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REPORT
on the implementation of the CoE/EU Joint Programme "Emerald Network of Nature Protection Sites, Phase II" in Armenia in 2013

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Introduction

Work on the implementation of the EU/CoE project "Preparation of the Emerald Network of Nature Protection Sites, Phase II" in Armenia have been frames by the terms of reference for the country in the Administrative Arrangement signed in February 2013.

As a first step we organized the first national workshop in the frame of the project, which took place in Yerevan on 25th and 26th of June 2013. The project is implemented by the "Environmental Project Implementation Unit" (EPIU), in cooperation with the Ministry of Nature Protection of the Republic of Armenia). The workshop was attended by Mr Mark Roekaerts, the representatives of the Council of Europe, the NGO "Nature Rights Protection", the Ministry of Nature Protection of the Republic of Armenia, the National Academy of Science of Armenia (Institute of Botany and Zoology), Climate Change Convention Program Coordinator, UNDP Armenia and other research organizations.

During the workshop, issues such as the overview of the results and achievements of the first Emerald Network Program (2009-2011) were covered, as well as the priorities of Phase II of the Emerald Network constitution process, the analysis of the Armenian report and Emerald database, as well as the discussions on the draft Interpretation manual for new version of Resolution 4 (1996) of the Bern Convention and the Draft Guidelines for the management of Emerald sites in Armenia.

The working procedures of the agenda began with the Overview of the Emerald Network Program Phase I: regional involvement and general information. The Emerald team coordinator H. Ghalachyan represented the future development of the Emerald Network in the phase II and the "Main activities on Emerald sites identification and management and priorities of the Emerald Network Project, Phase II". Meanwhile, G. Fayvush represented the overview of the Proposed Emerald Sites for Armenia and further development of the sites network: GIS Site boundaries, Reference Database, GIS distribution data for species and habitats, species and habitats to be added to the Bern Convention: current status of protection at national level, analysis of Armenia resulted from the first Emerald project in terms of database, GIS maps and distribution/population data. At the end, it occurred that some technical inconsistencies still exist in the reporting materials, although they can be easily corrected. By using cross-check methods, a decision was made to verify the database and the separately submitted reference tables with habitats and species from the Bern Convention lists present in the country.

Mr Roekaerts insisted on recent strategic developments of the Emerald network and the particular tasks, which they had created for the countries working on its setting-up. He also insisted on the further changes in the reporting and management requirements for the Emerald Network. The consultant also stated that all potential sites of Emerald in Armenia should have been identified by the end of 2013.

The Climate Change Convention Program Coordinator informed that within the UNDP-GEF project on preparation of Armenia's 3rd National Communication under UNFCCC there had already been initiated the assessment of the vulnerability of ecosystems, including terrestrial ecosystems and wetlands. She mentioned that cooperation with Emerald project would allow more data exchanging and more emphasis on studying the climate change impact on the particular species and habitats.

Mr. Martirosyan, the Program Director, underlined that cooperation between the projects would enhance a better understanding of measures and that the regulatory framework improvement was needed for protection of the biodiversity and consideration of the climate change component in the planning process. With regard to the meeting with "Dino Gold" company for identification of the best ways of cooperation for ensuring protection Emerald site of "Impassable brushwood" (Paeonia tenuifolia habitat), it will be good to have the exact geographical coordinates of the habitat areal prior to the discussion. Mr. Martirosyan also accentuated that a visit of high-level EU delegation to Armenia is planned in September

for awarding the European Diploma to "Khosrov Forest" State Reserve (result of the on-the-spot appraisals, discussions and proposals to the Council of Europe Committee of Ministers). It would be great to plan and organize a Conference on nature conservation issues during those days. An organization of joint workshop was agreed between the CC Convention Program and Emerald Network team, in order to discuss results of the study and recommendations for improvement of the biodiversity conservation and development of the joint publication (outreach materials).

The National workshop launched the implementation of the "Joint Program Emerald Network, Phase II" in Armenia and helped to set definite tasks and terms for the implementation of the further steps in the country.

Throughout the year, work has been achieved in two directions:

1. Main achievements

Emerald team members investigated all possible materials. Every species and ecosystems were estimated on the basis of maps with their distribution. At least one population and/or part of ecosystem (locality) had to be on the site proposed up to 2012. Otherwise, new sites have been identified; mainly on the area with existing or planned state specially protected area.

Special methodologies were not elaborated and used. Only data on distribution of plants and ecosystems in Armenia were used and compared with the map of Armenia with identified sites.

The final Emerald sites database was reviewed. By the previous project, nine "Areas of Special Conservation Interest" (ASCI) - that occupy 206 697, 5 ha territory and form around 7 percent of the total area - were selected, relevant to the project requirements, and were described to be involved in "Emerald Network" (sites) in our country.

SITES			
N°	**Code**	**Sites name**	**Code-Site-AM**
1	0000001	"Sevan" National Park	0000001-"Sevan" National Park-AM
2	0000002	"Lake Arpi" National Park	0000002-"Lake Arpi" National Park-AM
3	0000003	"Khosrov Forest" State Reserve	0000003-"Khosrov Forest" State Reserve-AM
4	0000004	"Khor Virap" State Sanctuarie	0000004-"Khor Virap" State Sanctuarie-AM
5	0000005	Yerakh range	0000005-Yerakh range-AM
6	0000006	Khustup	0000006-Khustup-AM
7	0000007	Lori Lakes	0000007-Lori Lakes-AM
8	0000008	Impassable brushwood	0000008-Impassable brushwood-AM
9	0000009	"Plane Grove" State Sanctuarie	0000009-"Plane Grove" State Sanctuarie-AM

In the result of the works done during this year one site (0000005 – Yerakh range) was excluded from the list, and the following four new sites were evaluated and included in the "Emerald Network".

