiatives existantes et priorités d'actions.
- La seconde étape a été de faire partager les enjeux prioritaires du territoire identifiés avec l'Administration et les experts, afin d'aboutir à une stratégie qui référence plus d'une cinquantaine d'actions réparties sur 12 objectifs stratégiques et 31 objectifs opérationnels. Cette stratégie et ce programme d'actions ne sont pas figés dans le temps. Ils seront réévalués à l'occasion des visites annuelles réalisées dans le cadre de la démarche European Energy Award (EEA) de la Principauté.

La stratégie ainsi établie est le fruit d'un travail de diagnostic des vulnérabilités du territoire, partagé et concerté avec les services et les experts locaux.

THE NETHERLANDS / PAYS-BAS

BIODIVERSITY AND CLIMATE CHANGE

REPORT OF THE NETHERLANDS

Climate change considerations have been part of Dutch Nature policies for a long time, the necessity to allow species to adapt their range to the changing climate is for instance one of the objectives of the Dutch National Ecological Network (NEN).

At present, Climate change and biodiversity is a topic that is solidly embedded in Dutch Nature and biodiversity conservation policy and climate change adaptation programmes. In general, all improvements in Nature quality and connectivity resulting from these policies and programmes will also contribute to 'climate proofing' biodiversity. A recent update on biodiversity status, trends, and threats and implications for human well-being is provided by the Fifth National Report of the Kingdom of the Netherlands to the Convention on Biological Diversity in 2015, https://www.rijksoverheid.nl/documenten/rapporten/2014/04/18/convention-on-biological-diversity-fifth-national-report-of-the-kingdom-of-the-netherlands

Climate change in nature conservation policy

The government vision 'The natural way forward'

In 2014, the Dutch government's intentions for Nature and biodiversity conservation and management were set out in the governmental vision 'The natural way forward'. In this vision, climate change is indicated as one of the factors that make us think again about the way we manage our resources and what our responsibilities are.

The Vision explains that: 'The provincial governments are committed to putting the National Ecological Network in place, as agreed with the government. The Natura 2000 sites are important building blocks of that network. As there is now greater cohesion in the network and a programme-based approach is being applied, similar to that of the Nitrogen Programme, and the relationship with the surrounding areas is becoming more evident, the focus of nature policy can shift from individual protected species and areas to the larger landscape. Examples are the river areas and the dunes. Apart from management targeted at species and habitats in specific sites, greater emphasis will be given to creating room for natural processes to proceed in the dynamic delta area that gives Dutch nature is unique character. This will enable robust systems to develop: low management costs and achievable objectives that can adapt naturally to changing circumstances such as climate change'. It is also indicated in the Vision that climate change is one of the factors which increase the need for managing the conditions for natural processes rather than managing specific species and habitats.

The vision further indicates that in the coming period the government will promote a number of so called nature combinations, on among others in the field of Climate change adaptation: stimulate pilots in areas that combine nature with tasks under the Water Framework Directive (water quality), Deltaprogramma (flood protection, fresh water supply), climate resilience (water storage, heat regulation in cities, etc.). A promising pilot with international potential is being carried out in the Betuwe region: Waterrijk.

https://www.government.nl/documents/reports/2014/05/20/the-natural-way-forward-government-vision-2014

The Nature Ambition Great Waters outlines how robust nature could look in the timeline 2050/2100, and is especially mentioned in the governments Nature vision. This document, which was published in 2015, contains a clear ambition that invites the various interests to harmonise their objectives and work together. It is an example of how biodiversity and climate change objectives could be integrated in development plans. https://www.rijksoverheid.nl/documenten/publicaties/2013/10/31/beleidsverkenning-natuurambitie-grote-wateren-2050-2010

In *The National Water Plan 2016 – 202,* Nature and climate change targets are also integrated with other objectives. https://www.government.nl/documents/policy-notes/2015/12/14/national-water-plan-2016-2021

Nature and biodiversity in Climate change adaptation policy

The National Adaptation Strategy

The European Commission urges member states to adopt a broad-based approach for Climate Change strategies, and requested them to have an adaptation strategy in place by no later than 2017. In 2016, the Dutch Cabinet will endorse the National Adaptation Strategy (NAS), in order to ensure that the Netherlands (and the EU) is well prepared for the consequences of climate change, now and in the future, and is equipped to cope with those consequences. The Cabinet aims to view climate change in a broad perspective, using this as a basis to set down priorities, objectives, and agreements together with all the (public and private) parties involved. The analyses and agreements already made in the context of the Delta Programme will serve as points of departure for the NAS agreements. The point of departure for the NAS is that it takes account of all the sectors that may be affected by climate change. In addition to the water-related topics that feature in the Delta Programme, it also covers topics such as energy, IT, transport and infrastructure, agriculture and fisheries, nature, and public health.

http://www.ruimtelijkeadaptatie.nl/en/nas2016

Progress in Climate Change and biodiversity assessments and research

Dutch biodiversity and climate change policy and implementation measures are supported by a number of studies. The overview below lists the most important and relevant ones.

