Report of the 13th Meeting of the EABRN

21-25 October, 2013

Ulaanbaatar, MONGOLIA

The 13th Meeting of the East Asian Biosphere Reserve Network

Biological and Social Consequences of Global Changes

21 – 25 October 2013
Ulaanbaatar and Hustain Nuruu Biosphere Reserve, Mongolia

Organized by:
Mongolian National Commission for UNESCO
Mongolian National MAB Committee
Ministry of Environment and Green Development of Mongolia
EABRN Secretariat, UNESCO Office in Beijing

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Note from Editors

This report on the 13th Meeting of the East Asian Biosphere Reserve Network comprises presentation papers and country reports. While the editors have made minor changes to the format of the papers for the sake of uniformity, only a minimum of modifications have been made to the papers. The editors give thanks to all participants for their valuable contributions to the meeting and this final report. As always, we welcome any comments from readers for the improvement of future publications.

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1. PREFACE AND OUTCOMES

Within the framework of UNESCO's Intergovernmental Programme for Man and the Biosphere (MAB) and the related regional network of East Asian Biosphere Reserve Network (EABRN) activities, the 13th EABRN meeting was organized by the Mongolian National Commission for UNESCO, the Mongolian National MAB Committee in cooperation with the EABRN Secretariat and the UNESCO Beijing office. About 50 participants from EABRN member countries and representatives from local and international organizations, such as WWF, TNC and UNDP attended the meeting (ANNEX I). The meeting took place in Ulaanbaatar, Mongolia from 21 to 25 October, 2013 under the theme "Biological and Social Consequences of Global Changes."

The main objectives of the meeting were to exchange information and experience on conservation and management of biosphere reserves and other similarly managed protected areas in East Asian countries in light of the Seville Strategy and Madrid Action Plan, to review and update EABRN activities on its priority issues in anticipation of the next World Congress of Biosphere Reserves, to carry out a field evaluation for the Hustain Nuruu Biosphere Reserve, with particular focus on consequences of global changes, to continue discussions on the possible formation of AP-MAB, a regional MAB network for Asia and Pacific including all four sub-regional networks and to elaborate an activity plan for EABRN cooperation for the period of 2014 – 2015, including the 6th EABRN training course.

The principal outcomes of the 13th EABRN meeting were summarized in the Ulaanbaatar Statement, the text of which was unanimously agreed to by all participants. The statement is included in full hereunder.

Ulaanbaatar Statement

The 13th Meeting of the East Asian Biosphere Reserve Network
Ulaanbaatar and Hustain Nuruu Biosphere Reserve, Mongolia
21-25 October 2013

In Ulaanbaatar and the Hustain Nuruu Biosphere Reserve, Mongolia, more than 50 representatives of the East Asian Biosphere Reserve Network from all seven Member Countries (China, Democratic People's Republic of Korea, Japan, Kazakhstan, Mongolia, Republic of Korea and Russian Federation) as well as experts from the Ministry of Environment and Green Development of Mongolia, the Mongolian National Commission for UNESCO and the UNESCO Office in Beijing met for the network's 13th meeting during 21-25 October 2013. Participants reviewed activities undertaken by network members during 2012 and 2013, presented scientific papers and reported on local, national and regional activities under the theme 'Biological and Social Consequences of Global Change'.

Resulting from a series of intensive presentation sessions, discussions and field inspections, the participants:

Extended special thanks and appreciation to the hosts of the meeting, the Mongolian National MAB Committee, the Hustain Nuruu and Bogd Khan Uul Biosphere Reserves, the Mongolian National Commission for UNESCO and the Ministry of Environment and Green Development, Mongolia. Participants also extended their appreciation to the Ministry of Environment of the Republic of Korea and the Republic of Korea National MAB Committee for their continued professional and financial support to the EABRN, and the UNESCO Office in Beijing for its coordinating role.

Commended member countries on their active pursuit of new Biosphere Reserve nominations – including trans-boundary nominations – and ongoing review of Biosphere Reserves nominated prior to the adoption of the Seville Strategy.

Congratulated Kazakhstan on its attendance as the newest member country of EABRN.

Congratulated the management of the Hustain Nuruu Biosphere Reserve on the successful organization of a field evaluation and on its achievements in conservation and sustainable tourism development, and made a number of recommendations for the further implementation of the Biosphere Reserve concept at Hustain Nuruu.

Acknowledged the significant and diverse impacts of global change on the network's Biosphere Reserves, stressing the need for EABRN to facilitate training opportunities for Biosphere Reserve managers focusing on adaptation approaches and techniques; and called for the harmonization of the monitoring of climate change impacts on ecosystems in EABRN.

Identified the legislative status and context of Biosphere Reserves as essential in determining the successful implementation of the recommendations of the Madrid Action Plan, and called for further consideration of improved legislation through focused exchange of experience between the national and local contexts in the EABRN countries.

Underlined the continuing need for enhanced exchange and sharing of experiences on Biosphere Reserve management among the seven member countries through their National MAB Committees, relevant national and local partners, and Biosphere Reserve managers, and called for the development of a best practices toolkit based on concrete examples from Biosphere Reserves in the region.

Encouraged recent and ongoing steps to revitalize and extend trans-boundary and site-to-site cooperation between existing Biosphere Reserves and MAB committees, including the signing of agreements in support of joint research and management activities, and made several practical proposals to further stimulate this process making use of UNESCO networks where relevant.

Considered the prospects for an Asia-Pacific MAB network, taking note that collaboration through focused subregional and thematic networks provide the best possible basis from which to conduct practical trans-boundary and joint activities; and encouraged further integration between networks through the organization of joint meetings and mutual participation in network events at all levels.

Congratulated the China National MAB Committee on the successful organization of the Changbai Mountain International Ecological Forum (CMIEF) in September 2013, at

which two representatives of EABRN (Russia and the Republic of Korea) were presented with Conservation Awards by the China National MAB Committee. Participants encouraged China to organize further international forums, and took note of agreements signed between the Sikhote-Aline and Changbaishan Biosphere Reserves and between the China and Russia National MAB Committees.

Agreed on the following decisions of the Ad-Hoc Steering Committee meeting of the EABRN:

Venue and theme of the 14th EABRN meeting:

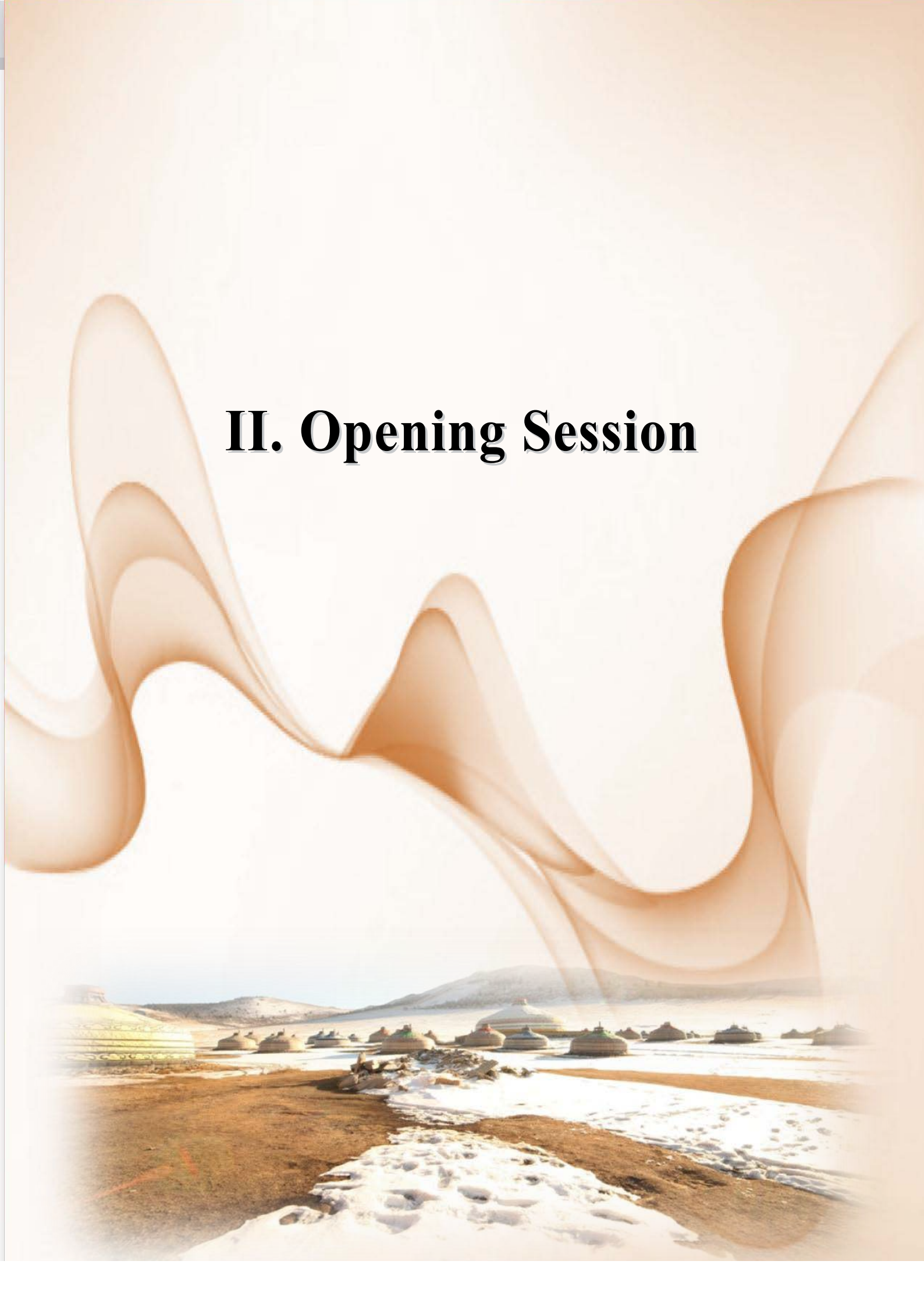
- DPR Korea was selected as first priority to host the 14th meeting of the EABRN and indicated its willingness to organize the event in 2015.
- Japan was selected as second priority to host the 14th meeting of the EABRN and indicated its willingness to organize the event in the Shiga Highlands Biosphere Reserve in 2015.
- The host country will determine the theme of the 14th meeting after consultation with the EABRN Secretariat.

Venue and theme of 6th EABRN training course

- China was selected as host for the 6th training EABRN course to be held in 2014, with the tentative theme of 'Drawing on scientific and traditional knowledge for climate change adaptation in Biosphere Reserves'.

Ulaanbaatar, 25 October 2013

II. Opening Session



2. OPENING SESSION

2.1 Opening Remarks by Dr. S. Oyun, Minister of Environment and Green Development, Mongolia

On behalf of the Government of Mongolia I am affirming importance to the 13th Meeting of the "East Asian Biosphere Reserve's Network," which is organized by Mongolia and other East Asian countries. These very countries have been preserving their unspoiled nature, and additionally maintain ancient traditions of protecting the environment, nature and resources. Taking this opportunity, I would like to express my sincere gratitude for being here and I appreciate having the conference in Mongolia.

Accompanied by global warming, human beings have been affected by diverse social aggravating issues and challenges, such as climate change, self-inflicted and human-caused environmental pollution, diverse biological impacts, natural disasters, urbanization and unemployment. It accelerates unemployment rates and significantly increases inequality. One of the activities that we are aiming at is to search for appropriate solutions in regard to these grave issues and to take conservation measures.

Thus, the meeting of the "Biosphere Reserve Network," which is organized among Mongolia and other East Asian countries, can be counted as one of the contributing improvement actions. I consider that representatives from East Asian countries are eager to discuss collaboratively about "biological and social consequences of global changes," which is a highly requested and needed event for us. Implementation of the Seville Strategy and the Madrid Action Plan are considered as the uppermost issues for the Mongolian government, as well as its success at an appropriate level. As indicated in the documents above, accredited areas that are in need of protection and which are registered in the Man and the Biosphere Reserve Network are basic factors to retain sustainable development, and shall be highly esteemed as a model for further environmental protection. It is my pleasure to tell you that we have already taken on

some measures in regard to the above-mentioned issues, including decision-making processes and negotiations between the Mongolian and Russian governments. This cooperation is concerned with the cross-border area located around the source of the Amar River, and is meant to be protected jointly. Therefore, a contract will be signed in Moscow as soon as possible.

I think this issue is worth paying attention to as the Mongolian government has set up the goal of implementing an operational programme under the caption: “Transferring Green Development Policy into a Basic Policy of Development,” which meets the requirements of the concept mentioned above, and is to be reached in the period of 2012 - 2016. In recent years, the world's orientation towards environmental development and its protection have changed remarkably: efficient and appropriate utilities are supported, protective measures against pollution have been initialized and a “green development system” that reduces the emission of green house gasses has been developed. The New Government for Change of Mongolia has conducted an analysis concerning the current environmental situation in the country and thereof formulated Green Development Goals that count as major goals within development policies. But the government has also prepared a “Green Culture” concept and a programme that complies with the foundation of green development, drafted samples and introduced it to the operational programme of the government. I am very pleased and delighted that Mongolia has gratefully accepted the decision of the RIO-20 Conference and became one of the first countries that used this decision as a supportive method for development policy. The policy of the Ministry of Environment and Green Development was newly founded in order to provide guiding principles for environmental issues that are well determined. Some measures have already been taken and complied with the regulations. Our Ministry has prepared drafts on “The Concept of Green Development” and a “Mid-term Programme of Green Development” in cooperation with the Ministry of Economic Development and the participation of state and private entities as well as civil society. These documents have been discussed by the Government Forum and submitted to the Parliament of Mongolia. It plans to discuss these policy-related documents at the Parliament Forum in autumn.

It is definitely possible to move towards a green economy and to increase employment by saving energy, increasing investment for renewable energy and developing environment-friendly agriculture. Some of the policies shall be implemented and applied to national environmental and cultural heritage areas, such as monitoring and the incorporation of green development principles, as well as nomadic lifestyles into areas advantageous for the establishment of Green Development. With the approval of the Green Development concept, it is important to efficiently increase domestic and foreign investments in order to be able to pursue the strategies and achieve the goals needed to retain and maintain sustainable development that simultaneously complies with cross-sectoral relations as well as Green Development. We consider that it is possible to start effective and extensive cooperation with Asian and Pacific countries concerning the collective efforts of reaching continuous growth in a green economy that is supported by the framework of international partnerships and the network “Human and Protected Area of Ecosystems.” I really hope that Mongolian participation in the “Human and Ecosystem” programme of UNESCO and the effective partnerships with East Asian countries can turn into successful implementation of Green Development Policy in Mongolia. Protecting specific natural and significant areas is of the same weight as the protection of human beings and nature in general due to their unavoidable interconnectedness.. I am fully confident that this conference can make an immense contribution to important issues, such as environmental protection, biological diversity and social issues in East Asian countries and other regional areas.

Finally, may human beings always be able to enjoy and cherish their linkage to and dependency on nature, and may nature be always existent in order to give human beings a place for living and enjoyment!

2.2 Opening Remarks by Dr. G. Jargalsaikhan, Secretary-General, Mongolian National Commission for UNESCO

Distinguished delegates,
Ladies and Gentlemen,

On behalf of the Mongolian National Commission for UNESCO and the Ministry of Foreign Affairs of Mongolia and myself, I am honored to represent the 13th Meeting of the East Asian Biosphere Reserve Network on "Biological and Social Consequences of Global Changes." Indeed, it is a great pleasure to welcome you all to the meeting. I would like to extend a special thanks to Ms. S. Oyun, Minister of Environment and Green Development, all representatives from UNESCO, Man and Biosphere National Committees of the 7 Member countries of the East Asian Biosphere Reserve Network, representatives from WWF, TNC (The Nature Conservancy), and UNDP, as well as to other distinguished guests.

I would like to express my deepest gratitude to the EABRN secretary, Mr. Hans Thulstrup, who worked closely with us on the preparation of the meeting and for his continuous cooperation. I would also like to express my sincere appreciation to the Ministry of Environment and Green Development, Khustain Nuruu Biosphere Reserve and Bogd-Khan Biosphere Reserve for their assistance in preparing the meeting. I am pleased to inform that Mongolia hosts the East Asian Biosphere Reserve Network Meeting for the 4th time. It is magnificent to organize the meeting once more in Mongolia, 6 years after the 10th EABRN meeting in 2007.

Our country is delighted to offer its welcome and hospitality to this important, and imperative, event. In the past 18 years since membership in the EABRN and the establishment of the Mongolian National MAB Committee, Mongolia has conducted many activities and research works, and implemented several projects and programmes, owing to the successful cooperation between the Mongolian MAB Committee and the East Asian Biosphere Reserve Network. Consequently, 6 designated Biosphere Reserves were registered in the beneficial programme.

Today, I would like to address the importance of transboundary biodiversity conservation and conservation policy. Countries are working together in order to acquire improved coordination methods of registering national heritage. However, we still have a lack of international cooperation on the registration issue, particularly on transboundary conservation and its policy. I expect that the meeting will give us the opportunity to share a common and collaborative platform, where exchanging thoughts, deliberating those issues and contributing to enhancements and progress in cooperation and suggestions will be covered. Consequently, our efforts target a harmonious and content life together. I hope that you will have a pleasant week in Mongolia and I wish cheerful, productive and informative days to come.

2.3 Welcome Speech by Mr. H. Thulstrup, Programme Specialist for Natural Sciences, UNESCO Beijing Office

Distinguished delegates,
Ladies and Gentlemen,

It gives me great pleasure to be part of the 13th East Asian Biosphere Reserve Network Meeting on the theme of "Biological and Social Consequences of Global Changes".

It is a particular pleasure to be here in the dynamic and rapidly changing city of Ulaanbataar – and to know that we will be spending a good part of our time here in Mongolia in the spectacular Biosphere Reserves of Hustain Nuruu and Bogd Khan Uul.

I would like to begin by - on behalf of UNESCO - expressing my most sincere thanks to the Mongolian Man and the Biosphere National Committee and Mongolian National Commission for UNESCO for their incredible and tireless efforts in organizing this meeting - and to the Republic of Korean National MAB National Committee and Korean National Commission for UNESCO for their unwavering and invaluable support for EABRN and for their role as principal sponsor of this week's event.