- 0000005-"Aragats Alpine" State Sanctuary AM
- 0000010-Dilijan-Ijevan- National park and State Sanctuary AM
- 0000011-"Gnishik" Protected landscape AM
- 0000012 Ararat salt marshes AM

The total area of the 12 Emerald Network sites is currently 291329.0 ha and it forms around 9.8 percent of the total area.

SITES BOUNDARIES					
N°	Site code	Area (ha)	Elevation (m)		
			min	max	mean
1	0000001-"Sevan" National Park-AM	148620.8	1863	2862	1919
2	0000002-"Lake Arpi" National Park-AM	21133.3	1954	3009	2438
3	0000003-"Khosrov Forest" State Reserve-AM	28402.1	858	3065	1776
4	0000004-"Khor Virap" State Sanctuary-AM	50.0	815	822	817
5	0000005-"Aragats Alpine" State Sanctuary-AM	9446.7	2606	4090	3274
6	0000006-Khustup-AM	2000.1	2032	3201	2601
7	0000007-Lori Lakes-AM	174.1	1473	1496	1483
8	0000008-Impassable brushwood-AM	5.0	857	902	880
9	0000009-"Plane Grove" State Sanctuary-AM	1221.3	630	1195	876
10	0000010-"Dilijan" National Park, "Ijevan" State Sanctuary-AM	49965.5	740	2655	1628
11	0000011-"Gnishik" Protected landscape -AM	30300.1	2705	969	1924
12	0000012 Ararat salt marshes-AM	10.0	840	851	845
	Total area	***291329.0***			

Reference Databases on plant, animal species and habitats have been checked. As a result, two new plant species were found (it was a gap within the first checking data from Annexes and Resolution in the Phase I). List of ecosystems was double-checked as well. Generally, there were no difficulties with certain species, except with the distribution of species of birds. Some difficulties occurred with identification of ecosystems, but the guidelines for EUNIS ecosystems were very helpful for solving these problems. We have only two bio-geographical regions in Armenia; hence, we checked the distribution of all species and ecosystems there, and no further difficulties occurred.

2. Plants

Databases of these following two plants (Saxifraga hirculus and Echium russicum) were summarized.

AM-1528 - Saxifraga hirculus

Rare species for Armenia, met only in the alpine zone of Mount Aragats and Geghama plateau. This is decorative species and in many countries is grown in so-called “alpine hillocks”. The main population of this species in Armenia is located in the Mount Aragats (including the Aragats alpine sanctuary), which is included in the “Emerald Network”.

AM-4067 – Echium russicum

Common species for Armenia, met in almost all regions of the country. Mainly grow in the steppes and meadow-steppe zones, do not generate dense populations, usually met in scattered, separate individual groups. Grow in many "Emerald Network" areas, in the reservations and national parks of Armenia.

3. Habitats

The databases of 17 following ecosystems were summarized.

New data
Code-Habitat-AM
1. C1.224-Floating Utricularia australis and Utricularia vulgaris colonies-AM
2. C1.225-Floating Salvinia natans mats-AM
3. D6.1-Inland saltmarshes-AM
4. E1.2-Perennial calcareous grassland and basic steppes-AM
5. E1.3-Mediterranean xeric grassland-AM
6. E1.71-Nardus stricta swards-AM
7. E3.4-Moist or wet eutrophic and mesotrophic grassland-AM
8. E5.4113-Althaea officinalis screens-AM
9. F3.241-Central European subcontinental thickets-AM
10. F9.3-Southern riparian galleries and thickets-AM
11. G1.11-Riverine Salix woodland-AM
12. G1.37-Irano-Anatolian mixed riverine forest-AM
13. G1.6-Fagus woodland-AM
14. G1.A7-Mixed deciduous woodland of the Black and Caspian Seas-AM
15. G3.4E-Ponto-Caucasian Pinus sylvestris forests-AM
16. G3.9-Coniferous woodland dominated by Cupressaceae or Taxaceae-AM
17. H1-Terrestrial underground caves, cave systems, passages and waterbodies

C1.224 – Floating Utricularia australis and Utricularia vulgaris colonies
This ecosystem is rather rare in Armenia, only *Utricularia vulgaris* dominate here, and it is represented in the territory of "Sevan" national park.

C1.225 - Floating [Salvinia natans] mats
A rare ecosystem in Armenia and is represented in its typical form in one of the lakes of Lori mountainous plain near Stepanavan town. It is necessary to preserve a stable water regime in all relic lakes of Lori region.

D6.1 - Inland saltmarshes
This is a rare ecosystem in Armenia, developing in Ararat valley. It includes a number of rare plant species, included in the Red Data Book of RA. Saline marshes in the neighborhood of Ararat town are now marked as nature monuments.

E1.2 - Perennial calcareous grassland and basic steppes
Widely represented in Armenia, met almost in the whole country: in non-forested middle belt mountain slopes and mountain plateaus. In this habitat steppe communities with dominance of *Stipa* species and *Festuca valesiaca* are developed.