Climate change and habitat fragmentation:; impacts and adaptation strategies, 2011. http://library.wur.nl/WebQuery/wurpubs/fulltext/188268

The Effects of Climate Change in the Netherlands: 2012 http://www.pbl.nl/en/publications/the-effects-of-climate-change-in-the-netherlands-2012

Climate Change and Nature: an exploration of risks, opportunities and points of engagement for climate adaptation policy, 2014 http://library.wur.nl/WebQuery/wurpubs/fulltext/344932

Worldwide climate effects. Risks and opportunities for the Netherlands, 2015. http://www.pbl.nl/sites/default/files/cms/publicaties/PBL-2015-Worldwide-climate-effects-1412.pdf

Adaptation to climate change in the Netherlands – Studying related risks and opportunities, 2015. http://www.pbl.nl/sites/default/files/cms/publicaties/PBL-2015-Adaptation-to-climage-change-1632.pdf

NORWAY / NORVÈGE

NATIONAL REPORT ON BIODIVERSITY AND CLIMATE – NORWAY

This report gives an overview of the main issues and activities in Norway related to climate change and biodiversity since 2014. In general, challenges in nature management relating to climate change are integrated in the different areas of concern. We refer to the report of 2014 for a more extensive reporting of the integration of climate change and biodiversity in governance and management issues.

National policy

The three main national policy documents relevant for biodiversity and climate change are:

1. White paper on biodiversity – *"Nature for life"* - Report to the Storting no 14 (2015-2016) (in Norwegian)
2. White Paper on climate change mitigation– *Norwegian Climate Policy* – Report to the Storting no 21 (2011-2012)
3. White paper on climate change adaptation – *Climate change adaptation in Norway* – Report to the Storting no 33 (2012-1013)

In all three documents, the linkages between biodiversity and climate change are addressed and the need to consider the challenges together are pointed out. The white paper on biodiversity was presented by the government in December 2015, and describes the Norwegian action plan for biodiversity, including how to meet the international goals, such as the Aichi goals. The issues of effects of climate change are included throughout the report. The report focus on the fact that climate change will influence biodiversity in an increasingly way, and the need for adaptation measures such as securing habitats or limiting other stress factors. The report also focuses on ecosystem-based adaptation measures, such as how wetlands can contribute in flood reduction.

Norwegian Climate Service Centre and climate scenarios

The Norwegian Centre for Climate Services was established in 2011 and their main goal is to provide climate data for climate change adaptation at local governmental levels and by sectoral authorities. This include relevant support with regard to nature management. The most central task is to provide climate projections for Norway at national and regional levels. The report– "*Climate in Norway 2100*" was updated in 2015. The report described past, present and future climate, hydrology and conditions in the ocean including e.g. precipitation, temperature, wind, river flow including floods and droughts, snow, ocean acidification, sea ice and sea level rise.

Web portal with climate change adaptation guidance

In 2016 a new version of the Norwegian web portal on climate change adaptation was launched. The portal contributes with knowledge, guidance and sharing of experiences of climate change adaptation in Norway. For example, the portal includes several guidance, primarily to the municipality level, on climate change adaptation across a number of sectors. With regard to nature management, specific guidance concerning threatened species, alien invasive species, water management, cultural landscapes, fisheries and aquaculture, nature based solutions and outdoor activities, is given. In addition, important environmental concerns in climate adaptation planning at local level are described.

Assessments and reports

- ***Assessment report on impacts of climate change on biodiversity in Norway***

A new assessment report (NINA Rapport 1210) on the impacts of climate change on biodiversity in Norway, including Svalbard, was published in 2016. The report compiles existing published knowledge on the impacts of climate change on the main terrestrial, freshwater and marine ecosystems. The report is a significant knowledge basis for the climate change adaptation measures in nature management.

- ***Report on habitat types and climate change impacts and adaptation***

A more specific assessment report (NINA Rapport 1157) was published in 2015, compiling knowledge on impacts of climate change on habitat types and describing habitat types that may substantially contribute to preventing damage caused by climate change. The report lists important ecosystem services with regard to climate change for a number of habitat types, and is a valuable tool for ecosystem-based nature management.

- ***The importance of green infrastructure in Norwegian cities and towns***

A Report evaluating the importance of ecosystem services from green infrastructure was published in 2015 (VISTA Analyse Report 2015/10; in Norwegian). Importance for climate adaptation and water management was among the ecosystem services evaluated.

- ***Red list for species***

A new Norwegian Red List for species was published in 2015. Climate change is one of the threats that being evaluated, and compared to the last red list (2010), there is a significant increase in the number of species which are negatively impacted by climate change. The red list for species is an important basis for the management of threatened species in Norway.