We meet here in Mongolia on the occasion of the 13th meeting of the East Asian Biosphere Reserve Network. As always, such gatherings present an opportunity to review past experience and to chart a new course for the future. However, our meeting today is of particular significance. We meet this time as the Madrid Action Plan (2008-2013) nears its end - and as MAB finds itself at the dawn of a new era with new priorities, responsibilities and urgencies to address.
For over four decades, the Man and the Biosphere Programme has been a flagship of UNESCO's work, not only in the natural sciences – but driving the Organization's contribution to the debate on sustainable development, and increasingly underpinning our policies to respond to the pressures of global change, including climate change.

Of unparalleled importance in MAB's 45-year history has been the biosphere reserve itself – the MAB programme's physical manifestation – as a place in which local communities, researchers, teachers, leaders, planners, and businesses come together to jointly bring life to a concept that - while it is beautiful on paper - would be nothing without its champions in the field. I would like to consider the EABRN and in particular this meeting as a celebration – or perhaps as hard physical evidence, if you will - of the MAB programme's relevance and potential.

To restate a point made during the opening session of the 12th EABRN meeting, managing biosphere reserves means managing the relationship between human development and the environment. It means understanding and acting on the symbiosis between natural ecosystems and social and economic processes. It means grasping the inter-dependence between biological and cultural diversity. And increasingly, it means understanding and responding to the local impacts of global changes – and championing the importance and unique nature of local approaches to managing change.

Often overlooked at the global scale, the agency and resourcefulness of local communities – equipped with unparalleled first-hand detailed knowledge of the environment in which they live – can be studied and acknowledged in the biosphere reserves, and shared regionally and globally through MAB's networks. This association between the local and the global – and the way in which it allows local ingenuity to be shared and offer inspiration to others – is among MAB's principal strengths and greatest potentials. This is particularly so in the present period of accelerating global environmental change.

While working for UNESCO first in Southeast Asia and later in the Pacific Islands, I was always deeply impressed – and always somewhat jealous - of the East Asian Biosphere Reserve Network. For two decades, EABRN has set the standard for regional MAB networks – with regular meetings, training events, exchanges, research and

transboundary cooperation, the network has served as an example for others to follow. The success of EABRN brings with it considerable responsibility.

The trends identified in the Madrid Action Plan for Biosphere Reserves (2008-2013) are not only relevant today, they are increasing in pace and scope. Urbanization is quickening – as we see ample evidence of around us here in Ulaanbaatar. The consequences of climate change are deepening for societies and ecosystems. We are experiencing the increasing loss of biological and cultural diversity, with rising impacts on the ability of ecosystems to provide critical services for human wellbeing. The United Nations Secretary-General, Mr. Ban-Ki moon, called climate change the defining issue of our era.

The Man and the Biosphere Programme, the World Network of Biosphere Reserves and the Regional / Sub-Regional Networks are all the more important in this context. And this meeting, of one of the most successful regional networks in MAB history, is particularly essential.

During our week here in Mongolia, we must clearly articulate our priorities for a post Madrid Action Plan MAB programme. We must take stock of what we have achieved so far, and acknowledge our failures as well as our successes. We must chart a new course for EABRN, setting clear priorities in terms of transboundary and research cooperation, training and capacity development. And most importantly, we must consider what EABRN's vision for the future should be – we must be clear about where and how we make a difference.

The timing of our discussions is also critical for other reasons. We are now rapidly advancing towards the target date for the Millennium Development Goals (less than 900 days from now), as we shape a new global development agenda to follow 2015. This post-2015 agenda must address the big questions of our time - questions about eradicating poverty, enhancing food security, promoting sustainable energy, managing water and environmental resources, controlling disease, mitigating natural and man-induced disasters, and fostering sustainable cities.

These are all issues being addressed at the local level in biosphere reserves – and the local perspectives offered by biosphere reserves can help ground this new development agenda in new field-tested approaches that are inclusive, rights-based and founded on solid scientific ground.
The United Nations system is wholeheartedly committed to supporting this process. And by helping to articulate a new course for EABRN, we will also be contributing not only towards MAB's global future, but the wider UN system as well.

As a contributor to EABRN and as a resident of the East Asian region, I am a novice. I am grateful and humbled to have been given the opportunity to help play a small part in making this meeting a reality. I thank you for your confidence and apologize in advance for my shortcomings and the mistakes I am bound to make. I look forward to learning from you.

Let us make the most of the week at our disposal, for an open, frank, productive and enjoyable exchange. We are given the perfect surroundings here in the hospitable and beautiful country of Mongolia. Let us take full advantage of what we are offered.

I wish the meeting a great success, and remain at your disposal for any assistance you may require.

2.4 Keynote Address by Mr. Enkhbat, Director, Clean Technology and Science Division, MEGD and Dr. A. Namkhai, Member of the Mongolian National MAB Committee

Global change and green development challenges in Mongolia

Deterioration in social issues and an increase in challenges are caused by ongoing intensive climatic changes, urbanization and human-induced pollutive behaviour towards the environment, which worsens the country's biological diversity and destroys the beauty of nature. Thus, a continuous increase in unemployment rates is taking place, which in turn accelerates further impoverishment as well as pervasive inequalities. The Mongolian government tries to ratify reforms to achieve improvements. Therefore, analyses in regard to the country's current condition in comparison to other countries have been conducted. Hereby, leading trends in elaborating Green Development principles have been incorporated into the Government Action Plan. The possible ways to overcome negative consequences and to cope with future developments are closely interrelated to Mongolia's Green Development Policy. This is why these issues are significant and need to be discussed here and now.

Global warming. Owing to high emissions and the accumulation of greenhouse gases in the atmosphere, the world climate has undergone long lasting changes with respect to various regions, oceans and sea basins of the world. It is indicated that natural disasters are occurring more frequently as Arctic temperature and ice cover values have changed and global precipitation amounts have decreased whereas sea salinity has increased. Further particulars of risk are: Intensification in wind force, alteration in distribution areas of species, droughts, rainstorms, increase in temperatures and an intensification in tropical cyclones. In the 2007 report of the Intergovernmental Panel on Climate Change (AR4) it was stated that global ground surface air temperature had increased by 0.74°C over the last 100 years (1906 to 2005). The recent half century of warming's linear rise (by 0.13°C per annum) has nearly doubled in the last 100 year trend. In total, the air temperature from 1850 to 1899 and from 2001 to 2005 has risen as high as 0.76°C. A total of 11 years out of the last 12 years (1995 to 2006) are

recorded as the warmest years since the recording and observation on global surface temperature began (1950).

The conclusions specified in the assessment conducted by the IPCC [2] WG1 in September, 2013 indicated that the human influence on the climate system is obvious and severe, which is apparent for most regions of the globe. Global warming in the climate system is unequivocal, and since 1950 many changes have been observed throughout the climate system that are unprecedented over decades to millennia. “Observations of changes in the climate system are based on multiple lines of independent evidence. Our assessment in science explores that the atmosphere and oceans have warmed, the amount of snow and ice has diminished, the global sea level has risen and the concentrations of greenhouse gases have increased.” “Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system.” “Global surface temperature change for the end of the 21st century is prognosticated to be likely to exceed 1.5°C relative to 1850 to 1900 in all but hereby the lowest scenario is being considered.” “Heat waves are extremely likely to occur more frequently and last longer. As the Earth warms, we expect to see currently wet regions receiving more rainfall, and dry regions receiving less, although there will be exceptions.” “As the ocean warms, and glaciers and ice sheets reduce, global mean sea levels will continue to rise, but at a faster rate than we have experienced over the past 40 years.”

The IPCC Assessment Report stated that [3] “As a result of our past, present and expected future emissions of CO2, we are committed to climate change, and effects will persist for many centuries even if emissions of CO2 stop.” According to these worldwide acknowledged report's conclusions, greenhouse gases that are emitted at the current intensity and that are further released into the atmosphere, are one of the major driving forces that accelerate global warming right up to the 21st century. This process leads to substantial changes in the global climate system and changes are highly likely to exceed the values observed so far in the 21st century. As per scenarios based on various greenhouse gas emission versions: if in case B1, it will continue to warm up to

1.8°C, then according to the worst scenario (A1F1) the highest probable value will be up to 4°C. In compliance with the versions' estimations for the period of the next 20 years, it will be warming up by 0.2°C per decade.

Mongolia's climate change. Mongolia is located far away from external oceans and seas, in the heart of the Eurasian continent surrounded by high mountains from all sides, at an altitude of 1.500m or more, thus it is exposed to a harsh continental climate. The major Mongolian climate feature is its four seasons occurring around the year, which increases the climate's longitudinal and latitudinal zoning alterations, with high air temperature fluctuations observed. Temperature values in the winter season range from -15°C to -30°C (50°F to 22°F), and summer temperature values from 10°C to 26.7°C (50°F to 80°F). The annual mean air temperature values for mountainous regions such as Altai, Khangai, Khentii and Khuvsgul are around -4°C and -6°C to -8°C for their intermountain depressions and largest river valleys. For the Gobi steppe regions the mean is above 2°C, and 6°C for the southern Gobi. There is not much precipitation observed throughout the country. For the mountain ranges of Khangai, Khuvsgul, and Khentii the range is from 300mm to 400mm, for the Mongolian Altai and forest-steppe regions from 250mm to 300mm, for the steppe region 150mm to 250mm, and for the Gobi desert region 50mm to 150mm, respectively. The amount of precipitation recorded is lower in the direction from the north to the south, and from the east to the west. However, there is a strong influence on the part of local terrain specifics with respect to precipitation distribution patterns.

According to Mongolia's 48 meteorological stations, with data from 1940 to 2010, the air temperature has risen by 2.14°C which is more strongly expressed for the mountainous regions. Over the last 70 years, nine of the warmest years observed occurred following the year 1990. The precipitation amount is expected to increase but tends to decrease in warm periods. If considering the average assessment issued as per the comprehensive conclusions based on a number of models made concerning Mongolia's future climate change trends, it would fluctuate below 6°C, rising by 2.6°C on average per 100 years. According to Hadley's model estimations, the annual mean air

temperature for the period of the 2040s would make up +2 degrees, and for the 2060s, +3 degrees, respectively. However, even now the warming rate has already exceeded +2 degrees. During the period of 1940 to 1975 the average recorded was at 0.06°C per decade, whereas in the time span of 1976 to 2006 it had made up 0.52°C per decade. Proceeding from the above estimations, the warming rate is very likely to exceed +3 degrees in the years up to the 2030s period.

The winter precipitation amount is likely to change below 50 per cent from year to year and on the average for a century would change below 23 per cent, whereas the summers are expected to change below 20 per cent, increasing on average for a century by 3 per cent, respectively. On the whole, it can be concluded that due to climate change impacts on Mongolia, the actual harsh winter conditions will be milder, while the summer heat is anticipated to intensify, and though the precipitation rate is to increase a little, aridization is expected to prevail.

Green development policy. In connection with global and Mongolian climate change and its consequences, the government of Mongolia has looked to expediently adopt and pursue the policy of supporting efficient and adequate application of natural resources and setting up a green development system with the least possible greenhouse gas emissions and preventing environmental pollution and deterioration.

The UN RIO+20 Sustainable Development Conference held in June 2012 in Brazil recommended in its outcome document "The Future We Want" to the national governments for ensuring the promotion of economically, socially and environmentally sustainable future for the planet and for the present and future generations, acknowledging the need to further mainstream sustainable development at all levels by integrating economic, social and environmental aspects and recognizing their interlinkages, and to formulate and pursue development policies meeting each country's own national specifics. Mongolia appreciatively accepted the recommendations, becoming one of the first countries formulating green development as a priority state policy. Mongolia is a brown economy country based on the export of its raw mineral

resources, with poor efficiency rates of its power, raw materials, resources used, obsolete industrial technologies, wasteful and highly conducive to environmental pollution. We have chosen the conception and path of transferring the major economic branches from the brown economy to the green one, considering that Mongolia is a country with a harsh continental climate and its future economic development is based on mining of natural resources. The newly founded Ministry for Nature, Environment and Green Development has acknowledged its major function, which is to ensure regulation and implementation of this new Green Development Policy outlined. On the scale of the world's countries, the sustainable growth of an environmentally friendly economy is defined as "green growth." The major objective of green growth is to implement environmental policies aimed at improving people's living standards and ensure economic growth benefits. "Green development conception," and "Green development medium-term programme" projects created by the Ministry in cooperation with relevant governments, private sector organizations and social organizations have been submitted for consideration to the Mongolian parliament. They are to be discussed at the Mongolian Parliament's 2014 year's spring session.

The green development concept, considering the issues of alleviating social poverty and improving people's living standards as the key issues of development, aims at ensuring a safe and healthy environment for people to live in, to express their opinions and views, securing justice alongside with broadening the social insurance base, to build up capacities, to cease movements and migrations from villages to urban areas and to overcome environmental, economic and social crises. Ensuring increased investment into the renewable energy sectors and economizing energy consumption, environmentally sound agricultural development is essential for accelerating the opportunities for a transition to a green economy and increasing the number of job vacancies. Mongolia's "Green Development Conception" is projected to incorporate the following perspectives and principles to be abided by.

Vision. To create a "green civilization" based on Mongolia's relatively undisturbed and preserved environment, national traditional culture and historic heritage, human oriented

and prioritized “good” governance, environmentally friendly and economically efficient technologies and knowledge built in an industrial setting, safe environment and adequate climate relevant for agriculture development.

Principles to be abided by:

- To ensure environmental, economic, social, cultural, governance development and advancements are promoted comprehensively through all their interlinkages;
- To develop and put to use Mongolia’s geographical locations, natural resources, and nomadic traditional cultural heritage advantages;
- To strengthen sustainable development governance at all levels, ensuring social involvement and support for government and partnership with the private sector;
- To ensure all Mongolians’ unity for promoting green development, making green civilization an issue of national pride;
- Promoting international cooperation and partnerships, to use to the fullest extent the opportunities made available due to globalization for introducing and adopting advanced technologies and green standards.

The following objectives are set forth based on the above principles, to be implemented in two major stages over 2013 to 2020 and 2021 to 2030:

Energy production

- Promote renewable energy production
- Introduce and apply advanced technologies and innovation in the energy sector, and increase the efficiency of the sector
- Improve the GHG inventory system

Resource efficiency

- Improve efficiency of steam and water consumption and introduce appropriate and innovative techniques, technologies and approaches for resource efficiency.
- Promote and support citizens' initiatives in applying economic consumption of resources.

- Widely introduce an offset system for activities to curve environmental pollution and degradation and reduce CO_2 emissions.

Green production

- Adopt and implement the “National Green Economy Strategy and Programme”
- Estimate the scope of the green economy in Mongolia
- Support green technologies
- Support green employment through various financial incentive mechanisms
- Increase organic production
- Develop tourism

Nature conservation

- Increase forest stock and enhance opportunities for carbon sequestration
- Decrease water pollution and shortages
- Decrease air pollution
- Protect and restore plant resources
- Mainstream natural resources and environmental management issues into other sectors, ensuring green economy principles are comprehensively followed.

Green development policy and Biosphere Reserves. The issues aimed to implement the cooperation objectives and purposes set forth from the Seville Strategy and Madrid Action Plan and East Asian Man & Biosphere Reserve have been and are focusing on the part of the Mongolian Government, and much progress has been made in this respect. It was reviewed in detail in the Report of the 12th Meeting of the UNESCO-MAB East Asian Biosphere Reserve Network [5]. In this regard, I would like to look over some issues at governmental level that were not mentioned in the report.

Appropriate decisions concerning the establishment of two transboundary state biosphere reserves the Onon-Balj national park on the part of Mongolia, and the source of the Amur River relating to the Sokhond biosphere reserve on the part of the Russian Federation, were issued in March 2013. The draft intergovernmental agreement on

setting up the transboundary biosphere reserves was worked out by the government of Mongolia, with relevant decisions issued in September of 2013 from the government and now are scheduled to be shortly signed and ratified by the authorized officials of both sides. Also, the sides have reached an agreement on registration of Mongolia's Daurian and the Russian Federation's Daurian transboundary biosphere reserve to be enlisted in World Heritage, setting up a joint task group. Since 2012 the sides' experts have worked jointly to provide the final preparations for its nomination in the World Heritage, as a result of which in March of 2013 it was submitted to the UNESCO World Heritage Committee.

The Seville Strategy and Madrid Action Plan set forth that Man & Biosphere reserves, particularly their environmental zones, should be used in a way that would make them examples of regional and environmental protection built into sustainable development.

Promoting regional green development by taking the advantages of the traditional nomadic culture, establishing places of natural and cultural heritage, and adhering to the principles of green development by planning for urban development and planning land use, ensuring citizens' health, safety and living conditions would fully comply with the letter and spirit of the above mentioned papers and documents. In this context, it is deemed appropriate to concentrate on the following issues for implementing the East Asian Man & Biosphere Reserves Network and Madrid Action Plan (MAP):

- Considering that biosphere reserves should serve as examples of sustainable development in compliance with the RIO+20 World conference's "The Future We Want" document and to work ensuring the fulfillment of programmes to implement MAP within the scope of national policy, EABRN and APBRN.
- In connection with the priority attached to the scope of duties of MEGD from the new government of Mongolia in carrying out inter-sectoral policies to focus on ensuring and implementing the Millennium objectives within the MAP objectives and actions now, and that the policies to develop the Green Economy, and Green Development Conception documents are being elaborated.

- To have 2014 assessment making methodologies issued from the EABRN Secretariat as per standard procedure concerning the implementation of Man & Biosphere Reserves' MAP and to arrange relevant seminars and training.
- In the lead-up to the Biosphere Reserves' World Congress IV, to prepare reports on the MAB programme's MAP implementation within the national, EABRN, and APBRN scopes
- To begin implementing from 2015 some actions for reinstatement of the country's biosphere reserves, considering their worsening state due to intensified climate change and desertification.
-

The approval and ratification of Mongolia's Green Development Conception is essential for opportunities to enhance and ensure the efficient usage of foreign and national funding, financial sources within the framework of sustainable development aimed at comprehensive strategies and objectives and to promote inter-sectoral policy coordination and building up the green development base. Also, it would uphold green economy and green growth programmes for the Asia-Pacific region, expanding opportunities for international cooperation to be intensified, including the collaboration maintained within the framework of the East Asian Man & Biosphere Reserve Network.