E1.3 - Mediterranean xeric grassland
Rather widely represented in Armenia, mostly met in the middle mountain belt. Annual herbs are represented in their communities, grasses are generally dominant there with its Aegilops, Bothriochloa, Cynodon genera, while Brachypodium is less.

E1.71 - [Nardus stricta] swards
Widely represented in Armenia, mostly met in the alpine belt (less in sub-alpine belt) and in the majority of the mountain districts of the country. Generally, Nardus stricta entirely dominats in the communities.

E3.4 - Moist or wet eutrophic and mesotrophic grassland
Not much widespread natural habitats in Armenia. Generally are met in the middle and sub-alpine mountain belts, near lakes, streams and springs, very often in forests. The common meadow plants are the main dominants. However, the Caltha palustris, Telekia speciosa, Geum rivale are widely represented here.

E5.4113 - [Althaea officinalis] screens
Rarely met natural habitats in Armenia. This species is met only in the Ararat plain: in the temporarily or permanently waterlogged lands. Primarily, the Althaea officinalis is dominant here.

F3.241 - Central European sub-continental thickets
Rather widely represented in Armenia. These communities are generally grown in the middle and upper mountain belts, generally in the steppes and meadow-steppes. These communities are generally dominated by Spiraea crenata, Spiraea hypericifolia, Rosa sp., Cotinus coggygria, Amelanchier ovalis species, and very often Vinca herbacea is represented there.

F9.3 - Southern riparian galleries and thickets
Rather common, but not widely spread communities, grow in the Ararat valley and in Vayots dzor region of Armenia. Tamarix species have dominated in these communities, sometimes by generating dense stands.

G1.11 - Riverine [Salix] woodland
Very common communities for Armenia, grow in almost all little and big river branches. Different Salix species are dominated in these communities.

G1.37 - Irano-Anatolian mixed riverine forests
This ecosystem includes riverine forests with dominance of Platanus orientalis, Populus euphratica and several species of willow and poplar. The grove with Platanus orientalis dominance in Armenia is represented only in Syunik region, and is currently managed by the administration of "Shikahogh" state reserve as "Plane grove" sanctuary. Riverine forests with Populus euphratica dominance are represented in the valley of river Araks within Megri region.

G1.6 - [Fagus] woodland
Beech forests in Armenia are distributed only in the northern part of the republic. They are one of the most valuable forest types. They are greatly represented in the territory of "Dilijan" national park.

G1.A7 - Mixed deciduous woodland of the Black and Caspian Seas

The Most common forest ecosystem in Armenia. Quercus macranthera, Quercus iberica and Carpinus betulus are dominated in these communities. Distributed in all forest regions of the country. Represented in the territories of 'Dilijan" and "Sevan" national parks, "Khosrov Forest" and "Shikahogh" state reserves.

G3.4E - Ponto-Caucasian [Pinus sylvestris] forests

Natural ecosystems of pine-tree forests are very rare in Armenia. Distributed only in the northern part of the country in a form of small islands among oak and beech forests, as well as represented in the territory of "Dilijan" national park and "Gjulagarak Pine" sanctuary.

G3.9 - Coniferous woodland dominated by [Cupressaceae] or [Taxaceae]

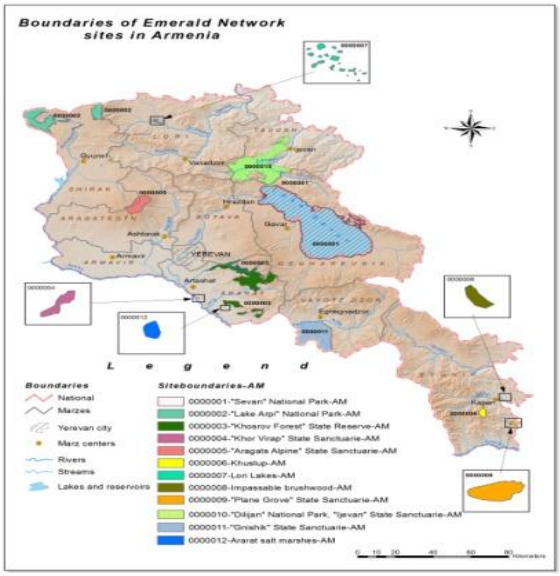
Taxus baccata can be seen as separate trees in the forests of Northern and Southern Armenia. The ecosystems with its domination occupy small areas. Groves of "Dilijan" national park (Akhnabat Yew Grove), the grove in the neighborhood of Voskepar village of Noyemberyan region and the grove of "Shikahogh" state reserve are the most famous. Juniper sparse forests are widely spread in Armenia. Met in many districts, starting by the middle mountain belt to the upper mountain belt. The main dominants are the Juniperus polycarpos, Juniperus foetidissima, Juniperus communis.

H1 - Terrestrial underground caves, cave systems, passages and water bodies

There are many caves in Armenia, as a mountainous country. The biggest three caves (Magel, Mozrov and Arjer) are located in Vayots Dzor region, in the Gnishik site, which is proposed to be included in the "Emerald Network". These are karst caves with more than 1 km length.

4. Emerald sites

The databases, the digital boundaries for all 12 Armenian "Emerald" sites in GIS were summarized.



The databases of Emerald Network on following 4 new Emerald sites have been filled.