- ***Norwegian nature index***

Norway's Nature Index is intended to document overall trends for the state of major ecosystems throughout the country, and to provide a readily available overview of whether Norway is making progress towards its goal of halting the loss of biodiversity. A new version of the Nature index was presented in 2015. The index is based on a number of indicators within each ecosystem, and the indicators may or may not be climate sensitive. An analyses of the climate sensitive indicators show that the mountain ecosystem is particularly vulnerable to climate change. Some indicators are already showing a negative trend since the 1990s (e.g. palsa mires, some mountain birds); whereas most are relative stable.

- ***Official Norwegian report on storm water***

The Norwegian Government recently commissioned a report on the regulation and handling of urban runoff water ('storm water') (NOU 2015: 16 (In Norwegian)). Extensive use of bluegreen solutions were among the recommendations from the commission.

Relevant but not recently updated reports:

- ***Red list for ecosystems and nature types (2011)***

This red list contains an evaluation of 80 nature types in Norway, of which 40 are regarded as threatened. Of these 40, 8 are regarded as being negatively affected by climate change. (Report in Norwegian.)

- ***Alien Species in Norway - with the Norwegian Black List 2012***

Many of the species on the Norwegian Black list are regarded to benefit from climate change, and hence become even larger threat to native species. The Norwegian black list is used actively within management when prioritizing measures against harmful alien species.

Research and monitoring programs

Research and dissemination on basic climate change science is to a large extent funded through public funds. A large-scale, 10 years Climate Programme (KLIMAFORSK) started in 2014. The aim of the program is to provide increased knowledge about climate change, the consequences for nature and society, and how the society needs to change to meet requirements for climate mitigation and adaptation.

The monitoring programs established on terrestrial ecosystems, palsa mires, common birds, mountain vegetation and the monitoring at the Norwegian bird-ringing stations are the most relevant monitoring programs in Norway today on linkages between climate change and biodiversity. In addition there is a monitoring program on ocean acidification. Relevant information is also gained from other freshwater and marine monitoring programs. Both the marine and freshwater programmes are being developed to include more climate relevant parameters.

Relevant plans and projects

- ***National restoration plan for peatland and wetlands***

The Norwegian Environment Agency and the Norwegian Agricultural Agency will during 2016 deliver a national plan for restoration of peatlands and wetland. The plan will focus on both biodiversity and climate, and will contribute to three governmental goals:

1. Improved ecological status
2. Contribution to climate adaptation
3. Contribution to reduce greenhouse gas emission

The plan period is 2016-2020, during which the restoration projects will be implemented.

- ***Marine management plans***

The management plans for the Norwegian marine areas are regularly being revised. Next up is the Barents sea and Lofoten. Impacts of climate change are evaluated and included in the management plans.

- ***Green roofs***

Green roofs may be effective measures for handling storm water and at the same time be important for biodiversity and ecosystem services. However, knowledge on the structure and function of green roofs is mainly based on more dry and continental areas. Hence, a project with green roofs in seven Norwegian cities was established in 2014, with the goal to identify and document runoff and how different vegetation types and systems function in a cold climate. The project is planned to continue until 2018.

- ***Pilot project in counties***

➢ Climate change and mountain ecology in areal planning (Vest-Agder county)

In 2015 the county had a project in which they looked at how climate change issues could be included in spatial planning for the mountain areas of the county – with focus on the mountain ecology.

➢ Climate change adaptations course for all municipalities (Vestfold county)

In 2015 the county arranged a course in climate change adaptation with a practical approach for all their municipalities. Nature management was one of the themes included.

- ***Regional water management plans: How to include climate change***

In 2015 a pre-study was conducted on how national guidance material on climate change adaptation and water resource management in the context of the implementation of the Water Regulation (Vannforskriften) best can be developed - (NIVA Report 6849; in Norwegian) . This is to be used in the future national implementation of the EU Water Framework Directive (WFD), where the goal is to ensure good ecological status of the Norwegian water bodies.

International cooperation and activities

Norway is involved in a number of different international activities and forums in which conservation of biodiversity and climate change in issues are central. Norway is member of the Arctic Council, and has a strong engagement in CAFF (Chair) and AMAP. Both CAFF and AMAP have recently produced and have upcoming reports relevant for biodiversity and climate change. Norway takes an active part in following up the Agreement on Conservation of Polar Bears and is responsible for taking the lead in developing a communication strategy on "the Polar bear and climate". Climate change and environmental issues are also central in the Barents Euro-Arctic cooperation and the bilateral cooperation between Norway and Russia. Through the EEA and the Norway grants, Norway has a cooperation with several countries in which biodiversity and climate change issues are included. Most specific is the project in the Czech Republic, which focus on nature management, monitoring and climate adaptation.

SERBIA / SERBIE

REPORT ON IMPLEMENTATION OF THE RECOMMENDATION NO. 159 (2012) ON THE EFFECTIVE IMPLEMENTATION OF GUIDANCE FOR PARTIES ON BIODIVERSITY AND CLIMATE CHANGE

Introduction

Implementation of the Recommendation No 159 (2012) in Serbia was integrated into policy, strategies and legislation frame including obligations taken under all relevant international agreements and international documents.