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5. Namkhai A., B.Garid Country Report of Mongolia, "Report of the 12 th Meeting of UNESCO-MAB, East Asian Biosphere Reserve Network", November 2011, Korea.

2.5 Congratulatory Remarks by Professor Chung-il Choi, Co-Chairperson, MAB National Committee, ROK

Dear colleagues,
Distinguished guests,
Ladies and gentlemen,
Dr. Sanjaasuren, Minister of the Department of Environment and Green Development of Mongolia,
Dr. Eradenechimeg, head of the Man and Biosphere Programme (MAB) of Mongolia,
Other directors and managers from Mongolian Biosphere Reserves,
And all the participants from the member states of the East Asia Biosphere Reserve Network (EABRN).

It is my honour to give congratulatory remarks to our 13th EABRN meeting here in Ulaanbaatar, Mongolia.

As you may recall, EABRN now holds its 13th meeting, and it has been acknowledged as one of the most successful Biosphere Reserve (BR) networks among the World Network of Biosphere Reserves (WNBR).

The international conference 'For Life, For the Future: Biosphere Reserves and Climate Change' during the MAB's 40th anniversary International Coordinating Council (ICC) meeting in Dresden, Germany adopted the "Dresden Declaration" and in this BRs represent a global network of model regions in which sustainable forms of use and options for adaptation to changing ecological, economical and social conditions can be tested involving all stake-holders.

There is no doubt that the task to safeguard the existence of our global environment from climate change is one of the highest importance and urgency. The MAB programme through BR in our East Asian region in particular has a mission to respond to the serious needs of our time in order to decrease and counteract climate change

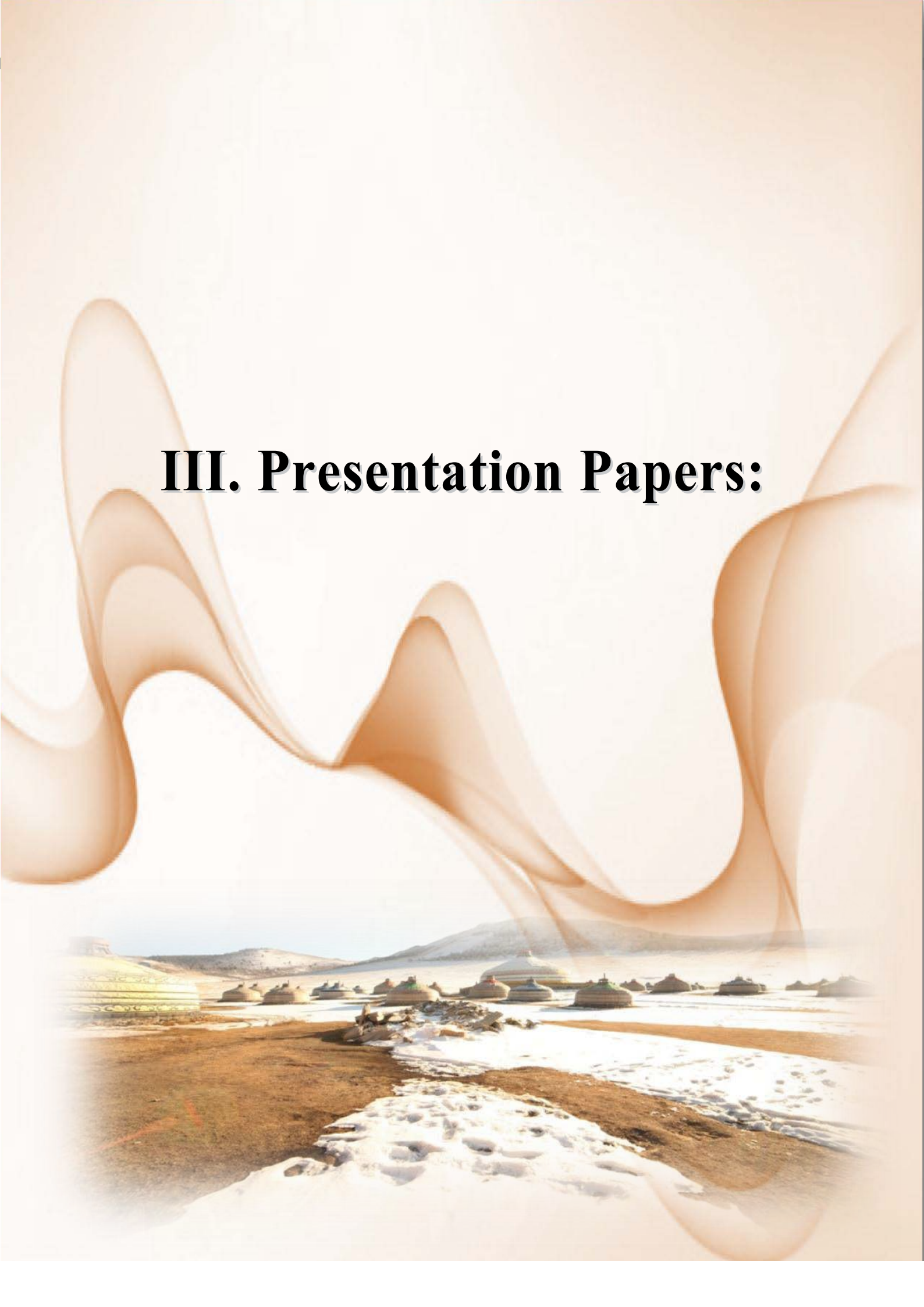
(CC) and thus having the ability to serve nature and all living beings, as well as acting as a kind of laboratory that aims to maintain the environment. The significance of our meeting here under the headline 'Biological and Social Consequences of Global Change' is of global importance, as it is a severe and all-encompassing issue that the world has to solve. I can assure you that our network that has gathered together has the capability to accomplish the purpose of protecting our environment, and we should do our utmost to fulfill our job precisely and without hesitation.

The Korean delegation and I are extremely grateful to welcome the DPR Korea's participants and we are hoping that we will not only be able to achieve the MAB principles for DPRK, but we are also looking forward to the contribution and a provision of assistance of DPRK to our region in East Asia.

I kindly ask you for your continued concern and support for the EABRN. I wish you satisfying and fruitful results from our 13th EABRN meeting here in Ulaanbaatar.

Thank you.

III. Presentation Papers:



Biological and Social Consequences

3. PRESENTATIONS: BIOLOGICAL AND SOCIAL CONSEQUENCES

3.1 Potential BR Barsakelmes: Biological and Social Consequences of Global Changes, Dr. Roman Jashenko, Kazakhstan

The Barsakelmes Strict Nature Reserve is one of the most important protected areas in Kazakhstan's national nature protectoral system. This national reserve is one of the candidates for the status of UNESCO biosphere reserve. The Kazakhstan National MAB Committee plans to propose this protected area to the world network of UNESCO's biosphere reserves. Barsakelmes Nature Reserve is located in an area of global and also regional climate change, which is causing a lowering of the Aral Sea level.

Information on biological and social consequences caused by climate change for decades is stated below.

1. Global importance of the reserve

There are 20 nature reserves in the area of the Aral Sea basin (parts of Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan and Afghanistan), and its total area accounts for 600,000 ha. State Barsakelmes Nature Reserve is in the centre of the Aral Sea ecological crisis among all regional protected areas. The decrease of the Aral Sea water level caused the joining of the island with the eastern continental coast. Because of that, wild animals inhabiting the reserve could migrate to the continental site. Since 1939, the main goal of Barsakelmes Reserve is to protect wild nature ecosystems of the northern Turan Kazakhstan deserts (as models of regional nature), regional landscapes and biodiversity. The additional and significant purpose of highly protected nature reserves,

in the last 30 years, is also to monitor the natural succession processes of ecosystems (particularly avoiding any human impacts)

2. Localization, size and accessibility of the Barsakelmes Reserve

Cluster parts of the nature reserve (Barsakelmes peninsula, former Kaskakulanisland and Syrdarya delta) are located in the northern part of the eastern coast of the Aral Sea. The total area of the nature reserve accounts for 160,826 ha. The part located in Barsakelmes includes previous territories of nature reserve (16,975 ra) and some parts of dried Aral Sea bottom with a total area of 50,884 ha, (reserve core 37,725 ha and buffer zone 13,159 ha). The part of Kaskakulan occupies 109,942 ha of land (reserve core is 68,154 ha, and buffer zone is 41,788 ha). These two separate parts of nature reserves are connected by an ecological corridor. Administratively, the nature reserve is located in the Aral district of Kyzylorda Province. The administration of the nature reserve is located in Aralsk City (36 hours from Almaty by railway). Reachability of the nature reserve territory: car journey to Karateren village (180 km) and a further 20 km to west-northwest (Syrdarya delta) or 50 km to south-west (Kaskakulan), or 120 km to the south-west (former Barsakelmes Island). The field road (sand, clay) from Karateren village to Kaskakulan and Barsakelmes partly goes through a dried sea bottom, so in spring or autumn it might be hard to travel because of rain and wind storms (Strict Nature Reserves of Central Asia, 2006).

3. Reserve history and geographic characteristics

3.1. History.

In 1929 the first hunting farm was established on the Barsakelmes Island for the purpose of breeding and trading regional wild animals. Some large vertebrate animals such as gopher, Persian gazelle, saiga, brown hare, partridge, and pheasant were brought and released on the island. Later on, the Barsakelmes Reserve as a strict nature area was established by the Kazakhstanian Government in 1939. The population of saigas (Saiga tatarica) on the isolated island consisted of 50-60 specimens (Vasenko, 1950). Asiatic wild ass (Equus onager) were brought from Turkmenistan and released on the island in 1953 in order to re-establish the northern population of onager. According to the main goal of management, the scientific department included

zoologists, botanists and geographers. In spite of this, in the first 20-30 years (1950-1970s) the main part of scientific observation was devoted to large animals (some birds and mammals). Therologists of reserve have provided monitoring observations and an annual counting of mammals, particularly of ungulate animals. The number of mammals was not stable and changed widely from year to year. This was connected to winter nature conditions. There was a big fluctuation of the Persian gazelle (*Gazella subgutturosa*) number. Only nine were brought in 1929 from Karakalpakstan (the southern Aral Sea area). After that, the number reached up to about 2,000 in 1948. But after the severe cold in 1948 and 1949, which included a snowy and windy winter, only 60 of them survived (Zhevnerov, 1984). Later on, the gazelle number increased again. The antelope saiga adapted well to island conditions. Their amount increased from 900 to 3,000. According to the counting in 1983, there were 230 saigas, 160 gazelles, and 242 kulans on the Barsakelmes Island (Afanasiev, Smirnov, 1985).

3.2. Topography

The territory of the state reserve is situated in the plain and includes peninsula Barsakelmes, former Kaskakulan Island, with the dried out bottom of the Aral Sea and the Syrdarya river delta. The highest point is 108 m above sea level and is located in the former Barsakelmes Island. Relief of the peninsula is divided into two parts: the southern – high plateau and the northern – undulating plain crossing from south to north by valleys of temporary streams (Kuznetsov, 1979). The north-western, the northern and eastern coasts are bordered by sand dune belt. The south-western and southern shores are of abrasion property. There are shallow and drainless depressions at the surface where takyrs and solonchaks are formed. The original coast is separated from a gently dipping marine plain by a well marked terrace. The primary marine plain is formed in the dry seafloor with slightly inclined surface partly with drying cracks. The relief of the eastern coast is hillock-low-hummocky sand dunes oriented almost in a meridional direction. Alluvial plains are differed by a slight incline with the formation of erosion and accumulative processes (Veselova et al, 1987).

3.3 Geology

The basal massif of Barsakelmes Island is composed of oligocene gypsiferous argil, aleurite, and sandstone (Yanshin, 1953). The northern part is composed of fine-grained sand, aleurite and loam with a black silt interlayer. Marine and lacustrine sediments of former coasts are mostly represented by medium-grained and coarse-grained sand. Quaternary and recent deposits spread in the plain. Primary marine plains are composed of different grain sand, aleurite, agglomerations of shells, restricted by clay, rubble and pebble material.

3.4. Soils

Gray-brown soils of different salinity and texture are represented in the original coast of the peninsula (Kuznetsov, 1979). The most widespread ones are gray-brown alkaline soils, but takyrs and solonchaks are also represented. Sandy soils occur in the northern, western and eastern coasts of the former island. Marsh and coastal solonchaks, coastal sand and coastal soils with blown sand cover are formed in the dry seabed. Flood-plain meadow, meadow-swamp and swamp soils are present in the Syrdarya delta.

3.5. Climate

Generally, the climate is temperate, but with a long hot summer and a relatively cold winter, insignificant cloudiness, and low precipitation, which are typical for the northern deserts. Annual precipitation is low (126-128mm) and mostly related to the colder time of the year. The average air temperature in July is 25-26°Ñ, and it reaches a peak of maximum 42-44°Ñ. The average air temperature in January is -10-13°Ñ, and the absolute minimum is -34-36°Ñ, including strong winds. Wind from a north-eastern direction prevails, with average velocity of 3.5-6 m/c (maximal reaches 20-24 m/c). Snow cover is constantly varying, as strong winds blow it off. Snow coverage remains up to 80-90 days. The frost zone is 45 cm, and complete defrosting proceeds at the end of March.

4. Socio-economic changes in the region

The total population around the North Aral Sea area is estimated to be between 150,000 to 200,000 people. The settlement differs in many ways: The range comprises villages of just a few premises but also cities like Novokazalinsk, Aralsk, and Kzyl Orda. The population was essentially stable and the birth rate (1995) of 26 per 1,000 was slightly above the national average of 24. Migration out of the region began to increase in 1970 with declining environmental conditions, and reached a peak between 1975 and 1985. Literacy is high, since most children complete primary school. More than 80 per cent of households have more than one income source. Considerable work time is devoted to subsistence activities (livestock tending, vegetable growing, fuel wood gathering), some of which provide ancillary income. Average (to the end of 1990s) household income was about US$920 or per capita about US$178.

The overall state of health of people living in the Aralsk and Kazalinsk Rayons has always been below the national average and has further worsened in the last 30 years. The most prominent problem is a serious nutritional deficiency. The cumulative result of this is an increase, in the last ten years, in miscarriages (from 21 to 35 per 1,000 pregnancies), congenital anomalies (4.5 to 10.2), premature births (4.1 to 6.5), and stillborn babies (8.5 to 9.7). The infant mortality rate of 28.3 per 1,000 exceeds the national average of 26.4. High amounts of nitrates are found in the water of rivers and canals that are consumed untreated by 17 per cent of the rural population, and have been blamed for other health problems. The nitrates, residues of fertilizer applications in the upstream agricultural massifs, are reported to cause birth and growth defects, and oral and intestinal sores. The rate of infection of numerous diseases including parasitic infections is well above national averages in the Aralsk and Kazalinsk districts. Examples include respiratory, gastrointestinal, typhoid and paratyphoid fevers, viral hepatitis, and internal parasites. Many of these increased by 10 to 30 times during the 1970s. The central government and the Oblast Health Department have upgraded health services in the last 20 years, including construction of several new hospitals and clinics. Unfortunately, the general economic situation in the country and the lack of local funds have left these facilities badly understaffed and lacking in essential supplies.

The total land area of the Syr Darya basin within Kzyl Orda and South Kazakhstan Oblasts is 27.7 million ha. About 60 per cent of it (15.7 million ha) is used for farmland, and the remainder is uncultivated natural land, some of which is used for extensive livestock grazing. Of these farmlands, the largest part is used as desert pastures (15.2 million ha) with low productivity. The irrigated land in the project area is (official statistics) 370,000 ha (2.3 per cent), used for the cultivation of rice, wheat and maize. This used to be a large-scale mechanized type of irrigated agriculture, with cultivation in relatively large basins (2 ha). Since the large-scale mechanized agricultural system virtually collapsed in the early nineties, the actual cropped area decreased considerably. Existing co-operatives struggle with financial constraints, lack of input, lack of spare parts, and shortage of labour. Yields per hectare have decreased, but accurate data of the actual output and cultivated area are lacking. The total irrigated area in the project area is estimated to be about 250,000 ha.

5. Changes of the Aral Sea level

The current lowering of the Aral Sea began more than 40 years ago – scientists have been discussing this issue since 1961. At that time The main reason for the fall in water level was ascribed to the rapid development of extensive irrigated agriculture along the two main Central Asian rivers Amudarya and Syrdarya, both of them flow into the Aral Sea. The water balance of the Aral Sea consisted of the tributary of river water, atmospheric precipitates and underground flow with the deduction of evaporation loss. Evaporation has always played a very important role in filling up the Aral Sea water in the arid area of waterless deserts. From the beginning of 20^{th} century to 1961, the evaporation loss was on average 66.1 km^3 per year, but the inflow accounted for 56 km^3 of river water, 9.1 km^3 of precipitation, from 0.1 to 3.4 km^3 of underground water annually. In general, there was an approximate equality between water income and outcome in the Aral Sea. That equality ensured the water level stability of this lake.

The volume of the river water income of the Aral Sea was going to decrease because of water usage for agricultural needs after the building of irrigation canals. From 1961 to 1970 the river water income was on average 43.3 km^3, but from 1971 to 1980 it was only 16.7 km^3. In the first half of the 1980s the river flow to the Aral Sea was almost

discontinued, in that time it was 2 km^3 per year, in which the connection of the water of Amudarya did not reach the Aral and the formerly full-flowing Syrdarya became a small river. From 1986 to 1995 the annual river flow was 7 km^3 on average. Syrdarya River had the maximum volume of water in 1993 (7.8 km^3), 1994 (7.66 km^3) and 1998 (7.23 km^3) because of rainy years and regional economic troubles in the last ten years. But in general, during the last 40 years the water balance was destroyed because of the decrease in river water and evaporation.