1) **0000010-Dilijan-Ijevan- National park and State Sanctuary AM**

"Dilijan" National Park was founded in 2002 and together with "Ijevan" sanctuary, as an "Emerald Network" area, occupies 49965.5 ha territory. It is located in Tavush region. The main goal is the oak and beech forests conservation. "Ijevan" sanctuary was founded in 1971. Main goal is the protection of the rare animal species. Here are also represented number of animals and plant species from the Resolution 6 to the Bern Convention and ecosystems included in the Resolution 4 to the Bern Convention.

Plants

1758 – Ligularia sibirica
4067 – Echium russicum
2333 – Steveniella satyrioides

Vertebrates.

Mammals

1354 - Ursus arctos
1361 - Lynx lynx
1352 - Canis lupus
1304 - Rhinolophus ferrumequinum
1303 - Rhinolophus hipposideros
1302 - Rhinolophus mehelyi
1307 - Myotis blythii
1355 – Lutra lutra

Reptiles

1222 - Mauremys caspica
1219 - Testudo graeca
1279 - Elaphe quatuorlineata

Fishes

1146 - Sabanejewia aurata

Birds

A072 - Pernis apivorus
A076 - Gypaetus barbatus
A078 - Gyps fulvus
A077 - Neophron percnopterus
A080 - Circaetus gallicus
A089 - Aquila pomarina
A092 - Hieraaetus pennatus
A103 - Falco peregrinus
A246 - Lullula arborea
A339 - Lanius minor
A215 - Bubo bubo

Invertebrate

1088 – Cerambyx cerdo
1061 – Maculinea nausithous
1087 – Rosalia alpina

Ecosystems
E1.2 - Perennial calcareous grassland and basic steppes
E1.3 - Mediterranean xeric grassland
E3.4 - Moist or wet eutrophic and mesotrophic grassland
G1.11 - Riverine [Salix] woodland
G1.6 - Fagus woodland
G1.A7 - Mixed deciduous woodland of the Black and Caspian Seas
G3.4E - Ponto-Caucasian Pinus sylvestris forests
G3.9 - Coniferous woodland dominated by Cupressaceae or Taxaceae
Insects from Annex II
Maculinea arion
Parnassius mnemosyne
Thersamonolycaena dispar

2) 0000011-"Gnishik" State Sanctuary-AM

Located in Vayots Dzor region and includes newly created Gnishik Protected Area with a total area of 30,300 ha. The main protection objects here are steppes, meadow-steppes, open forests, oak forests; however, the three caves (Magel, Mozrov and Arjer) are the most important here. It is important not only for the specific species but also for the ecosystems.
Here are also represented number of following animal, plant species from Resolution 6 to the Bern Convention and ecosystems included in Resolution 4 to the Bern Convention.
Plants
4067 – Echium russicum
2326 - Dactylorhiza chuhensis
Vertebrates.
Mammals
1354 - Ursus arctos
1361 - Lynx lynx
1352 - Canis lupus
1304 - Rhinolophus ferrumequinum
1303 - Rhinolophus hipposideros
1302 - Rhinolophus mehelyi
1307 - Myotis blythii
1305 - Rhinolophus euryale
1321 - Myotis emarginatus
1372 - Capra aegagrus
1355 – Lutra lutra
Reptiles
1279 - Elaphe quatuorlineata
Fishes
1146 - Sabanejewia aurata

1143 - Barbus capito
1130 – Aspius aspius
Birds
A072 - Pernis apivorus
A076 - Gypaetus barbatus
A078 - Gyps fulvus
A077 - Neophron percnopterus
A103 - Falco peregrinus
A246 - Lullula arborea
A339 - Lanius minor
A215 - Bubo bubo
Ecosystems
E1.2 - Perennial calcareous grassland and basic steppes
E1.3 - Mediterranean xeric grassland
F3.241 - Central European subcontinental thickets
G1.11 - Riverine [Salix] woodland
G1.A7 - Mixed deciduous woodland of the Black and Caspian Seas
G3.9 - Coniferous woodland dominated by Cupressaceae or Taxaceae
H1 - Terrestrial underground caves, cave systems, passages and waterbodies
Insects from Annex II
Hyles hippophaes
Proserpinus prosperpina
Parnassius mnemosyne
Papilio alexanor
Maculinea arion

3) 000005-"Aragats Alpine" State Sanctuary-AM

This area occupies a territory of 9446.7 ha and includes “Aragats Alpine" State Sanctuary, covering 300 ha territory. Alpine meadows and wetlands are widely spread here. This area is very important for Saxifraga hirculus species.

Plants
1528 – Saxifraga hirculus
4067 – Echium russicum
Mammals
1352 - Canis lupus
Birds
A255 – Anthus campestris
A091 – Aquila chrysaetus

A090 – Aquila clanga
A404 – Aquila heliacal
A089 – Aquila pomarina
A403 – Buteo rufinus
A080 – Circaetus gallicus
A082 – Circus cyaneus
A084 – Circus pygargus
A379 – Embersia hortulana
A101 – Falco biarmicus
A511 – Falco cherrug
A098 – Falco columbarius
A095 – Falco naumanni
A103 – Falco peregrines
A097 – Falco vespertinus
A078 – Gips fulvus
A076 – Gypaetus barbatus
A092 – Hieraaetus pinnatus
A272 – Luscinia svecica
A242 – Melanocorypha calandra
A073 – Milvus migrans
A077 – Neophron percnopterus
A072 – Pernis apivorus
Ecosystems
E1.71 - Nardus stricta swards

4) 0000012 Ararat Salt Marshes –AM

This area is located in the Ararat region of RA, it occupies 10 ha territory. It also includes the territory of "Ararat Salt Marshes" natural monument and some neighboring areas. Extremely important for the D6.1 habitat and Microcnemum coralloides plant species.