According to the analysis made at the national level, for the purposes of developing First and Second National Communication of the Republic of Serbia to the UNFCCC, as well as the South-East Europe region, Serbia is highly exposed to climate change impacts.

Besides potential negative climate change impact to the society, biodiversity is also endangered, and vice versa, deterioration of biodiversity state would also deteriorate ecosystem services provided by natural resources. Because of above mentioned facts, climate change poses a real danger for both society and biodiversity.

Relevant legislation and strategies

- The National Strategy on Sustainable Use of Natural Resources and Goods (2012-
- The National Environmental Protection Programme (2010-2019)
- Biodiversity Strategy of the Republic of Serbia for the period 2011 – 2018 was approved by the Government of the Republic of Serbia in 2011. The text already includes Aichi targets as a tool for measurement of trends. Draft of the Revised Strategy was prepared in accordance with the Strategic Plan for Biodiversity 2011-2020
- Law on Nature Protection (Official Gazette of RS", no. 36/2009, 88/2010,91/2010 – corr., 14/16) In Article 2, the law lists ´establishment and monitoring of the nature state´ as one of its main objectives. Based on this, biodiversity or protected area / ecological network monitoring is also mentioned at several parts of the law as a tool or measure.
- The Law on Air Protection (Official Gazette of RS", no. 36/2009 i 10/2013)

Activities in the field of Adaptation to climate change in the Republic of Serbia ongoing

Initial National Communication of the Republic of Serbia under the UN Framework Convention on Climate Change (adopted in 2010) evaluates known climate change impact to all sectors including biodiversity.

In accordnace with Atricle 50. of the Law on Air Protection (Official Gazette of RS", no. 36/2009 i 10/2013) th**e National Climate Change Committee** was established in 2014 as an intergovernmental body with the aim to:

- monitor the status, development and implementation of national policies in the field of climate change, sectorial policies, and other planning documents, in terms of consistency with national policy, climate change and proposes measures for directing, coordinating, and improving policies, measures and actions in this field;
- monitor the fulfillment of international obligations of the Republic of Serbia in the field of climate change, considers reports on the implementation of the UN Framework Convention on Climate Change and proposes measures to mitigate climate change and reduce greenhouse gas emissions and adapting to climate change;
- coordinates and directs the work on preparation of the drafts of lows and other regulations relevant for climate change and in other ways provides the platform.

Under the Second National Communication are, among else, prepared the list of adaptation measures and actions for three the most vulnerable sectors - hydrology, agriculture and forestry. Moreover, assessment of financial needs and possibilities of these actions and based on that prioritization is made under the **National Adaptation Plan** (within the scope of the GEF/UNDP project for development of the Second National Communication), which will be formulized and developed by the end of 2016.

The Climate change strategy and action plan will be developed under the IPA 2014 project and will start in 2016. National Adaptation Plan, combined with Climate change strategy and action plan, will provide a basis for the development of comprehensive National Adaptation Strategy.

The preparation of National Adaptation Strategy is requirement of the EU Regulation 525/2013 (MMR), while the transposition of Regulation 525/2013 starts with support of IPA 2013 twinning project: "Establishment of a mechanism for implementation of MMR" which implementation started in May 2015.

Taking into account the important role of local communities in the terms of planning the adaptation measures and their basic role for implementation of actions in climate change field including biodiversity and climate change, it is crucial to straighten the capacities of local governments and also civil societies in order to achieve results proposed through strategic and other policy acts.

Projects

With this regard, several important projects have been started and they are in progress:

1. GEF/UNDP Project "Development of the Second National Communication

2. IPA 2013 twinning Project: "Establishment of a mechanism for implementation of MMR"

3. Project "Proposal of Climate Change Impact Indicators on Biodiversity"

Objective:

Project was compiled under the agreement between Czech Development Agency (CzDA) and DHP Conservation with the aim to support Serbia in a development of so far non existing national set of biodiversity indicators on climate change impact. The beneficiary was Serbian Environmental Protection Agency.

The activity is held within the CzDA framework of transfer of Czech transitional expertise. The official country beneficiary was Serbian Environmental Protection Agency (SEPA).

Results:

Relevant biodiversity indicators on climate change were discussed and three of them - 1) Common bird index for farmland species, 2) Phenology of *Prunus laurocerasus* and 3) Natural Forest Health Condition – were selected as a first set of national indicators on climate change impact on biodiversity. Other five discussed indicators - i) Common bird index (incl. forest species), ii) International Waterbird Count (IWC), iii) Population trend of selected amphibian species, iv) Area of selected wetland habitats and v) Distribution of selected mountain species - need to be examined by additional research and analyses.