Loss of the water balance of the Aral Sea stimulated a rapid decrease in water level from the mark +53 m above sea level that was usual in the stable period. From 1961 to 1974, the level of the lake went down 27 cm each year on average, from 1975 to 1985 this annual lowering was 71 cm, and from 1986 to '92 it was 88 cm per year. In that time the total water level drop was 16 m. As a result of that, continuing from the west to east, Kokaral Island joined with the west coast in 1968, and in 1990 this new peninsula reached the east coast after drying up the Berg's strait. Thus, the former whole water area was divided into two parts: a relatively small northern part, named Small Aral Sea (or North Aral) and a rather larger southern part, namely Big Aral Sea (South Aral). In that time (1990) the total water volume was 370 km^3, total surface was 40,394 km^2, and the North Aral Sea had 23.61 km^3 water volume and 3,030 km^2 surface area. A new period of Aral Sea history began after the separation of these two parts had proceeded. The change in water level caused an altering of salt concentration in the water. The annual salinization was 10.2-10.3 per cent until 1961. Water salinization increased up to 11.5 per cent in 1970, 17.0 per cent in 1980 and 30 per cent in 1989. After that, in 1992 the average salinization for the Big Aral Sea was 42.1 per cent, and for Small Aral Sea 24.9 per cent. At the end of 1998, salinization was observed as 20.0 per cent in the Small Aral Sea and 46-48 per cent in the Big Aral Sea, though according to non-published information from Danish researchers the maximum salinization in the southern part of the lake reached up to 56 per cent.

The drop in water level was the same for all water areas of the Aral Sea until 1989. Later, after the isolation of the northern and southern parts, the process of water level

change became rapidly different in these two parts. In spite of the drying up of the Strait of Berg in 1989, a 4 km artificial canal existed. It was dug underwater for shipping in the beginning of 1980s. That canal was revealed at the same time the water level of the Big Aral was going down, whereas the level of the Small Aral was going up because of an enormous inflow from the Syrdarya River. As a result, water began to flow through this silted canal from the northern part to the south. Water removed silt from the canal bottom and continued to wash out the bottom ground, and within that increasing the width and depth of canal. In the spring of 1992, the canal became 5 km in length and 100 m in width. This canal could reach the Syrdarya delta and change the flow direction of this river to the south. In this situation, the Small Aral Sea would dry up completely. The main part of the population was located in the north side of the Aral Sea in Aralsk and Kazalinsk districts, so the disappearance of the Small Aral Sea would be a very hard disaster for 150,000 people, which included various economic, social and ecological consequences. (Prof. Aladin was the first who recognized this danger and attracted attention of the local administration to this risk). The reaction of the Kazakhstan government was rather rapid, and the local administration began to cover up the canal with earth and build the first dam between Kokaral and the east coast in August 1992. At that time the ground dam was 1 m height. The retrospective water balance of the north part of the Aral Sea in 1988-1991 showed some decreases:

a) Water level from 40.50 m to 39.40,
b) Water area from 3200 km^2 to 2 940 km^2
c) Water volume from 25.42 km^3 to 22.58 km^3
d) Evaporation – 10.58 km^3 total
e) Syrdarya water income 13.45 km^3 total (for 4 years)
f) Water outcome to the Big Aral Sea – 6.49 km^3

Total volume change of the north part of Aral Sea from 1988 to 1991 was -3.62 km^3
In 1992, the difference between the Big and Small Aral Sea water level became more than 2 m (Small Aral Sea – 39.0 m and Big Aral Sea – 37.1 m). Unfortunately, the dam was destroyed many times by the pressure of water from the North Aral. In that situation,

the water flow from the Small Aral Sea would allow the water level change until 37.0; then it would completely disintegrate. In consequence, in 1993 the Institute Kazgiprovodkhoz worked out a pilot project for the Kokaral Crosspiece (dam-road). According to this project, the ground dam was rebuilt and amounted to 3 m height (43.5 m above sea level on the top) and 12.7 km in length. The canal has also been re-covered. However, the winter drawdown from Toktogul Reservoir (Kyrgyzstan) in 1993/1994 resulted in water flowing through the dam and thus breaking it again.

In 1996 the dam destruction was repaired by the efforts of the local administration initiative. In April 1997, the water level of the North Aral reached the mark of 41.25 m above sea level, but the dam was destroyed again because of the strong winds that increased water positive setup at 0.6 m; the break was 125 m in length and 2 m in depth. In the middle of 1997 the water level dropped to 40.5 m. In the autumn of 1997, the foundation of the dam was rebuilt. The International Fund of Aral Saving began to support the dam construction from the second half of 1998. Due to this project, the dam increased in height and width both by 20 m, and overflow hydraulic work was also needfed. In December 1998, the water level of the North Aral reached 41.77 m, but the South Aral Sea dropped to 37 m. The highest water level of the Small Aral Sea was observed in April, 1999 – 42.3 m above sea level. A severe storm on April 20 destroyed the unfinished Kokaral dam, and as a result more than 7 km^3 sea water flowed out within just a few months and the water level dropped to 40 m in the middle of summer. Unfortunately, 50 workers stayed on the dam during the storm – 2 people died and 20 people were evacuated from the roof of cars and tractors by helicopters and boats. Several construction companies lost all their equipment (cars, tractors, cranes, etc.) in salt water and silt. Since 2001, the World Bank has supported the project to protect the Syrdarya and the north Aral Sea with US$64.5 million in funds; one of the goals is devoted to the re-construction o thef Kokaral dam, which was rebuilt in 2006 when wthe ater level increased to about 42 m above sea level.

Photo: Wasted lands with salts (by R. Jashenko)

6. Fauna

The Aral Sea region is internationally recognized as a priority area for wetland conservation. The Aral Sea lies within one of the most important north-south flyways of Palaearctic migrants with the Central Asian – the Indian Flyway and East African Flyway converge over this region. The delta lakes and shorelines provide significant foraging and breeding habitats for large numbers of waterfowl (ducks, geese) and other water birds (pelicans, cormorants, herons, plovers, terns, gulls). Thirty bird species are listed to the Red Book. Avifauna is still spectacular in and around the Aral Sea and in the delta area.

Drastic changes in the fauna spectrum of the Aral Sea have occurred since the 1960s. So far, very few species have permanently occupied the new, exposed lands. Some 67 mammal species have been recorded along the Syrdarya (including 30 near the North Aral Sea). Sixteen species are listed in the Red Data Book. It is important to mention that many animals are economically or commercially significant. Most species are typical for the desert environment.

6.1. Invertebrates. There are approximately 2,095 species from 12 orders of insects in the Aral Sea region: Odonata (13), Mantoptera (3), Blattoptera (2), Phasmoptera (1), Dermaptera (2), Orthoptera (90), Homoptera (520), Heteroptera (125), Coleoptera (731), Lepidoptera (60), Hymenoptera (248), and Diptera (300). The most numerous insects are beetles (Table 1). Information about 18 other orders, inhabiting the Turan deserts, is absent (Kazenas et al., 1998.). Species diversity, the level of endemism, is an important index of originality. There are 121 aralian endemic species, which accounts for 5.8 per cent of all known species. This percentage will grow through future research that will discover and assess new local species. For example, the percentage of endemic species of the well-studied Coccinea (Homoptera) and Cecidomiyidae (Diptera) is 35 per cent and 22 per cent, respectively. Biological and ecological features of endemic species are requested to be more researched.. These autochton species are subjects that need to be monitored. In regard to rare and vanishing species, two major and specific categories concerning the regional fauna have been compiled. Twenty-seven

rare species from the Red Data Book of Kazakhstan (2003) dwell in the northern Aral Sea region. Table 2 shows the habitats of these species. In general, it is recommended to add more species to the Red Data Book, e. g. *Aromia moschata* ssp. *vetusta* Jank. (Coleoptera, Cerambycidae) and *Eurythyraea oxyana* Sem. (Coleoptera, Buprestidae), but they have not been reported in the river-bed forests of the Syrdarya for twenty years. Current investigations show a considerable increase of the species diversity of zooplankton in comparison to the critical period in the 1980s. Some 88 taxa of microcrustacea were identified, 55 species and subspecies of which belong to Cladocera, 32 species to Copepoda (2-Calanoida, 24-Cyclopoid, 6-Harpacticoida) and Ostracoda. Fauna of Rotifera consists of 73 species. Also, Bivalvia mollusc larvae were revealed in two waterbodies.

Table 1. Families of Coleoptera on the Northern coast of the Aral Sea

Families	Total number of species	Species endemic to the Aral Sea area	Rare and relic species
1. Carabidae	150	2	1
2. Histeridae	34	3	-
3. Scarabaeidae	125	13	1
4. Cerambycidae	21	5	2
5. Buprestidae	39	4	2
6. Coccinelidae	41	-	1
7. Meloidae	22	3	-
8. Chrysomelidae	130	-	-
9. Curculionidae(Cleoninae)	62	1	-
10. Tenebrionidae	85	4	-
11. Elateridae	4	-	-
12. Anobidae	5	-	-
13. Other families	13	-	-
Total	731	35	7

Table 2. Distribution of rare and vanishing species in natural locations of the Northern Aral Sea region

Species	gallery forest	sea coast	sand desert	clay desert	salt-marsh	chink
1. *Ischnura aralensis* Hant	+	-	-	-	-	-
2. *Caloptex virgo* L.	+	+?	-	-	-	-
3. *Anax imperator* Leach.	+	+	-	-	-	-
4. *Orthetrum sabina* Drury	+	-	-	-	-	-
5. *Selycsio themis nigra* V.	+	-	-	-	-	-
6. *Bolivaria brachiptera* Pall.	+	+	-	+?	+?	+
7. *Saga pedo* Pall.	+	+	-	-	-	+
8. *Seraeocercus fuscipennis* Uv.	+	-	-	-	-	+
9. *Cicindela nox* Sem.	+?	-	-	-	-	-
10.*Calosoma sycophantha* L.	+	-	-	-	-	-
11.*Haplosoma ordinatum* Sem.	+	+?	+	-	-	-
12.*Stethorus punctillum* Weise.	+	+	-	-	-	-
13. *Scolia hirta* Schr.	+	+	+	+	-	+
14.*Sphex flavipennis* Fabr.	-	+	+	+	+	+
15.*Prionix macula lugens* Kohl.	+	-	+	+	+	-

16.*Hoplitis megalosmia fulva* Evers.	+	-	+	-	-	-
17.*Ephedromya debilopalpis* Marik.	+?	-	-	-	-	-
18. *Satans gigas* Evers.	+	+	+	-	-	+
19. *Ascalaphus macaronius* Scop.	+?	-	-	-	-	-
20. *Zigaena turcmena* Evers.	+	-	-	-	-	-
21. *Utetheisa pulchella* L.	+	+	-	-	-	-
22.*Paragluphisia oxiana* Djak.	+	-	-	-	+?	-
23. *Catocala optima* Stgr.	+	-	-	-	-	-
24. *Papilio machaon* L.	+	+	+	+	-	-
25. *Zegris eupheme* Esper.	+	+?	-	+?	-	-
26. *Microzegris pyrotoe* Evers.	+	+?	+?	-	+?	-
27. *Polyommatus elvira* Evers.	+	-	-	-	-	-
28. *Hesperophanes heydeni* Ball.	-	-	-	-	+	-
29. *Capnodis miliaris metallica* Ball.	+	-	-	+	+	-
Total	27	13	8	8	7	9
per cent	90.3	44.8	27.6	27.6	24.1	30.1

6.2. Vertebrates. Before the beginning of the Aral Sea catastrophe and the vast desertification expansion in the regions of the North and East Aral Sea, including Aktobe, Kyzylorda and western parts of South Kazakhstan Provinces, these areas were formerly inhabited by more than 300 species of vertebrate terrestrial animals. Thirty per

cent of Kazakhstan mammals were found here, together with 41 per cent of nesting birds and 59 per cent of reptiles, while the local representation of desert zone-fauna in Kazakhstan was as follows: 79 per cent mammals, 88 per cent reptiles and 95 per cent birds. More than 40 fish species inhabited the Aral Sea basin, among them greatly unique and endemic ones such as the Syrdarya shovelnose (*Pseudoscaphirhynchus fedtschekoi*) bastard sturgeon (*Acipenser nudiventris*), Aral trout (*Salmo trutta aralensis*), and pike asp (*Aspiolucius esocinus*); numerous colonies of pelicans (*Pelecanus onocrotalus*, *P.crisous*), cormorants (*Phalacrocorax carbo, P. pygmaeus*), geese, swans, and a great number of ducks, herons, gulls, plovers and other bird species were on the islands and shores. Wild boar (*Sus scrofa*) were very abundant in the riparian brushwood along the Syrdarya River. Even the Turanian Tiger (*Panthera tigris virgata*) occurred in this river delta, while adjacent desert sites were inhabited by saiga (*Saiga tatarica*) and Persian gazelle (*Gazella subgutturosa*). Macqueen bustards (*Chlamydotis undulata*) and sandgrouse (*Pterocles orientalis*, *P. alchate*, *Syrrhaptes paradoxus*) were also abundant here.

As a result of the negative and pervasive impact of intensified developments in economic activities, accompanied by the sharp drop in the amount of regional water supplies and the development of local desertification processes biodiversity of, for example, nesting birds has decreased by half, while the ichthyofauna has lost the most interesting, endemic and relic representatives during the second half of the 20th century. Many animal species do no longer occur in the region. This has been confirmed by the large number of local rare and vanishing species included in the Kazakhstan Red Data Book (1996), among them there are six fish species (37.7 per cent of the total included in the Red Data Book), two reptile species (20.0 per cent), 27 bird species (48.2 per cent), and 11 mammal species (27.5 per cent). More than half of those (27 species or 58.7 per cent) belong to the first two categories, the most endangered ones are:

1. Vanishing species (including presumably extinct ones), and
2. Species of rapidly decreasing abundance.

The fish fauna of the North Aral Sea is formed by two ecologically different fish groups: (i) introduced flounder; and (ii) small-sized species of salt-tolerant freshwater fish species that are no longer of commercial importance because of the increased salinity levels. Some 14 species have been introduced into the Aral Sea after its salinity levels started rising, but only the flounder survived. At present, three fish species are included in the Red Book. The delta lakes and river flood plain play an important role as spawning and nurturing sites for many original river and sea species. Lake fisheries, however, declined in quantity because of well-known reasons: increasing salinity, lack of replenishment of freshwater, blocked access to the lakes and floodplains (catfish) and drying up of lakes. It is known that before the construction of water regulatory works in the Syrdarya, many of the indigenous fish species migrated up to 600 km upstream. The present spawning area is limited by the Kazalinsk hydraulic system (200 kln upstream) and fish also use the area bordered by the temporary Aklak dike around 30 km from the sea for spawning. The potential impacts of the designated Aklak hydraulic structure on fish migration have been carefully taken into account in regard to the conceptualization of proper design developments and suitable location for the implementation of hydraulic construction..

Altogether, in the northern half of the Aral Sea 126 bird species are recorded, of which 88 nest there while the remainder migrate; 70 species of the total were observed in the North Aral Sea area, of which 61 nest there; the corresponding indices in the East Aral Sea area are 106 (66) (Tab. 3.).

Table 3. Fauna comparison of birds in different parts of the Aral Sea (numbers in brackets are breeding birds)

Bird orders	Species number in:						Total species
	eastern coast		northern coast		new lands		
	abs.	per cent	abs.	per cent	abs.	per cent	
Ciconiiformes	1(1)	0.9	2	2.9	-	0.0	3
Anseriformes	8(4)	7.5	2(2)	2.9	2	11.1	8
Falconiformes	7(4)	6.7	7(4)	10.0	1	5.6	10
Gruiformes	2(1)	1.9	1(1)	1.4	-	0.0	3
Charadriiformes	22(8)	20.7	7(7)	10.0	4(3)	22.2	22
Columbiformes	7(7)	6.7	7(6)	10.0	3(2)	16.7	8
Cuculiformes	1(1)	0.9	1	1.4	-	0.0	1
Strigiformes	2(1)	1.9	1(1)	1.4	-	0.0	2
Caprimulgiformes	1(1)	0.9	1(1)	1.4	-	0.0	1
Apodiformes	1(1)	0.9	1(1)	1.4	-	0.0	1
Coraciiformes	4(4)	3.8	4(4)	5.8	-	0.0	5
Passeriformes	50(36)	47.2	36(35)	51.4	8(4)	44.4	62
Total	**106(69)**	**100,0**	**70(62)**	**100,0**	**18(11)**	**100,0**	**126**

7. Flora

According to botanical-geographic regionalization, the territory of the Barsakelmes Reserve is situated at the border of the Iran-Turan sub-region of the Sahara-Gobi desert in the North Turan Province – West-North Turan sub-province, North-Aral (peninsula Barsakelmes) and East-Aral (former islands Kaskakulan and Uzunkair) districts. According to publications and the latest investigations on the dry seabed of the Aral Sea, flora of vascular plants of Barsakelmes peninsula and Kaskakulan area consist of 278 species (Kuznetsov, 1979) that are listed , which belong to 51 families and 174 genera. There are 253 species in Barsakelmes peninsula and 101 plant species in the area of Kaskakulan. Species from Chenopodiaceae, Asteraceae, Poaceae, Brassicaceae, and

Polygonaceae families are prevailing. The most imported genera are: *Calligonum* (15 species), *Artemisia* (9), *Atriplex* (9), *Astragalus* (7), *Salsola* (6),and *Strigosella* (5). There are 14 endemics: *Artemisia aralensis, A.scopiformis, A. quiqueloba, A. camelorum, Atriplex pratovii, A.pungens, Petrosimonia hirsutissima, Astragalus brachypus, Tulipa borszczovii, Calligonum crispatum, C.palibinii, C.humile, C.spinulosum, Corispermum laxiflorum*.