Plants
2068 - Microcnemum coralloides ssp. anatolicum
Ecosystems
D6.1 - Inland saltmarshes
E5.4113 - Althaea officinalis screens
F9.3 - Southern riparian galleries and thickets

5. Assessment of the climate change's possible impact on the sites included in the "Emerald Network" in Armenia

The second direction of our work was the climate change risks and impacts assessment in the Emerald Network sites and the species of fauna and flora of Armenia, included in the Resolutions 4 and 6 and Appendixes to Bern Convention.

In the Framework Convention on Climate change for development synergism between these two conventions, we evaluated vulnerability from climate change for all 12 Emerald Network sites this year.
The basis for this work would be a model of ecosystem distribution based on the Holdridge's "Life zones" system.

By using Holdrige's "Life zones" scheme in the Third National communication on climate change, the vulnerability of the main natural ecosystems in Armenia was evaluated and forecasts of their possible change were given. Based on this, the vulnerability of the sites included in the "Emerald Network" can be summarized as follows:

Alpine meadows

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

Sub-alpine meadows

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

Forests

In middle altitudinal belt "humid" forests, most probably, xerophyte processes will be observed; for instance, penetration of the typical steppe, arid open forests and shibljak plant species. A partial xerophytization of "wet" forests will lead to their transformation into "humid" forests. Current 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 specific 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 is more expected an expansion of forest ecosystems, which are the current meadow areas.

Steppes

Xerophytization is ecosystem change general direction. In this way, the current dry steppes can be replaced by phryganoids, the tragacanth steppe area should be extended. The current mesophile steppe ecosystems can be replaced by more dry variants.

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

Thus, by modeling Armenia's main ecosystem changes connected to the climate change scenario, we can come to a conclusion that a general xerophytization process will take place (with rare exceptions), which will lead not only to a significant change of the structure and species composition of the existing ecosystems, but also to their distribution change according to the upland belts and floristic regions.

6. Ecosystem change forecasts of the sites included in the "Emerald Network" of Armenia

1) "Khosrov forest" State reserve

A deterioration of the forest vegetation's growing conditions can be expected. The specific forest ecosystems will stay the same in the middle mountain belt, while in the lower mountain belt they will transfer into sparse forests. Overall, the natural forest growth will be hampered. Especially in the middle mountain belt the steppe vegetation of the reserve area will start to transfer into phryganoids. A significant expansion of tragacanth steppes and tragacanths is possible. Juniper sparse forests and open arid forests (leaf forests) will rather stay within the old borders. A bigger expansion of open arid forests (leaf forests) is possible due to the forest vegetation of the lower belt. The upper border of the forest probably will rise to the sub-alpine belt (an expansion of sub-alpine forests is possible); while the meadows situated in reserve's border will start to transfer into meadow-steppes. The presumed changes of ecosystems will lead to the conservation and improvement of Bezoar goat's natural habitats, and also to the occupation of new sites and expansion of their local areal within the reserve area. Most likely, the existence conditions of Transcaucasian water shrew - Neomys schelkovnikovi will improve, which will lead to the increase of the population rate. A fragmentation of the local areal of Hystrix indica – Indian porcupine may be expected, and out of their current migration reserve area, in best case, in reserve's separate parts a small groups of this species will remain. The existence conditions of the mouflons, which do not have permanent habitats here and are considered as a seasonal migrant during recent years, will get significantly worse. It is possible, that already in 2007 the reserve area will not be included in his areal. The existence conditions of Hemiechinus auritus – long-eared hedgehog, Vormela peregusna – marbled polecat will noticeably improve, which will lead to the increase of their populations and the extension of their areal. There won't be any significant changes in the populations of Tetraogallus caspius – Caspian snowcock. Climate change won't also have noticeable impact on the populations of Panthera pardus. For Cerambyx cerdo of the invertebrates the living conditions can be expected to have some improvements. Related to the rise and the change of species of the forest's lower border, a deterioration of the growing conditions is expected for those tree species (oak) that are considered as a main food. Consequently, the number of weak and semi-dry trees will increase, which will lead to the additional microbiotops for the development of the Cerambyx cerdo.

2) Lake Arpi national park

The sub-alpine meadows with successions should be replaced by meadow-steppes and later with steppes. In the near future, due to rainfall rate non-proportional changes compared with the temperature, the meadow-steppes can transfer into ecosystems, which are similar to modern sub-alpine tall grasses. However, later their return to meadow-steppes and transformation into steppes is possible (connected to the decrease of rainfall rate and the temperature increase). The wetlands will more likely stay in the same level (their extension to steppes and meadow-steppes is even possible). Due to the forecasts of the climate and ecosystem changes, good conditions are created for the Asia Minor ground squirrel - Spermophilus xanthoprymnus to penetrate into the national park's area. The existence conditions of Transcaucasian water shrew - Neomys schelkovnikovi, Eurasian otter - Lutra lutra, Dalmatian pelican - Pelecanus crispus, Corncrake - Crex crex, Vormela peregusna – marbled polecat, Armenian sea-gull – Larus armeniacus, great cormorant -Phalacrocorax carbo, Glossy ibis - Plegadis falcinellus will also improve. The existence conditions of Black stork - Ciconia nigra and Common crane - Grus grus will deteriorate.