Specific recommendations:

It is suggested to continue in the activity by the follow up "project" supported by CZDA with SEPA as a beneficiary. It appeared during the workshop as appropriate to continue in a support of selected Serbian bodies in indicator development. The main topics of the suggested follow up activity are:

4. Project GEF 6 "Contribution of Sustainable Forest Management to a Low Emission and Resilient Development"

Project Objective: To promote multifunctional sustainable forest management to conserve biodiversity, enhance and conserve carbon stocks and secure forest ecosystem services in productive forest landscapes

Implementation by the FAO in collaboration with the Ministry of Agriculture and Environmental Protection (MAEP)-Directorate of Forests

Corporate Results

1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services
4. Support to transformational shifts towards a low-emission and resilient development path (Replenishment Target:750 million tons of CO_{2e} mitigated (include both direct and indirect)
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks

References:

- The Strategy on Biological Diversity of the Republic of Serbia (2011-2018)
- Report prepared by the Divison on Climate change within the Ministry of Agriculture and Environmental Protection of the Republic of Serbia
- Reports on the impact of climate change website: www.klimateskepromene.rs
- http://www.klimatskepromene.rs/uploads/useruploads/Documents
- Report on the Project "Proposal of Climate Change Impact Indicators on Biodiversity" made by Authors: Michael Hošek, Jan Dušek
- Report prepared by the Department of Forestry within the Ministry of Agriculture and Environmental Protection of the Republic of Serbia

Prepared by Snezana Prokic,
Focal Point for Bern Convention Belgrade, 20th May 2016.

SLOVAK REPUBLIC / REPUBLIQUE SLOVAQUE

MINISTERSTVO ŽIVOTNÉHO PROSTREDIA SLOVENSKEJ REPUBLIKY

NATIONAL REPORT ON IMPLEMENTATION OF THE RECOMMENDATION NO 159/2012 ON THE EFFECTIVE IMPLEMENTATION OF GUIDANCE FOR PARTIES ON BIODIVERSITY AND CLIMATE CHANGE IN THE SLOVAK REPUBLIC

Prepared by Mr Libor Ulrych (State Nature Conservancy of Slovak Republic), Ms Jana Durkošová and Ms Lenka Chocholová (Ministry of the Environment of the Slovak Republic)

Bratislava, May 2016

Introduction:

Our report provides the complement of the general overview on implementation of the Recommendation No 159/2012 at the national level prepared in June 2014.

Summary:

During 2014-2016 four important documents were approved that created the bases for the coordinated action and for the financing of needed activities in Slovakia. They are namely:

1. Action Plan for Implementation of Measures of the Updated National Strategy on Biodiversity Protection approved by the Government of the Slovak Republic on September 10th, 2014;
2. Updated National Program for Wetland Management in the Slovak Republic for years 2015-2021 and its Action Plan for Wetlands for years 2015-2018, both approved by the Government of the Slovak Republic on June 3rd, 2015.
3. Water Plan of the Slovak Republic approved by the Government of the Slovak Republic on January 13th 2016 ;
4. Government Manifesto endorsed by the National Council of the Slovak Republic (parliament) on April 27th, 2016,

In 2015 the State Nature Conservancy of the Slovak Republic finalized the Comprehensive Information and Monitoring Systems (KIMS) for state of habitats and species of Community interest. The Slovak Hydrometeorological Institute continued in administration of the meteorological and climatic data monitoring.

Reflection of biodiversity/climate change in the actual national documents and practice:

1. The Action Plan for Implementation of Measures of the Updated National Strategy on Biodiversity Protection includes several activities specifically on the mitigation of climate change impacts as well as on support to protected habitats, protected areas and restoration of ecosystems including wetlands. The most relevant activities are planned in the scope of aims:

- B.3.4 4 develop strategic framework to set priorities on restoring ecosystems and to prepare and implement program of revitalization of wetlands and of river ecosystems and to contribute into elimination to the climate change – 4 activities;
- B.3.6 ensure positive impact of the Adaptation Strategy of the SR on Adverse Impacts of Climate Change on biodiversity via ecosystem based approach – 3 activities..

2. The Updated National Program for Wetland Management in the Slovak Republic for years 2015-2021 and its Action Plan for Wetlands for years 2015-2018 pay attention to the topic of biodiversity/climate change is the Aim 11 –revitalization of degraded wetlands - priority is in localities important for biodiversity protection. This contributes to decrease of floods risk, to mitigation and adaptation to climate changes.

3. The Water Plan of the Slovak Republic tackles in its chapter 8.4.2.2 problem of lateral discontinuity of wetlands, inundation and water streams/rivers. Discontinuity is the result of previous arable land enlargement, straightening of water streams and the flood prevention. The main planned measures for lateral connectivity are:

- connection of abandoned meanders with main stream and
- other measures to improve morphology of wetlands.

These measures are aimed to enhance the biodiversity of water organisms, to improve wetland ecosystems as well as the water quality. Reconnection of wetlands in inundation area with main streams, abandoned meanders will also enhance the retention capacity in the case of floods.