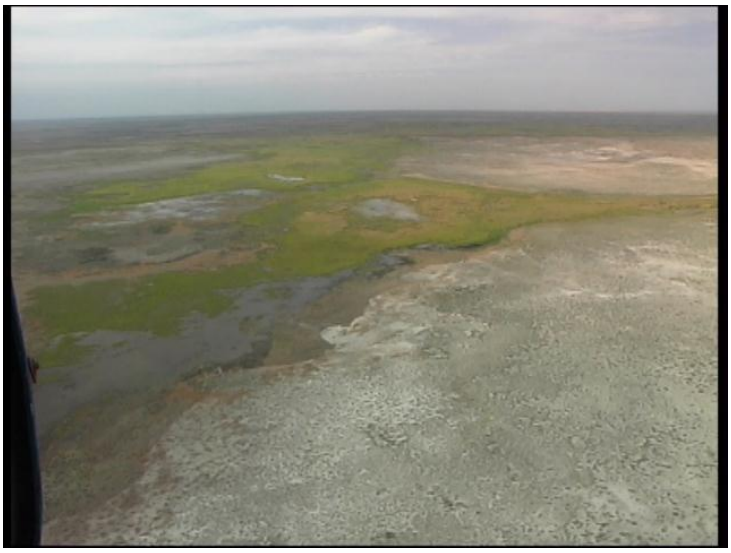


Photo: Former bottom of the Aral Sea with salt cover and some water area
(by R. Jashenko)

8. Management approach of the Barsakelmes Reserve

The Barsakemes Reserve was established in 1939, and has been determined as a conservatory area of wild nature ecosystems of the North-Turan deserts which simultaneously is a showpiece of regional nature, and therefore it includes a number of goals that are to be pursued. Fortunately, there were no direct human impacts on the area of the highly protected nature reserves, but Barsakelmes Reserve is located in the middle of environmental changes and is immensely interrelated to the decrease of the Aral Sea water level. It caused some impacts on the reserve and surrounding areas, such as aridization, water and soil salinization, desertification and chemical pollution. These new environmental challenges required new approaches in regard to the management of environmental protection in these areas. Therefore, since the mid-1980s, connected with ecological crises, the additional and important goal of reserve management was formulated as follows: ***to provide monitoring observations of***

succession processes in wild nature ecosystems, as well as to protect some wild species of animals and plants from climate change impacts. In the period of 2002-2003, Barsakelmes Island became a peninsula through the connection with the eastern continental coast because of the decrease in water level of the Big Aral Sea. From that time on, a considerably high amount of wild mammals that inhabited the island escaped to the continental deserts. In spite of new environmental conditions, the reserve could survive as a protected area needed for conservation of wild nature ecosystems, protection of some threatened species and monitoring of succession of wild nature ecosystems. What kind of efforts were made for such protection by corresponding governmental agencies, the reserve administration and the local community?

Governmental agency. In the last several years, Kazakhstan's government increased its reserve territory several times and initialized thorough management of water supplies with the aid of a specific agency expertised in Pas (Committee of Forestry and Hunting of Ministry of Environment Protection of Kazakhstan) in the region:

a) The area of the state reserve expanded almost tenfold including the territory of the dry seabed in 2006. Now the reserve area is a unique “nature laboratory” for studying climate change, aridization, desertification of landscapes, changes in the structure and composition of ecosystems and nature's adaptation to global changes of environment. The government included three cluster areas in the reserve: 1) the former Barsakelmes Island (the most valuable area) with surrounding dry seafloor; 2) former islands Kaskakulan and Uzunkair with surrounding dry seafloor (habitats for onager and Persian gazelle); 3) and wetlands in the Syrdarya river mouth.
b) The government built the Kokaral dam in November 2006 (with the financial support of the World Bank) and isolated the northern part of the Aral Sea from the Syrdarya delta and the inflow of river water. It allowed the water level of the Small Aral Sea to increase to 42 m absolute height (level of Big Aral Sea 33 m). Now Syrdarya delta is flooded, and its shallow water area is going to be covered by reeds (the main habitat of water birds). In future, the delta area, the new

hygro-mesophytic meadow vegetation and riparian forest (tugay) with a diverse complex of wild animals will be formed naturally. The rehabilitation of Syrdarya delta and the northern part of the Aral Sea is very important for global bird migration as it encompasses the wetland area where the birds' migration route between West Asia and the western part of North Eurasia proceeds.

c) The government increased the budget of and their staff number in the nature reserve.

d) The government established two new populations of Asiatic wild ass (onager) in the central and the southeastern parts of Kazakhstan. At the end of the 1980s, some parts of the Asiatic wild ass population were resettled to central parts of Kazakhstan (the southern part of Betpakdala desert) and to the southern part of the Balkhash Lake area by governmental conservationists. The main purposes of that re-introduction were to preserve the population of Asiatic wild ass in Barsakelmes in conditions of limitation of fresh water there (salinization of the Aral Sea increased because of water level drop, and there was only one source of fresh water on the island) and to establish two new onager populations for conservation of gene type variability.

The Barsakelmes Reserve administration has built up an effective protection system for the whole continental territory that embraces fields of additional fundraising, advertizing campaigns concerned with educational broadcasts on media (TV, radio, newspapers, journals) and the cooperative inclusion of a broad circle of scientific institutions in order to provide ecological monitoring researches.

e) Several new protection posts were organized in the eastern side of PA with border signs and notices. Some security guards live in the village called Karateren that is located near to the reserve and local community. In that case guards could establish good relationships with local people, provide PR and effectively control violations (fire, penetration to reserve territory, illegal hunting, etc). Security guards were equipped with cars, mobile radio connection systems, and optic instruments, etc.

f) The protection system has a specific goal, namely to conserve threatened

species registered in the Red Data Book (in the Kazakhstan Red Data Book species are under legislative protection) that escaped from the reserve territory within the time of local migration. There are many represented animals listed in the Red Data Book: onagers, Persian gazelles, 25 species of birds and two species of invertebrates. In the period of 2002-2004, after the island joined together with the continental site, some (parts of large) mammals moved to the surrounded continental deserts (west part of the Kyzylkum desert). According to the count in 2004, about 150 onagers in the area of Kaskakulan and 10 Persian gazelles (as well as 153 saigas) in the former island of Barsakelmes were discovered. In that time around 1000 Persian gazelles moved to Kyzylkum desert in the south-eastern coast of Aral Sea. Several small projects devoted to nature conservation in Barsakelmes Reserve were implemented within the timeframe of several years which was supported by different non-governmental funds. Several scientific institutions, such as academic institutes (Institute of Botany, Institute of Zoology, Institute of Geography, Institute of Soil Science), Tethys Scientific Society, Center of GIS studying "Terra", etc. in(side) Kazakhstan and some scientific institutions from abroad (St-Petersburg University, Zoological Institute of RAS – Russia, Kyoto University and Tokyo University, etc. - Japan) have provided some ecological basic guidelines and conducted researches in collaboration with Barsakelmes Reserve. These kinds of international collaborations allow us to continue ecological monitoring observations. At the end of 2007, some results of this scientific research, devoted to environmental changes, will be published in a special monograph. Some TV programmes devoted to the biodiversity conservation of Barsakelmes Reserve were broadcasted on national (Khabar) and international TV (NHK, BBC World). Several video films were shot in collaboration with Kazakh, Russian, Turkish, and Japanese TV journalists. Many articles in newspapers (*Arguments and Facts, Izvestiya, Kazakhstanskaya Pravda, Kyoto Shinbun, Asahi*, etc.) and journals (Didar, DM, etc.) were published.

The local community was involved in the process of nature conservation in several regions (including Barsakelmes Reserve) through diverse local NGOs (Aral Tenizi, etc.) as well as international organizations (UNDP, GEF Small Grant ProgramME, WWF, Danish Fishers, etc.). The main goal of collaborations with local people is to decrease the anthropogenic press on nature ecosystems. The purposes of involving the local community are to find economic niches for former fishermen, to find alternative sources of energy (wind, solar instead of wood), to struggle against poverty (organizing small business), to raise awareness in regard to ecological knowledge and to provide ecological education for children. Specific attention of local community in nature conservation was directed to the Syrdarya delta system of lakes. It is an important area for economical activities, such as hunting, fishing, and haying).

Future

At the present time the conservationists are suggesting the idea of establishing a biosphere nature reserve on the ground of Barsakelmes Reserve. A new form of protected area is seen as significant in order to strengthen the protected systems of nature and the interaction with indigent people for the increase and maintenance of the sustainable use of natural resources and development. The main idea of the biosphere nature reserve is to combine wild nature and human economic activities for sustainable development and to find an appropriate balance between humans and nature. It is difficult to protect regional significant components of biodiversity outside of the Barsakelmes Reserve. For example, saxaul forests (*Haloxylon spp.,* main tree in the Aral Sea region), Aral Sea wetlands and floodplain meadows, shrub lands and forest plantations in the dry seabed with dominance of whole northern region of Aral Sea. It is attempted for rare and endemic species, Turan desert plant communities and numerous habitats of Red Data Book species of flora and fauna. Large mammals expanded their own distribution areas from the former BarsakelmesIsland to continental deserts (on 300-400 km). Some (parts) of the Asiatic wild ass population migrate(s) to irrigation canals in summer time because of a lack of drinking water in Barsakelmes, but they return back to (the) peninsula in winter. Small herds of *saiga tatarica* are observed in wider parts of the territory (everywhere, but mostly in Barsakelmes). Large parts of the

Persian gazelle population moved to Kyzylkum desert and Karakalpakstan (southern Aral Sea area in Uzbekistan) and stay out of PA. In that case, establishing a biosphere reserve is extremely important for the future of conservation systems in the northern parts of the Aral Sea.

Photo: Former south coast
of Barsakelmes Island
(by L. Dimeeva)

Photo: Wasted ships on sand
(by R. Jashenko)

Conclusions

During the last 15 years, the territory of the reserve has undergone transformatory changes due to the decrease of the sea water level. It has changed from a pure island into a continental area. Climate change highly affected huge swathes of the Aral Sea. The processes of aridization, desertification, and chemical pollution have brought a lot of ecological troubles to nature and local people living in the northern and eastern parts of the Aral Sea area. At the same time, within the last five years in conditions of vast economic growth in Kazakhstan, the government could accumulate financial support to this area and develop a protected area system. The territory of Barsakelmes Nature Reserve was expanded tenfold. The quality in management and capacity building of the reserve has also increased. Concerning these modern and contemporary conditions, experts proposed the idea of establishing a new form of PA in this region – the Biosphere Reserve.

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3.2 Biodiversity Change in the Northern Part of DPR Korea by Global Warming, Mr. Ho Kum Chol, DPRK

Introduction of recent climate change of DPRK by global warming

DPRK is located in the north-western part of the Asian continent (131°52′40″~124°10′47″ east longitude, 43°00′36″~ 33°06′43″ north latitude), and the area of the land amounts to 122,762 km^2 It has the Korean East Sea to the east and the Korean West Sea to the west, bordering China and Russia between the Amnok River and the Tuman River in the north. DPRK has four distinct seasons with a typical temperate climate, and the annual average precipitation is about 1,000 to 1,200mm. About 80 per cent of the territory is covered by mountainous areas, with a rather dense concentration of rivers and streams. However, recently destructive abnormal weather conditions such as typhoons, heavy rain, drought and severe cold periods have appeared more than before, accompanied by an increase in temperature and precipitation caused by global warming. The annual average temperature is 8.5℃ in regard to the last 5 years, 0.3° C higher than the average. The average temperature in DPRK is increasing by 0.2℃ every 10 years, as much as 2.7 times higher than the rising speed of global average temperature, even though it has increased 0.074℃ at the same rate for the last 100 years. Warming will likely continue for five years from 2013 to 2017 in DPRK. According to the data, it is expected that carbon dioxide density in the air will rise to 0.044 per cent exceeding the current 0.039 per cent, and a 0.6-0.7℃ rise over the average temperature by the year 2020. Meanwhile, it is assumed that the average temperature in DPRK will rise to 0.5℃ annually, and it'll reach 9℃ by 2017. Risks of threats such as flooding by heavy rain, typhoons, and storm waves caused by destructive abnormal weather are increasing in accordance with pervasive global warming. In this way, trends of recent maintained abnormal weather have a considerable impact on the biodiversity of DPRK.

1. Current trend and state of biodiversity change by global warming

We studied trends of the distribution change of species and communities in accordance with global warming in some areas of the north such as Ryanggang Province, North Hamgyong Province and Mt. Paektu Biosphere Reserve by using many recent research works.

2. Latitude and altitude rise in distribution area of species

Rise in temperature in the air by global warming has caused change in the distribution region in the northern part of some plant species, known in the past that those are distributed only in the area south of the middle part of DPRK. As a result, eight plant species–are newly added into plant inventory in the north area of DPRK. (table1)[5]

Table1: newly added plant species in the north area (Ryanggang Province, North Hamgyong Province)

Name of species	Distribution in the past	**Newly added distribution area**
Lespedeza robusta	middle, south part	**Northern part (Yonsa-Musan)**
Acer ginnala var.divaricatum	middle	**Northern part (Hueryong)**
Cynanchum japonicum Morr.	middle	**Northern part (Rason)**
Eragrostis poaeoides	middle, south part, Jeju island	**Northern part (Hueryong)**
Limnorchis hologlottis	middle, south part	**Northern part (Yonsa- Peak Kwanmo -Rason)**
Pterygopleurum neurophyllum	middle, south part	**Northern part (Paekam)**
Angelica distana	middle, south part	**Northern part (Hyesan)**
Acer ukurunduense var.pilosum	middle, south part	**Northern part (Hyesan - Samjiyon-Peak Begae)**

Recently, as it's related to the rising of annual average temperature by global warming, some plants distributed in the southern area have appeared in the northern part, such as Ryanggang and North Hamgyong Province. It's predicted that the move up north of the southern plants will appear around the whole northern area. A rise in temperature by global warming affects the latitude of plant cultivation. According to some investigations of scientists, they estimated the cultivation latitude of subtropical economic plants will change when the annual average temperature in DPRK rises as much as 2°C. If the annual average temperature gets up 2°C in coastal regions nearby the eastern sea of the middle part , reaching 12-13°C, then it will be possible to cultivate subtropical plants like persimmon trees (*Diospyros kaki*) in that area and introduce them in southern areas of North Hamgyong Province. There is a possibility to cultivate some plants with little cold resistance such as bumboo (*Phyllostachys reticulata*) in the coastal region of South Hamgyong Province. [3] A rise in temperature in the air by global warming is also the main reason for the biodiversity change in Mt. Paektu Biosphere Reserve. In the Jong Il Peak area of Mt. Paektu Biosphere Reserve, the annual average temperature was -1.3°C by the 1970s; it reached -1°C by the 1980s and -0.9°C by the 2000s. Around Lake Chon of Mt. Paektu, the annual average temperature was recorded as -8.3°C in the past, but it was -6.5°C in the first decade of the 21st century. In accordance with this, the permafrost located in the alpine zone (the boreal zone), which is much higher than 2,000m above sea level, is being gradually melting, and the melting speed is accelerating more and more. Succession of plant communities and flora formation is being promoted by such a warming of the weather in Mt. Paektu. The forest line in Mt. Paektu Biosphere Reserve has moved up as much as nearly 1,200m on the ground surface (1,850m→1,900m above sea level), and vertically 50m. It can't be questioned that the current forest line will move up more than before, hence the Siberian larches (*Larix sibirica*) will become a dominant species, while those ~~crow~~ and then the shade tolerant plants like *Abies nephrolepis* and *Picea jezoensis* will gradually predominate. Due to plant cover changes in the Mt.Paektu area, not only the kind of trees in the high tree layer and distribution structure, but also species and distribution under the tree layer are changing, so that wild animal and plant distributions are becoming different. The Korea larch (*Larix olgensis*) is replaced with *Abies nephrolepis*,

Picea jezoensis in the forest of Mt. North Phothae, Mt. South Phothae, and the core areas like Chong Peak, Pyegae Peak, and also in some buffer zones like Mu Peak the Korea larch is replaced with white birches (*Betula platyphylla*) and aspens (*Populus davidiana*). Then the the tree, shrub and herbal layers are changing. *Pinus pumila* and *Thuja koraiensis* are lively forms in areas more than 2,000m above sea level. In accordance with formation of the flora and plant community succession, plant species diversity is being enriched. [2,10,11]

Table 2 Taxonomic structure of plant species in Mt. Paektu Biosphere Reserve

taxon	gymnosperm	angiosperm		total	added number of species
		dicotyledon	monocotyledon		
family	3	99	11	113	302
genus	5	311	53	369	
species	7	1072	625	1644	

There are 302 species in total in Mt. Paektu Biosphere Reserve (15 in Jong Il Peak, 90 in Lake Chon). This means that 18 per cent of total plant species have been newly added to the list of Mt. Paektu during the last decade. [2,7,8] The enrichment of plant species in Mt. Paektu means the infiltration of new species from neighboring regions. It's necessary to investigate more on how much global warming contributed to species diversity enrichment, but it's clear that the distribution area of plant species is moving up in Mt. Paektu Biosphere Reserve by global warming, considering that among those species that are newly included in the inventory, many are distributed in lower regions of altitude and latitude. Especially, many newly investigated species at the shore of Lake Chon, like *Salix rorida*, *Salix hallaisanensis*, and *Betula gmelini,* are recognized as distributed at less than 1,700m above sea level. New animal species have appeared in Mt. Paektu Biosphere Reserve with the calescent weather. For example, recently approximately 11 unobserved birds species have appeared in the forest line (1,850~1,900m above sea level) of Mt. Paektu. *These include Saxicola torguata*

(stonechat), Upupa epopus (hoopoe), Fringilla montifringilla, Phylloscopus tenellipes, Phylloscopus scwarzi, Motacilla cinerea, Emberiza elegans, Emberiza yessoensis, Carduelis flammea, Phoenicurus auroreus, and *Strix uralensis*. [9]

3. Increase in the number of endangered species

In alpine areas like Chail Peak, which is located in the northern part of DPRK, the ascension of temperature by global warming threatens typical alpine plants.[1,4] *Betula fusenensis, Ribes ussuriensis, Sabina sargentii, Rhododendron chrysanthum, Berberis koreana,* and *Rhododendron brachycarpum* of Chail Peak are observed on a nationwide scale and recorded as endangered plant species. These plants survived in the lower land of DPRK, which was less affected by glaciers, while many others disappeared in the other parts by glacier impact during the period of the late Neogene and early Quaternary. When the glacier was thawing, these surviving plants gradually migrated to higher land in accordance with the prosperity of other plants. In particular, *Betula fusenensis, Sabina sargentii,* and *Rhododendron chrysanthum* can survive for a while because they are now in an independent position forming simple or self dominant communities in places that are much higher than 1,800~1,900m above sea level, but they are in danger of an expulsion by the dominants on the condition that the standard forest lines tend to gradually rise under global warming. Like this, the distribution range of wild blueberry, which is a typical and economic species of the Mt. Paektu Biosphere Reserve, is being reduced due to plant cover change (increase) in the high tree layer. In particular, *Ribes ussuriensis*, *Rhododendron brachycarpum,* and *Berberis koreana* are at a low density in the community composed of such dominants like *Betula ermai*, *Alnus sibirica*, *A. maximowiczii,* and *Betula paltyphll,a* which are predominant in that area.