3) Lake Sevan national park and its buffer zone

Sub-alpine meadows will be replaced by meadow-steppes in most parts of the national park's area. However, an expansion of sub-alpine tall grasses and woody vegetation, especially the sub-alpine curved-trunk forests are also possible. Meadow-steppes will be replaced by steppes; tragacanths (and the tragacanth steppes) will have a wider expansion. Sub-alpine meadows of Areguni shore will transfer into meadow-steppes and later into steppes. An expansion of the areas occupied by the tragacanths and tragacanth steppes will take place. The open forests (junipers and leaf forests) will remain, but some issues can arise related to their natural growth. The other forests will remain, but an improvement of the natural growing conditions is not expected. The predicted climate and ecosystem change will improve the living conditions of local populations of Caucasian black grouse - Tetrao mlokosiewiczi, Bezoar goat - Capra aegagrus and Vormela peregusna – marbled polecat. The sea level and fish stock increase will improve the existence conditions of Eurasian otter - Lutra lutra and Transcaucasian water shrew - Neomys schelkovnikovi. Yet the expansion of the recreational belt and the fishing intensification will be a powerful factor hampering the growth of the population of Eurasian otter - Lutra lutra. In case of an expansion of the coastal marshy area, the Red–necked grebe - Podiceps grisegena nesting process will recover. The gray cranes as well as two species of pelicans will not nest here, yet they will be more seen during their migration period or eating times. The conditions of Armenian sea-gull - Larus armenicus, Great cormorant - Phalacrocorax carbo and Pygmy cormorant - Phalacrocorax pygmaeus, Ferruginous duck - Aythya nyroca will improve. The population of Indian porcupine - Hystrix indica may disappear from here, because now they live in the upper border of the spread areal. The decrease of coastal vegetation will lead to the deterioration of the existence conditions of Greater white–fronted goose - Anser albifrons, Greylag goose - Anser anser, Lesser white–fronted goose - Anser erythropus, Glossy ibis - Plegadis falcinellus, Ruddy shelduck - Tadorna ferruginea and Purple swamphen - Porphyrio porphyria in case of the development of coastal shrubberies the existing conditions of these species will improve.
The deterioration of the natural environment conditions for the invertebrates - Maculinea nausithous is not expected.

4) <u>Dilijan-Ijevan site / National park and state reservation/</u>

A forest vegetation change is possible because of the transformation of "humid" forests into the "wet" forests: beech forest expand, wider spread of Georgian oak forests comparing with Eastern oak forests, the hornbeam will continue to spread, while the Carpinus orientalis forests will remain predominantly only in the affected natural habitats. Shiblyak will stay in its old level, but close in the 2100 it will expand due to the temperature rise and rainfall decrease. For the near future the sub-alpine meadows and tall grasses will remain, but later they will decrease and transfer into meadow-steppes. Because of the climate and ecosystem changes, the living conditions of local populations of Caucasian black grouse - Tetrao mlokosiewiczi, Transcaucasian water shrew - Neomys schelkovnikovi, brown bear - Ursus arctos and Wild cat - Felis silvestris in the territory of the national park will improve. At the same time, the increasing recreational workload will probably not let them to increase their population rate. A deterioration of living conditions for the invertebrates, Maculinea nausithous, is not expected. It is possible to presume some existence conditions' improvements of Cerambyx cerdo and Rosalia alpina. Due to the increase of the lower border of the forest and the change in the species composition, a growing conditions' deterioration is expected of the tree species (oak, beech) that are considered as a main food. Consequently, the number of weak and semi-dry trees will increase, which will lead to the additional microbiotops for the development of insects.

5) <u>Khor Virap reservation</u>

The climate change won't have a direct impact on this site, but, because of the water regime change in the site, a deterioration of the conditions can be possible. On the one hand, the predicted rainfall rate decrease can bring worse conditions. On the other hand the increase of the irrigation water demand and the modern irrigation system's opportunities in the Ararat valley's surrounding sites can provide the site with the required quantity of water.

6) **Aragats Alpine state reservation**

The main impacts of the predicted climate changes can influence on alpine meadow vegetations. A general way of the conditions change is envisaged not for the sub-alpine meadows, which could be assumed, but for the expansion of sub-alpine meadows or tall grasses and wetlands. A penetration of the aggressive species can be considered as a threat for the rocky natural habitat types.

7) **Khustup State reservation**

As a result of the forest growing conditions improvements, the Eastern oak forests from Quercus macranthera will expand in the sub-alpine belt and will penetrate into the site. The meadows will expand more in deforested parts, and the steppe vegetation presumably will be replaced by shiblyak. Together with the expected ecosystem change the existence conditions of the Caucasian black grouse - Tetrao mlokosiewiczi will improve, it's areal will expand and population state will improve. The living conditions of Bezoar goat - Capra aegagrus, Long-eared hedgehog - Erinaceus auritus, Transcaucasian water shrew - Neomys schelkovnikovi will also improve. A good forages base will generate for marbled polecat - Vormela peregusna and wild cat - Felis silvestris due to more intensive spread of rodents – Rodentia and sparrows – Passeridae. For Cerambyx cerdo of the invertebrates, the living conditions can be expected to have some improvements. Related to the rise and the change of species of the forest's lower border, a deterioration of the growing conditions is expected for those tree species (oak) that are considered as a main food. Consequently, the number of weak and semi-dry trees will increase, which will lead to the additional microbiotops for the development of the Cerambyx cerdo.