4. Government Manifesto of the new government in more parts reflects results of COP 21 UNFCCC (Paris 2015). The most relevant to the topic of biodiversity/climate change are:

- support of water catchment in landscape by appropriate agriculture farming methods;
- consideration forests as the integral part of rural environment, where management of forests has to follow principles of sustainable development securing permanently other public service;
- support of forest´s adaptations to climate changes as the mitigation tool:
  - effective intersection forest management and nature conservancy issues,
  - support to ecological approach used in the forest production,
  - support of forest management which enables the wide scale of ecosystem functions and services for the public, knowing the permanent increase of importance of these ecosystem function and services
- focus of the government on implementation of national strategy on biodiversity with aims to maintain tor improving the quality of ecosystems, ecosystem services and the comprehensive value and diversity of nature areas in Slovakia,
- support of green infrastructure development, securing the landscape ecological stability,
- focus on elimination of invasive alien species.

Currently, there is no available methodology for monitoring and evaluation of the effects of adaptation measures and it is hard to choose indicators to monitor the progress of adaptation. Some steps to improve this situation were done.

The State Nature Conservancy of Slovak Republic (SNC SR) completed the Comprehensive Information and Monitoring System (KIMS) for habitats and species of Community interest for the purpose of collection, processing, evaluation and publication of data from field monitoring. KIMS is an open internet based system which includes electronic forms for filling in data in accordance with the methodology of monitoring. Each record inserted into the information system is validated on two levels, by group leader and expert coordinators of the SNC SR. Approved records are being published in an adapted form via portal www.biomonitoring.sk. KIMS summarizes and evaluates the data for the conservation status of habitats, species and its distribution on a daily basis. The most of data were collected during 2013-2015.

The Slovak Hydrometeorological Institute administrates the monitoring system on meteorology and climatology that from March 2015 provides each week on-line assessment of dry period. Monitoring of the quality of the underground water is also provided by the Slovak Hydrometeorological Institute. Connection of results from habitat monitoring (KIMS) and underwater quality is used for reporting within the Water Framework Directive..

SWITZERLAND / SUISSE

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of the Environment,
Transport, Energy and Communications DETEC

Federal Office for the Environment FOEN
Species, Ecosystems, Landscapes Division
http://www.bafu.admin.ch

BIODIVERSITY AND CLIMATE CHANGE REPORT OF SWITZERLAND

The action plan of the Federal Council's strategy "Adaptation to climate change in Switzerland – Action Plan 2014-2019"[1] entered the phase of implementation. The action plan takes up the targets from the Federal Council's strategy "Adaptation to climate change in Switzerland – Goals, challenges and fields of action"[2] which was published in 2012. A total of 63 measures have been elaborated covering the sectors most affected by climate change. These sectors encompass water management, natural hazards prevention, forestry, agriculture, energy, biodiversity management, health, tourism and spatial planning. The measures dealing with the biodiversity sector are based on the action plan of the Swiss Biodiverisity Strategy (SBS) and focus on additional pressures and threats that derive from a continuing climate change. The implementation of the measures depend on each other and waits until the action plan of the Swiss Biodiversity Strategy has been adopted by the Swiss Federal Council.

In addition to the work of the strategy, a pilot program has been established with 31 projects dealing with climate change adaptation on a regional to local level[3]. This pilot program aims at promoting and implementing innovative projects on climate change adaptation in cantons, regions and communities with financial support by the state. The projects are clustered in five different topics:

- Cluster «Handling of local water shortage»
- Cluster «Handling of natural hazards»
- Cluster «Management of ecosystem changes and land use»
- Cluster «Climate adapation in city and settlement development»
- Cluster «Knowledge transfer and governance»

In the same context, a conference on climate adaptation in praxis[4] takes place on June 7-8 2016 in Bern. Furthermore, an analysis of the major risks and opportunities for the major sectors and biogeographic regions (Jura, Swiss Midland, Prealps, Alps, Southern Switzerland, Major Agglomerations) in Switzerland[5] is under way. For each region, a cross-sectoral analysis has been carried out based on expert judgement and a representative canton. The regional findings will be extrapolated and summarised in a synthesis report.

Within EPA (European Network of Heads of the Environment Protection Agencies) and ENCA (European Network of Heads of Nature Conservation Agencies) representatives of the Swiss Federal Office for the Environment (FOEN) actively participate at various working groups such as a.o. the ENCA Climate Change Adaptation Working Group[6] dealing with ecosystem based adaptation to climate change.