It shows that these plants will disappear in the near future. Therefore, *Rhododendron brachycarpum* and *Ribes ussuriensis* can also be assessed as endangered species by result of the observation around Chail Peak. *Rhododendron brachycarpum* is mainly distributed in the site with the lowest thickness of first layer trees – that is, where shrubs and high weeds are growing on the mountainside, but

ecologically few individuals distribute on the top of the mountain. Broadleaf, needle leaf and mixture communities are distributed on the mountainside of Chail Peak, and they held the sites in a low or lowest thickness throughout. Consequently, *Rhododendron brachycarpum* is being driven away to the area higher than 2,100m above sea level, while on the other hand in the areas more than 2,100m above sea level *Betula ermanii*, *Pinus pumila* and *ledum palustre* groups are gaining predominance, so that *Rhododendron brachycarpum* is losing its sites altogether. Consequently, *Rhododendron brachycarpum* rarely distributes in a very low density between 2,000m and 2,200m above sea level. In the meantime *Ribes ussuriensis* is distributed around 1,600m above sea level, and most individuals are in the areas with comparatively low thickness of high trees, where it is humid. So if the sites are lack humidity and get dry, *Ribes ussuriensis* will lose its habitat. Since these species are endangered on a nationwide scale, it's necessary to pay attention to their conservation. *Aconitum vanunculoides, Geranium eriostemon var. ganescens, Coelopleurum nakaianum, Zygadenus sibiricus, Rhodiola ramose, Bergenia pacifica, Rhodiola elongate, Rhodiola angusta, Astragalus setsureianus, Viola biflora* and *Rheum coreanum* are recorded as endangered herb species on a nationwide scale. Among them, a decrease in species such as *Zygadenus sibiricus*, *Bergenia pacifica*, *Rhodiola elongate* and *Rheum coreanum* is definitely observed in the 1970s to 1980s. In particular, *Rhodiola elongate* and *Rheum coreanum* are in a more critical situation. Distribution of *Zygadenus sibiricus* begins from the forest line, and it can be observed in the *Juniperus sibirica* and *Salix berberifolia* communities at Chail Peak, but its individual density is very low. The research work about rising distribution areas and the increasing number of endangered species should be intensified in the future.

Conclusion

1. The distribution areas of species in the northern area including Mt. Paektu Biosphere Reserve are rising along altitude and latitude by global warming.
   - Eight plant species coming from the middle and the southern region are included in the plant inventory of the northern part of DPRK.
   - Species diversity in Mt. Paektu Biosphere Reserve is being enriched.
     Many plant species such as *Salix rorida, Salix hallaisanensis*, and *Betula gmelini*, were recorded in the past that those are distributed less than 1,700m above sea level, and almost 10 bird species of the lower distribution region, are now observed on the shore of Lake Chon and the forest line.
   - The cultivation latitude of subtropical plants like bamboo and persimmon has moved toward the north.
2. Typical alpine plants such as *Betula fusenensis, Ribes ussuriensis, Sabina sargentii, Rhododendron chrysanthum, Berberis koreana,* and *Rhododendron brachycarpum* are under the threat of global warming, and consequently the number of endangered species will increase.

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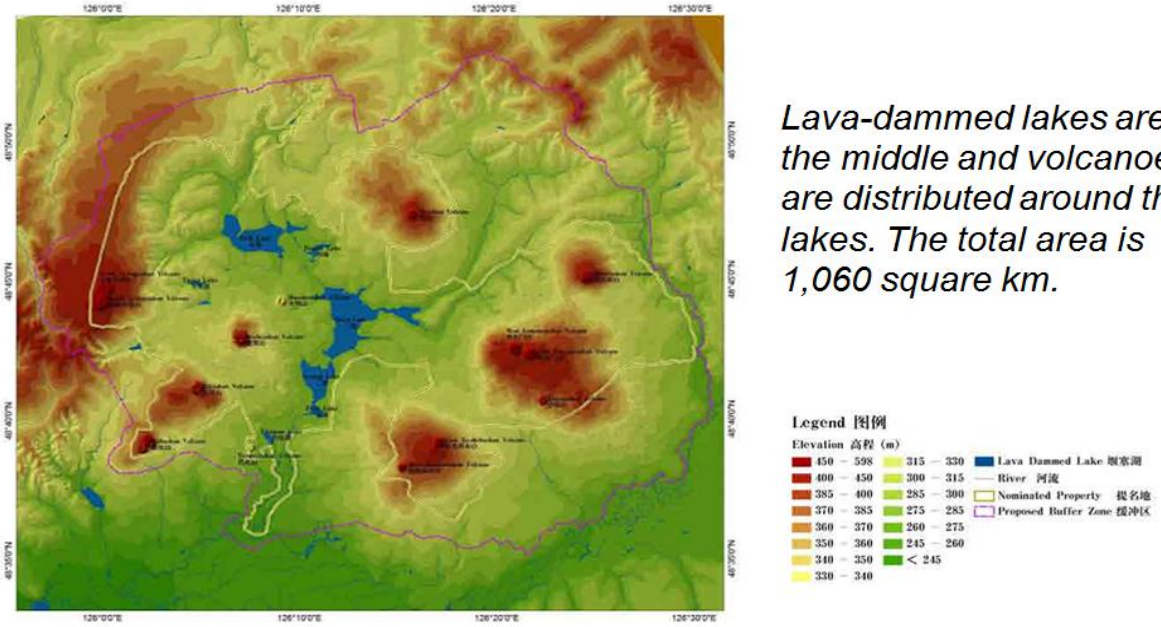
3.3 Introduction of the Wudalianchi BR and Social Consequences of Global Changes, Ms. Yongchao Si, PRC

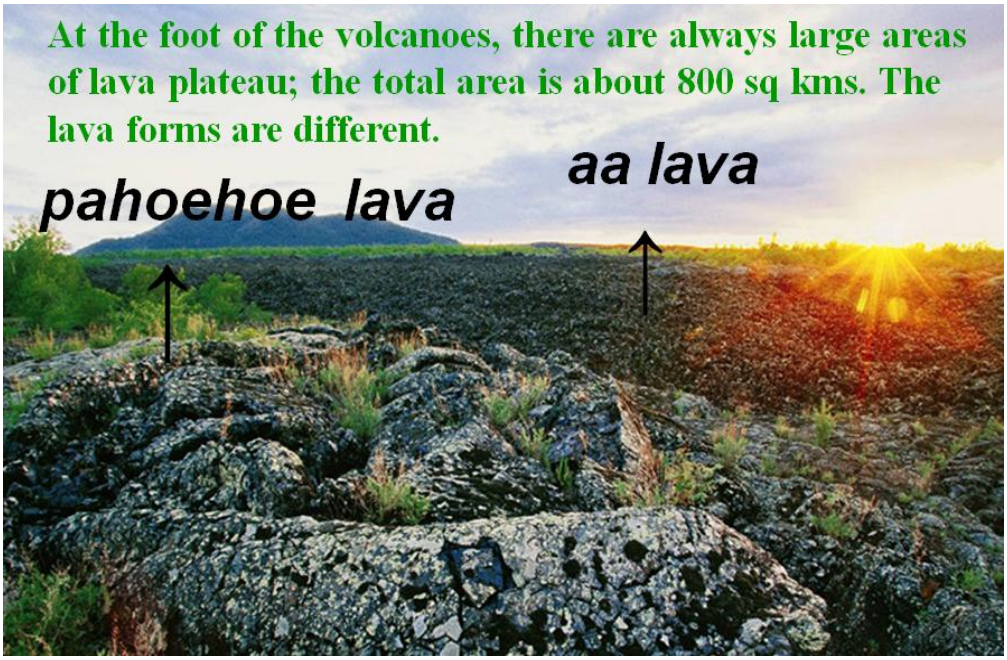
On behalf of the Management Committee of Wudalianchi Biosphere Reserve, I will share my views on the 'Wudalianchi BR and the Social Consequences of Global Changes'. First, I want to make a brief introduction about Wudalianchi BR. It is located in the north of Heilongjiang Province, China, at the intersection of Lesser Xing'an Mountains, Greater Xing'an Mountains and Songnen Plain. From the map below we can see the lava-dammed lakes are in the middle and volcanoes are distributed around the lakes. The total area of the reserve is 1,060 sqkm.



Elevation analysis map of Wudalianchi BR

Regarding geological values, there are 14 old and young volcanoes with different eruption ages ranging from 2.1 million years prehistory to 280 years ago. The south Gelaqiushan is the oldest, and there is still water in the crater. Heilongshan is the youngest one. It erupted during 1719-1721 and its crater is still very complete now. At the foot of the volcanoes, there are always large areas of lava plateau, with the total area of about 800 sqkm. The lava forms are different. The common three kinds of lava

in Wudalianchi BR are aa lava, pahoehoe lava, and block lava, which are shown in the two graphs below.



Besides lava, there are more than 1,500 driblet cones and driblet dishes in the reserve. They are extraordinarily amazing and rare in the world. There are also many

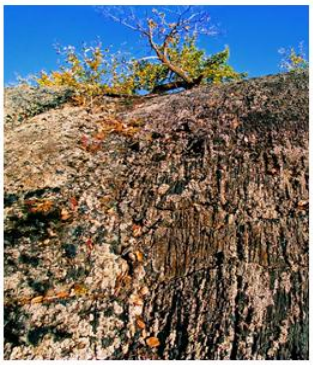
micro features such as lava fall, lava bombs, wavy-like lava, raft-like lava, rope-like lava, bread-like lava and so on. Shown in the graph below, they all look different. There are also lava tubes underground with stalactites in them. They are the internal transportation arteries of active lava flows.

There are more than 1500 driblet cones and driblet dishes, they are extraordinarily amazing and rare in the world.

Driblet cones and dishes

Typical driblet dish

Volcanic bomb



Lava fall

Wavy-like lava

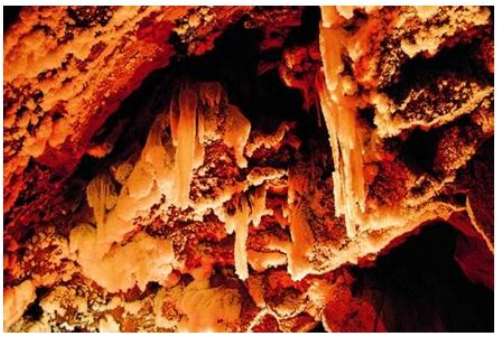
Raft-like lava

Rope-like lava

Bread-like lava

Man-like lava

Reptile-like lava



There are lava tubes underground with stalactites in them. They are the internal transportation arteries of active lava flows.

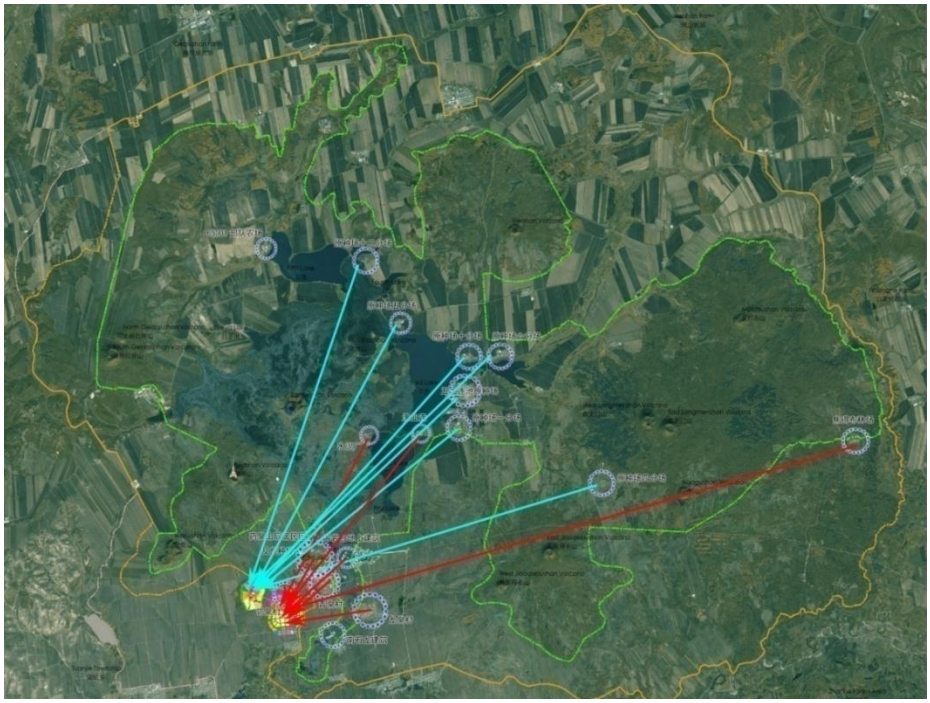
There are two primary and integrated vegetation succession series. One is terrestrial succession, from Lichen, moss and fern→Herb→Shrub→Forest (Pioneer forest, Transitional forest and Stable forest). Another one is aquatic succession, from Submergiherbosa →Free floating plant community→Fluitantes community→Emergent community→Swamp →Trophophyte community. Since 2003, Wudalianchi has been a Biosphere Reserve (BR). From then on, it has been endeavouring for protection, development and logistic functions as the core points of the reserve. Until 2012, Wudalianchi BR had been working on comprehensive environmental protection projects, with a total investment of nearly RMB 800 million. In order to reduce the impacts of human activities on the natural environment, a very important step has been taken since 2010. More than 3,000 families who lived in core areas and buffer zones moved to transition areas, where a new town was built. We can see the great changes from the pictures below. This was a fishing village near the lake three years ago, but now the houses are all torn down.

In order to reduce the impacts of human activities on natural environment, a very important step are taken since 2010. More than 3000 families who lived in core area and buffer zone were moved to transition area, where a new town was built. We can see the great changes from the pictures below. This was a fishing village near the lake three years ago, but now the houses are all tore down.

In another example shown in the graph below, the tall buildings were pulled down and now it is a beautiful public garden.

This is another place; the tall buildings were pulled down and now it is a beautiful public garden.

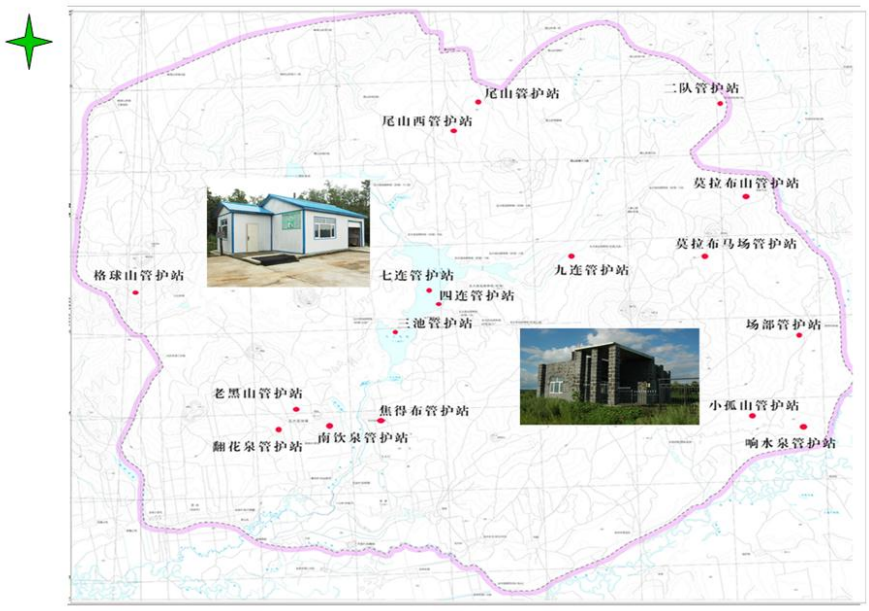
The map below illustrates the movement of people from core zones of the reserves to a newly built town. This town is called the new tourism town. It is located at the southwest of the reserve, far away from the core area and the buffer zone. Although it is still under construction, many people have moved to it and more people are expected to come. Another beneficial point concerning the relocation, which can be added, is the highly improved living standards of local residents.



The town is located at the southwest of the reserve, far away from the core area and the buffer zone. It is still under construction and more people will be moved in. By the way, the living standard of local residents is greatly improved.

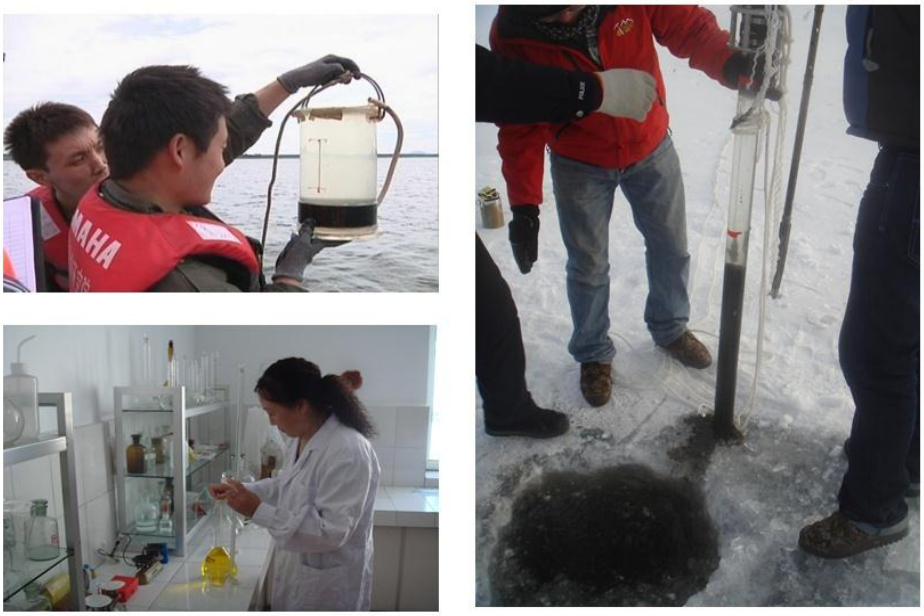
New houses in new town

At the same time, a large area of farmland near the lava-dammed lakes and lava plateaus has been returned to forests, and the overall ecological system services are enhanced. The graphs below show the distribution of 17 Resource Management and Protection Stations in the reserve.