8) **Lori lakes**

Ecosystem change is not expected, but the predicted rainfall decrease can contribute to the lakes' water balance disturbance, which can make their surface smaller and deteriorate existence conditions of some species. In the result of the ecosystem surface minimization and hydrological regime change, a deterioration of the population state is possible particularly for the Vertigo angustior and Leucorrhinia pectoralis invertebrates.

9) **Shibljak Impassable brushwood**

The predicted climate changes represent no threat to this area. Overall, shibljak can expand in the result of climate change. There is no direct threat to peony; because it is a spring species, vegetation term change is possible.

10) **Plane grove State reservation**

Overall, the predicted climate change represents no threat to this area, but the expected water regime change can have a negative impact on the plane regrowth. The ecosystem will be totally preserved, while the surrounding forest ecosystems and the Shibljak ecosystem are not supposed to be threatened.

11) **Gnishik Protected landscape**

The main ecosystems will remain, but little areas of sub-alpine and alpine meadows can transfer into meadow-steppes. Change of dominants and their distribution of areas can be observed in the steppe ecosystems. The open forests will remain, while the phryganoid areas will expand. Overall, the process of ecosystems' becoming more xerophyte and arid will take place.

12) **Ararat Salt Marshes –AM**

Climate change will not impact on this site itself, but it may increase the effect of anthropogenic impact, such overgrazing and artificial burning of natural ecosystem. The decrease of precipitation may affect on the level of underground water, which can indirect affect on conditions of the site.

Conclusions

The outcomes of the activities undertook towards the establishment of "Emerald network" we can record that 9 of the 12 sites included in "Emerald Network" of Armenia: "Khosrov forest" State reserve, "Sevan", "Arpi lake" national parks, "Khor Virap", "Plane groove", "Khustup", "Aragats Alpine" sanctuaries, "Gnishik" protected landscape, "Dilijan" National Park, "Ijevan" sanctuaries are included in the system of specially protected nature areas and have various categories stipulated by SPNA law, five sites have management plans, the part of "Ararat Salt marshes" is included in the list of nature monuments, while the territories of "Syunik shibliak" and "Lori lakes" do not have any category yet.

Meanwhile the site of "Lori lakes" among these three coincides with "Tashir" IBA among Armenia's 18 important bird areas/IBA/defined by the support of "Birdlife international" organization and with the "Lakes on Lori Plateau" site included in the Armenia's Important plant areas/IPA/, while the site of "Ararat Salt marshes" matches with the homonymous IPA. Most of the sites of "Emerald network" having SPNA status also match with IBAs and IPAs, for example the sites of "Sevan, "Arpi Lake" and "Khor Virap", "Khosrov Forest" are IBA sites as well, while "Plane groove", "Ararat Salt marshes" and "Khor Virap" are IPAs as well.

"Sevan", "Arpi lake", "Khor Virap" sites of "Emerald Network" are at the same time included in the list of wetlands of international importance of the Ramsar Convention (formally, the Convention on Wetlands of International Importance, especially as Waterfowl Habitat). The above mentioned IBA sites of Armenia are as well highlighted for the conservation of migration species included in the Annexes of Bonn convention and migratory bird species of the Bern convention.

At the same time the sites of "Emerald Network" crossing with the protected areas under Ramsar, Bonn conventions, as well as with IBA and IPA once again attach importance to the conservation of these sites and planning measures designated for the further development in the national program of RA SPNA 2014-2020 development activities, as well as presentation of proposals and activity extensions on new SPNA establishment as an important step towards the conservation of species and habitats of international, European and national importance.

All maps were checked and new maps are prepared and therefore there are no problems with Government or land owners. Decisions on two sites conservation have to be made after consultations with Ministry of nature protection, local authorities and land users. New law of RA "On specially protected nature areas" prepared for approving will be very helpful for these decisions, because it includes new categories of SPNA.

Nowadays the strategy of the "Specially Protected Nature Areas in Armenia" is being developed, where the activities about "Emerald Network of Armenia" will also be included.

A 2014 Calendar about implementation of Emerald Network in Armenia is published. This environmentally-oriented Calendar is one of the means of disseminating the information about Emerald Network.

Members of the national Emerald team in Armenia

In the scope of Emerald Network of Nature Protection Sites, Phase II the "Emerald" Network the establishment works were entirely implemented by the National team in Armenia. Specialists involved in the National team submitted reports on the following implemented works.

George Fayvush

Botanist, an expert of ecosystems, habitats and plant species of RA, an expert of threatened species and Specially Protected Nature areas. Within the frames of the program, the assessment, identification of 8 plant species included in the Appendixes of the Bern Convention Res. 4 and Res. 6, natural habitats and ecosystems, sites for the formation of "Emerald" network, preparation of the scientific substantiations, as well as data registration works in CDR Information System were implemented in RA.