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[1] http://www.bafu.admin.ch/publikationen/publikation/01762/index.html?lang=de (so far available in F, D, I, only)
[2] http://www.bafu.admin.ch/publikationen/publikation/01673/index.html?lang=en
[3] http://www.bafu.admin.ch/klima/13877/14401/14913/index.html?lang=de (so far available in F, D, I, only)
[4] http://proclimweb.scnat.ch/portal/ressources/3725.pdf (in F and D)
[5] http://www.bafu.admin.ch/klima/13877/14401/14897/index.html?lang=de (so far available in F, D, I, only)
[6] http://www.encanetwork.eu/interest-groups/climate-change-adaptation

UKRAINE / UKRAINE

BERN CONVENTION: IMPLEMENTATION BY PARTIES OF RECOMMENDATION NO. 159 (2012) OF THE STANDING COMMITTEE ON THE EFFECTIVE IMPLEMENTATION OF GUIDANCE FOR PARTIES ON BIODIVERSITY AND CLIMATE CHANGE

Expert group meeting on biodiversity and climate change

Mostar, Bosnia and Herzegovina 31 May - 1 June 2016

The territory of Ukraine is not the most vulnerable to global climate changes. However, climate change is a real threat in Ukraine. According to the repot of National Academy of Sciences of Ukraine, the last decade in the country was witnessed significantly by increased temperatures. There are too obvious interconnections between climate change and biodiversity in Ukraine. The trend is most evident in major southern regions within the Steppe Biogeographical Region.

National policy documents make commitments to biodiversity conservation, development of an ecological network and climate changes. Ukraine consistently contributes to measures for mitigating global climate change. Ukraine fulfills its commitments to reduce greenhouse gas emissions according to the UN Framework Convention on Climate Change. Being Party of the Kyoto Protocol Ukraine takes an active part in reducing greenhouse gases through "flexible mechanisms" - Joint Implementation and Emission Trading in the framework of Green Investment Scheme.

In the frame of the state policy in the field of adaptation to climate change, it fulfilled a number of research projects, including:

- restoration of springs, rivers, lakes, floodplains and mires;
- elaboration of climate change scenarios in Ukraine in the medium and long terms with using global and regional models;
- preparation of detailed maps with using geographic information systems on future climate conditions in Ukraine under different scenarios of climate change;
- carrying out spatial analysis of trends in the frequency and intensity of extreme meteorological events in Ukraine as a result of climate change;
- conducting spatial assess for the extent of future climate favorable conditions for basic crops and forest plantations;
- carrying out spatial analysis of changes of water regime basins of surface water bodies in Ukraine due to climate change;
- elaboration of guidelines on risk assessment for human health of the environment, economic sectors due to the increased number and intensity of extreme meteorological phenomena due to climate change;
- development of guidelines for central and local authorities to identify adaptation measures to climate change.

With the purpose to connect two global issues of biodiversity and climate change in the years 2014-2016 there were taken such measures:

Restoration channel on "Biyenkovy plavni"

Owing to an active and consistent work during November-December, 2016 in the National Nature Park "Biloberezhzhya Svyatoslava" (Mykolaiv Region) was conducted the restoration of the hydrological regime of the tract called "Biyenkovy plavni (floodplains)" of the total length of 1100 m.

Even at the lowest levels of markers of maternal reservoir lake, smooth areas of about 200 hectares began to be filled with water from the Dnieper-Bug Estuary. This means that reed beds come to life, thus in spring the birds will return to their native comfortable and well-fed house and some fish species – for spawning and feeding. If the forecast of the scientists about bird's population recovery comes true, the next step of the Park's administration will be filing an application for including "Biyenkovy plavni" to the list of wetlands of international importance.

Since its inception, the administration of the Park as one of its main purposes identified the restoration of biodiversity of "Biyenkovy plavni". In the past five years due to the siltation, crumbling and overgrowing of artificial and natural channels, permanent decline in the level of Dnieper-Bug Estuary, water cycling has stopped. Owing to cooperation with the Ukrainian Society for Protection of Birds with financial support of Coca-Cola Ukraine a number of measures, which gives us hope for success, has been implemented.

One more major achievement in the field of biodiversity was signing the decree of the President of Ukraine on creation of the Chornobyl Biosphere Reserve in April, 2016 and the beginning of the UNEP-GEF Project titled "Conserving, Enhancing and Managing Carbon Stocks and Biodiversity in the Chornobyl Exclusion Zone".

The Chornobyl Biosphere Reserve was created to preserve valuable natural systems in Polissia, support and improve the barrier function of the Chornobyl exclusion zone and zone of obligatory (mandatory) resettlement, stabilize and restore hydrological regime of contaminated territories and international researching. The zone has become a special area for scientific research. Proof of that is the interest shown by the Global Environment Fund (GEF), which has set up a Research and Environmental Protection Centre and Protected Area.

Main objectives of the Chornobyl Biosphere Reserve:

- to comprehensively preserve a unique natural habitats and biodiversity that have been restored during the period of restricted access to the Chornobyl exclusion zone;
- to provide support and to improve the barrier function of the zone, reducing the risk of forest fires and amounts of radionuclides migration etc.;
- to implement environmental monitoring, to study environment – its changes of human impacts;
- to regulate greenhouse gas, hydrological regime stabilization and rehabilitation of the contaminated territories;
- international cooperation, implementation of international projects;
- environmental education and information.