Distribution Map of 17 Resource Management and Protection Station

The two graphs below show research and monitoring activities on geology and biodiversity and the digital monitoring system.



Research and monitoring activities on geology and biodiversity.

Wudalianchi BR has been trying hard to explore local resources scientifically and find effective ways of implementing sustainable development suitable to the principles of humans and nature. We also have a mineral water production line. The local sustainable agriculture has rapidly developed and the local food is very delicious. In fact, it is a recent changing trend that eco-tourism has increased in Wudalianchi BR. The number of visitors and tourism income increase continuously every year. Most of the visitors come to Wudalianchi in order to explore the beautiful landscape, enjoy mineral water or conduct scientific research. More plank roads for protection of the geological relics and wildlife, as well as various facilities related to visiting, hiking, mountain climbing and recreation were built. Eco-tourism facilities with translations in Chinese, English, Russian, Japanese and Korean have also been constructed.

Since the 1950s, global integration has accelerated. This era has witnessed incredible global changes in communication, transportation, and computer technology, which brought Wudalianchi into a new era in its own history. Wudalianchi has built a friendly “sister” relationship with Baotianman BR in Henan Province and Saihanwula BR in Inner Mongolia Autonomous Region. We also built the friendly “sister” relationship with Jiju Island BR in Republic of Korea and Cilento and Vallo di Diano BR in Italy, to enhance protection and mutual development. There are international cooperative activities every year. Meanwhile, many global issues and challenges have emerged or intensified, such an accelerating process of climate change, a loss of biological and cultural diversity, rapid urbanization, and so on. Humans are altering the planet’s biogeochemical cycles in a largely unregulated way with insufficient knowledge of consequences. But, as the same problems occurred in Wudalianchi BR, such as immense increases in water level and rainfall in recent years, the local people have paid much more attention to protection and sustainable development. A good example of this is that they are happily willing to move from core areas and buffer zones. They want to protect their beautiful home. A wide range of environmental education and training programmes have been carried out for students, teenagers and local people to raise public awareness. Until now, there have been 621 BRs around the world, which is a high number. It is imperative for every BR to take measures to respond effectively to

global challenges and grasp advantageous opportunities. In Wudalianchi, the Protection Planning Objective System including four levels has been set out. Each of the four levels covers the following eight aspects: habitat conservation, ecological value display, community coordination, visitor impact management, environmental protection, monitoring and assessment, scientific research support, and management capacities. However, these are not sufficient yet. Wudalianchi BR will further promote sustainable development through the harmonious co-existence of human beings with nature and contribute to the development of BRs worldwide through continuous monitoring and research on Wudalianchi BR against climate change and other global changes.

3.4 Reform of Protected Areas Management, Ms. T. Erdenechimeg, Mongolia

With this presentation let me briefly introduce the innovative policy issues that are launched by the Ministry of Environment and Green Development.

As part of their commitment to the Convention on Biodiversity, the government of Mongolia has made legislative commitments to set aside 30 per cent of its territory (46.9 mln.ha) as protected areas by 2030. The Biodiversity Action Plan (1996) and the National Programme on Protected Areas (Pas) (1998) provide the legal basis for this extension of Mongolia's PA network. This commitment was made again under a Millennium Development Goal resolution in 2005 and remains a target for the Mongolian government. Currently, a total of 99 Pas, which account for 17.24 per cent of total territory, are obtained under state protection. Some 32 Protected Area administrations with more than 550 staff are established at local level to take over the management of PAs. The successful conservation was only possible with the experience, achievements and heritage of our previous generation and our ancestors.

In order to achieve sustainability and to solve actual problems, we have to meet challenges in the near future. Let me explain why reforms or innovation are needed in order to achieve more effective management of Mongolia's PAs and what actions have been undertaken so far to implement this reform. The PA network is expanding and new administrations are established, and state allocation portion of the budget has increased year-on-year, with 80-90 per cent of the total budget spent on staff salaries and operational costs. Therefore, there is an extreme need to ensure sustainable financing of activities related to conservation objectives planned in the PA management plan. There are various financing options to ensure the implementation of management plans for PAs, including traditional and innovative financing mechanisms. There is a need for evaluating Pas in the network, the application of payment for ecosystem services, retention from payment for land use, violations and entrance fees. Surveys and studies are ongoing with regard to these issues and provisions to the revised Law on PAs are proposed.

The details of this are going to be introduced in further presentations.

It was mentioned earlier that a total of 32 PA administrations are responsible for the management of PAs in Mongolia. Upon expansion of the PA network, protected area administrations are established accordingly. The new policy will not be putting pressure on the state budget with a creation of new structure to establish more administrations. There is a need to strengthen the regional research and training centres suitable for Mongolian specific conditions. We are not aiming at having many Rangers located at each mountain pass, but rather at monitoring and inspection practices based on vulnerability and risk assessment. This in turn requires innovative mechanisms by conducting environmental inspection, monitoring and natural resource auditing.

Until now, the state has been responsible for the management of PAs and the functions of PA administrations. Currently, three PAs are managed by NGOs. Initiatives on implementing co-management approaches, transferring the management rights to NGOs, entities and local communities have started on a contractual basis under certain conditions. But the legal provision is lacking to implement this thoroughly hence these issues are proposed in the revised law and are currently being discussed. There is a lack of understanding of buffer zone development in regard to the general public and concerned stakeholders. Reducing the threats to PAs and Improving people's livelihood in buffer zones is the main purpose with regards to turning buffer zones into a green development supported area. Therefore, a relevant policy is in development and this issue is reflected in the revised law, and has been discussed among the population. It should be noted that tourism is an important source of revenue for PAs and the main factor that increases the economy of the PA network. Tourism has evolved in PAs without any planning and any research. We have a lack of tourism infrastructure and information centres that meet the requirements of tourists and visitors in order to provide appropriate camping facilities and travel possibilities in PAs. Public criticism of disordered locations of tourist camps are one of the heated issues and challenges of our sector. It's clear that this kind of development has an adverse impact on the

biodiversity of PAs. Therefore, it needs to be changed and reform is urgently required to resolve this critical issue. Tourism in PAs should be planned based on the assessment of capacity of Pas, and thereof infrastructure should be developed accordingly. Also, the law provision on allocation of land for tourism based on the PA management plan is reflected in the revised law. The proposal of the revised Law on PAs, which merged the previous Law on PAs and Law on Buffer Zones, has been discussed among the population throughout the country. The Mongolian government is planning to submit this law to the Parliament in 2014. We have informed you of some of the issues reflected in policy reform towards Mongolia's protected areas and activities that have been undertaken so far. If all activities planned in the framework of the policy reform are implemented, we would be able to reach international standards congenial to Mongolia's PA concepts, approaches, objectives and conservation management. However, substantial improvements will be made towards sustaining the ecological balance and improving the concept of green development in Mongolia.

3.5 Adaptation to Climate Change for Biodiversity Conservation in the Biosphere Reserves of the Russian Portion of the Altai-Sayan Ecoregion, Dr. Tatiyana Yashina, Russian Federation

Altai-Sayan Ecoregion: climate change and biodiversity

The Altai-Sayan Ecoregion (ASE) is located at the centre of Asia in the transition zone between the northern hemisphere boreal forest belt and the steppes of Western Siberia. The Altai and Sayan Mountain systems, semi-deserts, and deserts of China and Mongolia are at equal distance from the world's four oceans. The Altai and Sayan Mountain systems form the highest part of the watershed separating the basin of the Arctic Ocean from the inner montane areas of Asia. The eco-region represents the geographical and geopolitical heart of Asia where the borders of Russia, Kazakhstan, China and Mongolia meet. Of an overall territory of 1065 thousand sqkm, 659.9 thousand sqkm (62 per cent) lie within the borders of Russia (fig. 1, Table 1), 29 per cent Mongolia, 5 per cent Kazakhstan and 4 per cent China. It would be no exaggeration to describe the Altai-Sayan eco-region as the 'water tower' of Central Asia. Glaciers in Altai are numerous and are well documented due to a history of previous study. According to research[1], there are 1,500 glaciers in Altai with a total area of 906 sqkm. In the Sayan portion of the ASE the scale of contemporary glaciations is relatively small. The distinctive qualities of the natural conditions of the ASE, its predominantly mountainous terrain, remoteness from industrial centres, low density population and relatively low level of economic development in the southern part of the region where large river drainage is formed, account for the high quality of its natural waters, both fresh and mineral. This adds to the high current and future value of this area as a region producing drinking quality fresh water, one of the key natural resources of the future. The eco-region's spatial and temporal climate and environmental gradients are conditioned by the vast physical extent of the eco-region, its significant altitudinal range, as well as by its location at the centre of Asia at the junction of the subcontinental watersheds of the basins of the Artic Ocean and the inland depressions of Central Asia.

[1] Dolgushin L.D., Osipova G.B. 1989. Glaciers. "Nature of the World" Series. Moscow, 447 pp. [in Russian]

Together with the complex geological structure of the region, this has led to the formation of highly diverse natural ecosystems and their modes of functioning.

WWF has identified the Altai-Sayan as one of the 200 World's Global Eco-regions based on its unique biological, landscape, and historical and cultural diversity. The territory of the ASE is one of the world's most outstanding examples of highly concentrated habitat diversity. Its ecosystems are among the richest in biodiversity across Northern Eurasia and the region has the fullest series of altitudinal vegetation belts of all Siberia. Geographically, the region is represented by extremely diverse biomes, such as mountain tundra, and a mosaic combination of forest, desert, semi-desert, steppe and wetlands inhabited by a variety of species. These ecosystems are characterised by diverse natural conditions and are unique in their functioning. The ASE is one of the last remaining habitat areas of the Altai mountain sheep 'argali' (*Ovis ammon ammon*). Aside from argali, the Altai and Sayan Mountains are inhabited by another large mammal species: 'irbis', or snow leopard (*Uncia uncia*). These two animals have become the living symbols of the eco-region and are indeed 'flagship' species, as it is believed that the conservation measures required to ensure their protection will provide for the conservation of the entire system of mountainous communities in the Altai and the Sayan.

Similar to other parts of the world, the climate in Altai-Sayan has never been stable. Alternating periods of warming and cooling have been recorded throughout the Holocene (over the past 10,000 years). Changes in climate have generated responses to the region's environment. Cooling periods are marked by active glacier growth, particularly in the mountains, as recorded by moraine deposits of different ages that have significantly increased areas of periglacial tundra. Likewise, in periods of warming, vertical shifts of mountain forest and mountain-steppe altitudinal belts occurred. An analysis of time series data derived from weather stations in the region shows a gradual, synchronous increase in average annual air temperature in all altitudinal belts, on a background of inter-annual fluctuations. The minimal annual temperature increment rate has been recorded at high altitudes, where mean annual temperature increase over the

past 50-year period is 1.3-1.7º C. Maximum increment rates have been recorded in the large intermontane basins of Altai and Tuva, where annual increase in temperatures over the same period is 2.6 – 3.7°Ñ. This trend of climate change determines a number of consequences for unique biodiversity of the ASE. Firstly, over the past decade a consistent growth trend in fire frequencies has been observed[2]. Over the past decade the interval between extreme risk fire seasons has not exceeded two to three years. At the same time, within the context of a permanently high numbers of non-forest fires, a particularly rapid increase in the number of forest fires has been observed over the past few years. Secondly, the results of landscape structure modelling on a regional scale under different climate scenarios show that if current trends continue or amplify, changes will occur in the configuration of the main altitudinal belts, including their vertical shift upwards on montane slopes[3]. These results have been confirmed by a number of paleogeographic reconstructions, indicating the higher altitudinal position of montane forest and montane steppe zones in warmer historical periods. According to a number of researchers, climate change in the region will probably give rise to range shifts of key forest forming tree types. It is expected that shifts will occur in habitat areas of dark-coniferous forests with a fir and pine mix, and then there will be an increase in forests of a more complex composition resulting from a greater percentage of light-coniferous and deciduous tree types. In connection with increased aridity in the region as a whole, it is also likely that the steppe ecosystems of South-East Altai, Khakassia and Tuva will transform into more arid ecosystems, dry steppe and semi-desert. This effect may be amplified by the human impact on these areas caused by unregulated grazing, which at the present time is intensely evident in neighbouring Mongolia. Taking the trends observed in climate-induced transformation of alpine vegetation cover into account, one may assume that in the mountains of the Altai-Sayan eco-region it is the flora and vegetation of the subnival belt on the tops of the highest ridges and mountain ranges that will be mostly affected. It is more difficult to clearly define the direct threats and impacts that future climate change conditions will bring among animal species than

[2] Fire Hazard Mitigation: A Strategy for protected Areas of the Altai-Sayan Ecoregion. 2011. Manuscript. Report. V.N. Suchakov Institue of Forestry, SB RAS, Krasnoyarsk, 275 pp. [in Russian]

[3] Climate Change and its Impact on Ecosystems, Population and Economy in the Russian Portion of the Altai-Sayan Ecoregion: Assessment Report/ Ed. A.O. Kokorin; World Wild Fund for Nature (WWF Russia). M., 2011. 168 pp.

among plant species. There are many reasons for this, although in particular, animal species have a greater ability to migrate, as well as a generally higher adaptive capacity. Climate change induces habitat changes, thus it tends to have an indirect effect on the populations of bird and mammal species.

Climate change adaptation for biodiversity conservation

In order to reduce threats to unique biodiversity of the ASE, in 2011 under the UN Development Programme Project, 'Expansion of the Protected Area Network for the Conservation of the Altai-Sayan Ecoregion', financed by the International Climate Initiative of the German Government, the Climate Change Adaptation Strategy for Biodiversity Conservation was developed for the Russian portion of the region[4]. The Strategy is designed to be intersectoral and is devoted to the field of environmental protection. The focus of the strategy is conditioned by the high global significance of the Altai-Sayan eco-region for the conservation of biological and landscape diversity.

Since the climatic signal and its implications for biodiversity in the Altai-Sayan isnot as obvious as in other regions (e.g. the Arctic), priority should be given to the measures of proactive adaptation. Studies should be carried out to assess the impact of climate change on biodiversity and identify vulnerability. In addition, measures should be taken to reduce non-climate related risks to vulnerable species and ecosystems. This will enable c onservation of the natural resistance of species and ecosystems to climate change and reduce the risk of hazardous changes. The strategy provides for measures that can be taken in the medium term (10-15 years). The measures proposed will help to reduce the element of uncertainty in climate change predictions and the impact of climate change on natural ecosystems and biodiversity as well as increase the natural resistance of species and ecosystems to climate change.

The proposed strategic adaptation measures are grouped into several target programmes that include:

[4] Climate Change Adaptation Strategy for the Conservation of Biodiversity in the Russian Portion of the Altai-Sayan Ecoregion. Krasnoyarsk, 2012.

- Scientific and applied research, information support and development of adaptation methods
- Establishing a regional integrated system for climate, biodiversity and ecosystem monitoring
- Improving preparedness for climate change and its consequences
- Creation of regional framework for environmental management
- Reducing non-climatic threats to vulnerable species and ecosystems
- Management of watersheds and vulnerable species habitats
- Education, awareness-raising and public support
- Accounting for climate change in land use
- International cooperation management

Piloting climate change adaptation in the ASE

In order to implement key provisions of the Climate Change Adaptation Strategy in the ASE, protected areas including four BRs of the region (*Katunskiy, Altaiskiy, Sayano-Shushenskiy and Ubsunurskaya Kotlovina BRs*) were selected as pilot sites. Within the BRs basic activities were targeted to (1) establish a comprehensive system of monitoring climate and ecosystem change and (2) increase capacities for fire prevention.

For detecting signals of climate change and its consequences for biodiversity, vulnerable ecosystems of the BRs were identified; namely alpine ecosystems, located at the summits of mountain ridges, and upper treeline ecotone as well as glaciers and snow cover, which dynamics determines the water cycle of the high-elevated watersheds and habitats.

To provide comparison, internationally recognized approaches and protocols for monitoring were used. For meteorological monitoring, requirements of the World Meteorological Organization (WMO) were taken into account. Monitoring of alpine ecosystems was organized, using the approach and protocols of the Global Research

and Observation Network in Alpine Environments (GLORIA[5]) developed by Vienna University. For glaciers monitoring, approaches of the World Glacier Monitoring Centre (WGMS[6]) were implemented. In addition, an interactive information system and database was developed for processing the monitoring data. All these activities allow the use of BRs as internationally relevant global change monitoring sites, which is recommended by the Madrid Action Plan for BRs.

Climate change adaptation measures include not only monitoring system within the UNESCO MAB GLOCHAMOST project, but also the outlines of the climate change adaptation strategy for Katunskiy BR were developed based on a participatory approach. The general aim of the strategy is to maintain ecosystem services of the territory of Katunskiy BR and to reduce the vulnerability of local communities to global change. The general guiding principles for global change adaptation strategy for the BR are as follows:

- Using adaptive management to maintain flexibility
- Monitoring and tracking changes in weather, hydrology, ecosystems and land use
- Identifying possible futures through modelling;
- Maintaining the resiliency of ecosystems and minimizing stress at the core zone
- Raising public awareness on the effects of global change
- Implementing model projects on sustainable use of natural resources in changing conditions.