He summarized the databases of 17 ecosystems and two new plants (Saxifraga hirculus and Echium russicum). He also implemented climate change risk assessment works on 5 invasive plant species (Ailanthus altissima, Silybum marianum, Robinia pseudacacia, Astragalus galegiformis, Tanacetum vulgare) and 2 ecosystems included in the Bern Convention Res. 4 and Res. 6 /G1.37 Irano-Anatolian mixed riverine forests and D6.16 (15.115) Interior Central European and Anatolian Salicornia, Microcnemum, Sueda and Salsola swards and 7 plant species /Paeonia tenuifolia, Dracocephalum austriacum, Ligularia sibirica, Microcnemum coralloides ssp. Anatolicum, Dactylorhiza chuhensis, Steveniella satyrioides/ within the Program and Climate Change Convention cooperation.

Mark Kalashian

Fauna expert of Joint Programme between the European Union and the Council of Europe for the Preparation of the Emerald Network of Nature Protection Sites, Phase II of RA.

Entomologist: Within the frames of the program implemented scientific researches of the 5 invertebrate animals included in the Bern Convention Res. 4 and Res. 6 in Armenia. He implemented an assessment, identification of invertebrate animals in designated 12 areas, preparation of the scientific substantiations for the development of "Emerald Network".

Within the Program and Climate Change Convention cooperation as well carried out climate change risk assessment works under the Bern Convention Res.4 and Res. 6 on 5 invertebrate animal species included in the Annexes (Vertigo angustior, Leucorrhinia pectoralis, Maculinea nausithous, Rosalia alpina, Cerambyx cerdo), as well as for the "Emerald Network" sites, such as "Khosrov Forest" State Reserve, "Sevan" and "Arpi Lake" National Parks, "Khor Virap" and <<Plane Grove>> state sanctuaries and "Syunik Shiblyak".

Levon Sahakyan

Fauna and invertebrate animals expert of Joint Programme between the European Union and the Council of Europe for the Preparation of the Emerald Network of Nature Protection Sites, Phase II.

Taxonomist, zoologist. Within the frames of the program implemented scientific studies of the distribution of vertebrates, including 117 bird species. For conservation of the vertebrates implemented the assessment, identification of vertebrates, including distribution of bird species in designated 12 areas that are envisaged to be included in the "Emerald Network".

As well, within the Program and Climate Change Convention cooperation the climate change risk assessment works for the 15 vertebrate species included in the Appendixes under the Bern Convention Res. 4 and Res. 6 are in the preparation process.

Arman Kandaryan

GIS expert of the Joint Programme between the European Union and the Council of Europe for the Preparation of the Emerald Network of Nature Protection Sites, Phase II. During the Program implemented mapping procedures of common plant, animal species and ecosystems in and out of 12 sites designated for the establishment of "Emerald Network" in Armenia, took part in creation works of the information bank, also, as a result of climate change assessment implemented mapping /digitizing/works

by GIS system for the above mentioned species. Also implemented border adjustment and mapping works for 12 sites of "Emerald Network".

Tamar Martirosyan
Interpreter of the program. During the implementation of the program she did English-Armenian and Armenian-English translations of all necessary materials, a final report submitted to the Council of Europe, an Emerald-Calendar developed within the frames of the program and the namesake book and also many other materials. She also translated materials of the national seminar held in June and other meetings.

Rima Ghukasyan
Technical expert of the Program. Coordinated the common plant, animal species and ecosystems' database included in the Appendixes, and carried out preoperational data input works by CDR System.

Armen Shahnazaryan
Financial manager of project.

Hasmik Ghalachyan
National coordinator of Joint Programme between the European Union and the Council of Europe for the Preparation of the Emerald Network of Nature Protection Sites, Phase II and Bern Convention. Within the Program and Climate Change Convention cooperation, in the scope of the Program implemented climate change risks assessment, identification of plant and animal species and ecosystems included in the Appendixes under the Bern Convention, prepared scientific substantiations, as well as data registration works in CDR Information System. Prepared reports, organized meetings and discussions with Emerald national team members and the coordinator of the Climate Change Convention. Formed and organized the printing procedure of the Emerald – 2014 environmental- informative Calendar, which was provided to other Ministries, "Emerald Network" sites' managers and NGO's.

During the Steering Committee meeting she represented the final report on the implemented works. As well, prepared the book of "Armenian Emerald Network", which will be printed with the financial support of Climate Change Convention Armenian Program.

Represented reports on "Emerald Network" establishment works:

- In conformity with the procedure approved by the President of the Republic of Armenia
- In conformity with the procedure approved by the Government of the Republic of Armenia
- In conformity with the procedure approved by the Minister of the Nature Protection

During the implementation of the program meetings were arranged to discuss the implemented works.

- The first National workshop – for the implementation of the European Union/Council of Europe Joint Program "Emerald Network, Phase II" in Armenia – took place in Yerevan on 25th and 26th of June 2013 /"Environmental Project Implementation Unit" (EPIU) State Institution (SI), (Ministry of Nature Protection of the Republic of Armenia).
- Meeting with Emerald National team members, the coordinator of the Climate Change Convention and member of NGO Nature Rights.
- A conference convened by the Minister of Nature Protection of RA with employees of the Ministry to discuss the implemented works.
- After the Steering Committee meeting held in October the team members were provided with the results of the meeting.
- A national team and monthly working meetings with the purpose of work coordination.