The next steps:

Establishment of transboundary Ukraine-Poland biosphere reserve "Poztochchia", and new national parks, Emerald sites and Ramsar sites;

Improvement of guidelines on development of management plans for protected areas with the purpose to include in their composition mandatory measures to prevent and adapt to climate change, against invasive species, etc.;

Further involvement of international and government funds to implement specific measures for biodiversity conservation and climate change mitigation and adaptation.

UNITED KINGDOM / ROYAUME-UNI

UK REPORT
TO THE GROUP OF EXPERTS ON BIODIVERSITY AND CLIMATE CHANGE UNDER THE BERN CONVENTION
- May 2016 -

Governments of Contracting Parties are kindly requested to submit written reports on their relevant actions on biodiversity conservation and climate change, particularly in the light of Recommendation No. 159 (2012) of the Standing Committee on the effective implementation of guidance for Parties on biodiversity and climate change. National reports should be sent to the Secretariat (veronique.decussac@coe.int), in electronic Word format by 20th May 2016 at the latest.

Progress since last report in 2014

The Climate Change Act (2008) set out a 5 year cyclical programme for the UK Government to assess the risks from climate change and prepare a strategy to address them. As reported in 2014, following the publication of the first UK wide Climate Change Risk Assessment (CCRA) in 2012 a National Adaptation Programme (NAP) for England was developed to respond to the risks identified, including action to promote adaptation of the natural environment. The CCRA also informed the development of adaptation planning in the Devolved Administrations (Scotland, Wales, Northern Ireland).

Progress in delivering the NAP is independently assessed by the Adaptation Sub-Committee (ASC) of the Climate Change Committee, who report to Parliament every two years. Their first report published in June 2015 highlighted that whilst progress was being made improvements to the strategic nature of the NAP should be made. It also identified that the natural environment is still under threat. The government has responded to the report highlighting the actions that will be taken to address the issues raised.

The governments in the devolved administrations (DAs) have developed similar climate change policy and adaptation planning.

Scotland:

Scotland's first statutory Scottish Climate Change Adaptation Programme was published May 2014. The Programme addresses the risks identified for Scotland in the UK Climate Change Risk Assessment (CCRA). Progress is monitored annually. The latest progress report was published in 2015.

As part of the Adaptation Programme, Scottish Natural Heritage (SNH) has been assessing the vulnerability of protected sites features to climate change and possible adaptation responses. Responses are guided by a set of adaptation principles which are set out in SNH's recently updated action plan Climate Change and Nature in Scotland. SNH has published a set of case studies http://www.snh.gov.uk/climate-change/taking-action/adapting-to-change/helping-nature-adapt/turning-principles-into-practice/ on the application of these principles to conservation management particularly on National Nature Reserves.

Wales:

Within Wales, the Environment Act (Wales) 2016 has established a legal framework for the sustainable management of natural resources, requiring Natural Resources Wales to produce both a national State of Natural Resources Report (in autumn 2016) and regional 'Area Statements' (from 2017 onwards) that will encompass both biodiversity and climate change impacts. The Wellbeing of Future Generations Act (2015) requires Public Service Boards to produce Local Wellbeing Plans that take account of climate change impacts, and specifically the risks identified in the UK CCRA.

The Climate Change Strategy for Wales (2010) and its Adaptation Delivery Plan set out biodiversity related actions for Wales, including monitoring of climate change impacts and delivery of adaptation measures on protected sites. Progress has been covered in Annual reports.

A LIFE+ funded project for Natura 2000 sites in Wales has reviewed the vulnerability of sites and features and developed an Action Plan for managing climate change impacts on the network up until 2020. A vulnerability assessment for marine SACs in Wales, that compliments previous analysis for all terrestrial sites, was produced as part of the project.

Northern Ireland:

The Northern Ireland Climate Change Adaptation Programme (NICCAP) was published in January 2014 and sets out the NI Government's response to the risks and opportunities identified in the NI Climate Change Risk Assessment (published in January 2012), as part of the overall UK CCRA.

Progress on the high level actions and key activities is being reported to the NI Executive through the Cross Departmental Working Group Annual Progress Report.

England:

As part of the England National Adaptation Programme, Natural England have developed and rolled out a programme to embed climate change adaptation and mitigation into the short term management and long term planning of England's network of National Nature Reserves.

A project funded by LIFE has also developed a methodology (theme plan) to assess the vulnerability and identify appropriate adaptation for England's Natura 2000 sites that will be undertaken in 2016.

The Living With Environmental Change network has produced a series of UK wide climate change impact report cards, that highlight the latest evidence of climate impacts on the biodiversity (2015) and water (2013). These follow the model developed by the Marine Climate Change Impacts Partnership (MCCIP) that publish annual report cards for the marine environment.

The report cards provide the necessary scientific evidence base to identify appropriate adaptation actions.