Key objectives include:

1. Refining the monitoring programme to detect the signals of the effects of climate change and land use on the natural ecosystems. This monitoring system, guided by the GLOCHAMORE Research Strategy, has been implemented in Katunskiy

[5] PAULI, H., GOTTFRIED, M. et al (eds). The Gloria Field Manual. Multi-Summit Approach. Luxembourg: Office for Official Publications of the European Communities. 2004 – 89 pp. Available at http://www.gloria.ac.at/downloads/GLORIA_MS4_Web_english.pdf

[6] www.wgms.ch

BR since 2006. It is focusing on complementary monitoring of vulnerable ecosystems and components of the environment. Key targets of this activity are:

- Meteorological parameters along altitudinal gradients
- Water balance of high-altitudinal catchments
- Glaciers
- Snow cover
- Alpine ecosystems (monitored using the GLORIA approach [Pauli et al 2004])
- Ecotone of the upper treeline
- Species composition and productivity of typical vegetation communities along altitudinal gradients
- Populations of large mammals
- Changes in ecosystems caused by human activities (effects of recreation and grazing).

2. Strengthening the partnerships with research institutions for modelling changes in hydrology, biodiversity and ecosystems. In 2006, the Research Consortium of the Katunskiy BR was established, and it includes seven universities and institutes which conducted the monitoring and research activities within the BR according to the general medium-term research plan adopted by the BR administration. The results of all these studies are integrated into the joint database and serve as the baseline for further modelling.
3. Providing migratory routes for large mammals by implementing the concept of connectivity conservation [7] and strengthening cross-border cooperation with Katon-Karagaiskiy National Park (Kazakhstan). The cross-border cooperation was initiated in 2004 and it includes a number of joint activities such as information exchange in the field of law enforcement and breakers, research expeditions, and educational activities for local people at both sides of the border, etc. Eventually, a cross-border biosphere reserve will be established.

[7] Worboys, G.L., Francis, W. and Lockwood, M. (eds). 2010. *Connectivity Conservation Management: A Global Guide*, IUCN, Earthscan, London.

4. Developing educational and interpretative programs on climate change related issues for different target groups (children, farmers, decision makers, visitors, etc.)
5. Implementing model projects on (1) alternative energy supply (equipping ranger stations and high-altitudinal apiaries with solar batteries, mini-hydropower schemes and solar cookers) (2) sustainable tourism (focused on the most stressed areas in the transition zone) and (3) diversification of vulnerable economies (Altai wapiti farms). The third type includes developing tourism within Altai wapiti farms, marketing additional Altai wapiti products such as meat, setting up small enterprises for processing raw materials into pharmaceutical products, etc. These projects are implemented with support from the UNDP-GEF Project Biodiversity Conservation in the Russian Portion of the Altai-Sayan Eco-region, WWF Russia, US Fish and Wildlife Service and other NGOs.

The way forward

The Altai-Sayan is a transboundary region which determines its values both in a natural and geopolitical context. The distribution area of individual species and communities, areas of high natural values, habitats and animal migration routes often extend across the state borders of the countries comprising the Altai-Sayan: Russia, Kazakhstan, China and Mongolia. Given these circumstances, effective biodiversity conservation in the eco-region demands cooperation and coordination in the environmental protection efforts of all four countries. This is particularly the case under conditions of a changing climate, which stimulates active species migration. Therefore, transboundary cooperation for biodiversity conservation, climate change related studies, monitoring and development of concrete adaptation strategies and plans are of high importance for this unique region. At the same time, the BRs of the region could serve as field laboratories for monitoring, researching, developing and testing approaches for the adaptation to climate change not only in the biophysical realm, but also with relation to socio-economic settings.

3.6 Synergistic Impacts of Habitat Destruction and Climate Change on Biosphere Reserves in Humaid East Asia, Dr. Masahiko ohsawa, Japan

Introduction

The Biosphere Reserve (BR) of the UNESCO Man and the Biosphere (MAB) Programme, which started in the 1970s, is one of the first to have a zoning system in the reserve (cf. Fig. 1) to achieve the dual objectives of nature conservation and human welfare through socio-economic development. A nature reserve of any kind is subjected to multi-scale impacts of human activities, enterprises and related influences, e.g. grazing by cattle and other domestic animals, various agricultural practices, urbanization, and climate change. The impacts of human activities are multi-scaled, and the measures to mitigate those impacts also need to be multi-scaled (Fig. 1).

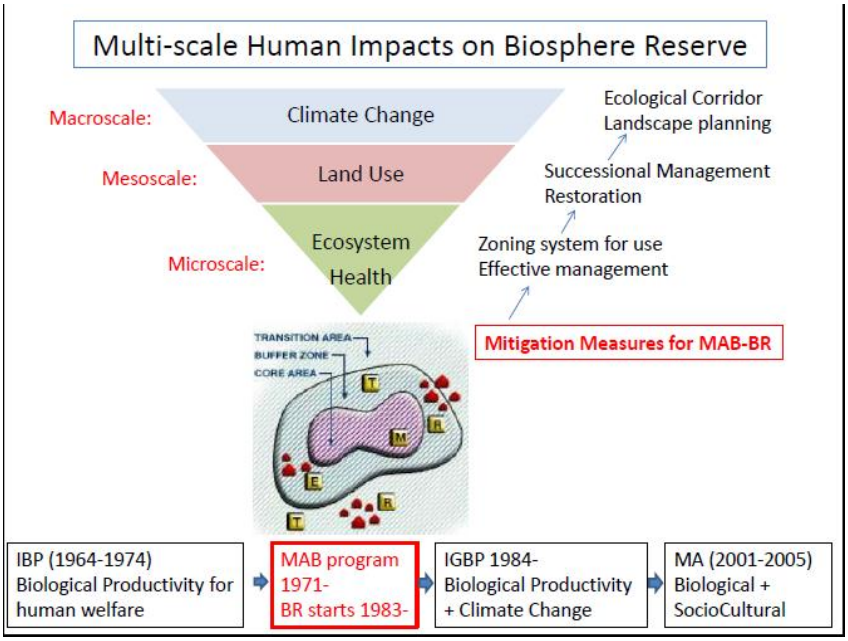


Fig. 1 Multi-scale system of nature reserves under human influences

The international scientific community has been trying to cope with these issues by inventing various programmes to collaborate with various disciplines, such as scientific, socio-economic, and cultural areas. A notable such project is the International Biological Programme (IBP) organized by ICSU and other organizations (1964-1974), primarily aiming at the fulfillment of the increasing human demands for food, which are

provided only through the essential biological production of plants. Biologists, particularly ecologists, mainly led the project. Approaching the end of the project cycle, people were aware of the deterioration of ambient environments, such as air/water pollution, and the destruction of natural habitats/environments by human alteration of natural ecosystems. Human enterprises such as agriculture, forestry, and fishery practices inevitably exhausted or destroyed natural environments through the rapid development of biological production. These situations required new additional projects that aimed at better or harmonious reconciliation of nature and human society. The UNESCO MAB is one of such projects. The Biosphere Reserve (BR) Network of MAB is the major focal project to preserve various natural ecosystems as well as biota (flora and fauna) contained in reserves throughout the world. The development of the project so far (2013), with 621 BRs in 117 countries, could cover most of the major biome (ecosystem) types throughout the world. However, habitat destruction is still continuing because of the increase in human activities, and the increase in atmospheric CO_2 levels that cause another global change: global warming. This required another international project, known as the IPCC (since 1988) to cope with global warming. The ICSU also started a post IBP project, the International Geosphere-Biosphere Programme (IGBP, 1984-1992) as the further development of IBP through adding another aspect of global change in the physical environment, orgeosphere, which was especially required because of the fact of global warming. The important point of the IGBP project was, however, not only climate change but also changes in land use and atmospheric composition as the components of global change (Fig. 2) (IGBP 1992).

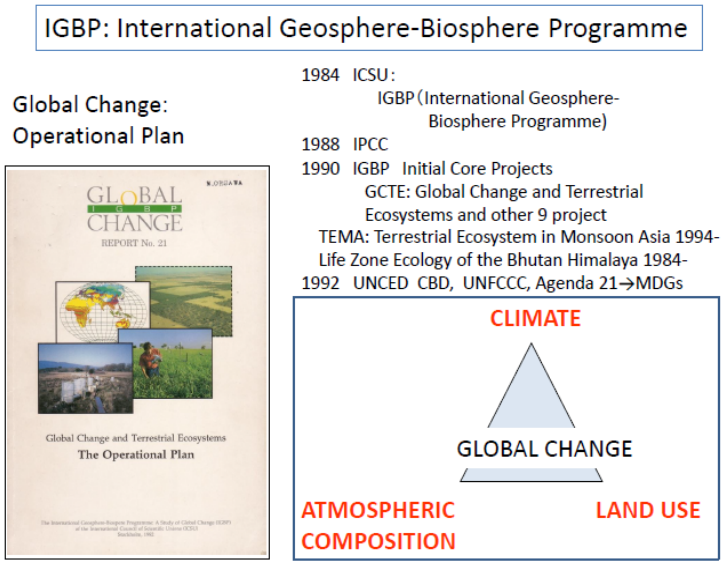


Fig.2. IGBP concept of global change.

Thus, the human alteration of Earth's ecosystems was recognized as the complex interacting processes of several components, and the changes are ongoing with us now. We are living in a human-dominated planet and our dominance will increase (Vitousek et al. 1997). The recognition of changing the Earth through our own activities helped to develop another global project, the Millennium Ecosystem Assessment (MA, 2001-2005) through the initiative of the primarily ecologists (Mooney 1991). The projects clarified the importance of scientific assessment that was based on scientific monitoring and research, and it led us to recognize the importance of ecosystem services for human survival and well being (MA, 2001-2005, Hassan et al. 2005).

Through this brief overview on the historical development of human recognition on the global environment and better management of natural resources, which supports our own survival, it leads us to further recognition and re-emphasis of the importance of the development of the Biosphere Reserve Network. This nework is aimed at three objectives since its initial phase of development (Franklin 1977), 1) conservation of genetic diversity, 2) environmental research and monitoring, and 3) environmental education. Thus the Biosphere Reserve itself is still recognized as the key site for integration of human activities, conservation of biodiversity including flora and fauna, and ecosystem services which make our survival possible through sustainable use of natural resources. Beside the above-mentioned three points, we should add one more important aspect: scientific assessment, particularly in terms of environmental research and monitoring The Biosphere Reserve Network should also stress to provide facilities for education and training of young people. It is the prerequisite for sustainable development of human society and the understanding of natural-ecosystem processes and conservation of pristine nature, including flora and fauna biodiversity. UNESCO Biosphere Reserves should be the sites for this purpose.

1. The Biosphere Reserve system of Japan and its significance for the conservation of Japan's major ecosystem

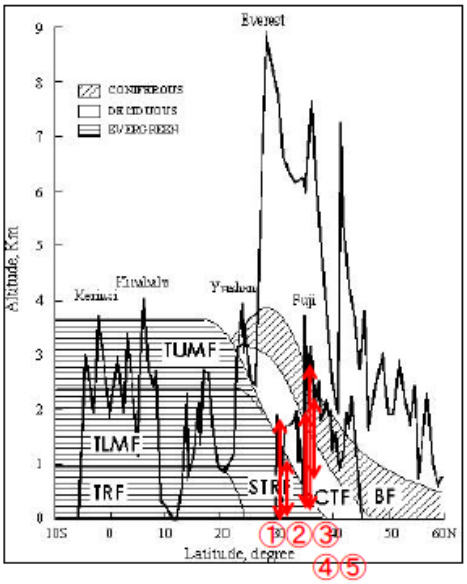
In Japan, we now have five BRs (Aruga 1999, Iwatsuki & Suzuki 2007), as depicted on the vegetation template for humid East Asia to show their location in the

vegetation zones in Fig. 3 (Ohsawa 1990, 1993). Among them, four Biosphere Reserves designated in 1981, i.e., Yakushima BR, Mount Odaigahara-Mount Omine BR, Mount Hakusan BR, and Shiga Highland BR, were primarily intended to be used for preserving pristine nature after the heavy destruction of nature during the rapid economic growth period of Japan (1955-1973). Thus, the zoning of the BR areas was composed of only a core area and the surrounding buffer zone, and there was no transition area as emphasized and re-defined in the MAB Biosphere Reserve concept through the reform of the concept after the Seville strategies in 1995 (Ohsawa 2013).

Japan's five BRs at a glance

Japan's five Biosphere Reserves are rather biased in their coverage of diverse ecosystem types.

1. Two are in the southern island of Kyushu. Three are in the main island of Honshu.
2. There are no representation of Shikoku and the northern-most island Hokkaido.
3. There are no representation of coastal and alpine ecosystem types.



	Altitude, m		NL	EL	Area ha			
	Lowest	Highest			Core	Buffer	Transition	Total
①Yakushima BR	0	1935	30 15	130 23	7559	11399		18958
②Aya Biosphere Reserve	26	1071	31 59	131 15	682	8982	4916	14580
③Mt Odaigahara/Omine	200	1915	34 10	136 00	1000	35000		36000
④Mt Hakusan BR	170	2700	36 10	136 50	18000	30000		48000
⑤Shiga Highland BR	800	2305	36 43	138 30	1000	12000		13000

Fig. 3.The location of Japan's five BRs indicated on the mountain vegetation template (altitude-latitude matrix) for humid East Asia (modified after Ohsawa, 1990, 1993).

The transition zone in the BR zoning system has been reemphasized by the new concept of BR (after the Seville strategy in 1995), which aims at reconciliation of local community development, including sustainable nature conservation. The main intention

of the concept is not to exclude, but rather to include local people as active guardians of biodiversity in the Biosphere Reserve. For this purpose, it is necessary to support their livelihood to facilitate conservation objectives. Following the Seville strategy, the Japanese MAB committee has newly designated the “Aya BR” in Miyazaki, Kyushu, and southern Japan, where the subtropical and/or warm-temperate type of evergreen broad-leaved forests (EBLF) are dominant (Ohsawa 2013).

Japan’s five BRs virtually cover most of the three major zonal forest ecosystem types, such as the subtropical and/or warm-temperate rain forests (Yakushima BR) and warm-temperate rain forests (Aya BR, Mt Odaigahara-Mt Omine BR), which are both dominated by evergreen broad-leaved forests (Udvardy’s “Japanese evergreen broad-leaved forest,” Udvardy 1975), cool-temperate deciduous forests (Hakusan BR) (Udvardy’s Oriental deciduous forest), and cold-temperate (subalpine) coniferous forests (Shiga Highland BR) (Figs. 3& 4).

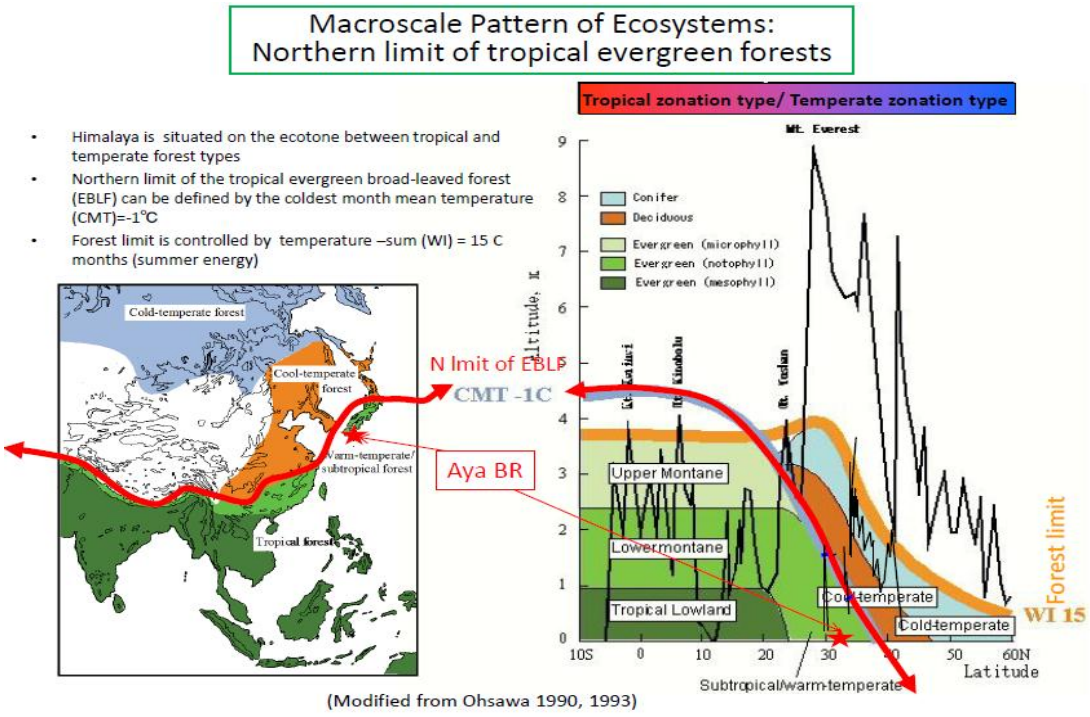


Fig. 4 Vegetation zones and mountain vegetation belts in South-East to East Asian mountains with major climatic factors controlling vegetation boundaries. Winter coldness (coldest monthly mean temperature CMT) equals -1°C,, which controls the northern limit

of evergreen broad-leaved forests, and temperature sum (WI) equals 15°C monthS, which controls forest the limit on high mountains (Ohsawa 1990).

2. Why natural forests should be restored instead of man-made forests (an example of Japan's newly designated Aya BR)

Aya BR located in the small town of Aya (population c.7,300), Miyazaki Prefecture, Kyushu Island, Southern Japan, and it has an area of 9,521 ha and nearly 80 per cent of that is the forested land of natural, semi-natural, and plantation forests. Among the forested area, nearly 26.4 per cent was designated as core area and protected as a forest ecosystem reserve of the Forest Agency in 2008, and the rest of the sites were used for environmental education (15 per cent), sustainable use of forestry (18.3 per cent), and secondary forest (a forest that has re-grown after a major disturbance) and man-made mono-specific plantation (40 per cent) due to the expansion of the plantation forest policy (late 1950 to 1970). This latter area was recently used for the project sites to convert and restore the natural evergreen broad-leaved forests from the present man-made mono-specific conifer plantation of *Cryptomeria japonica* and *Chamaecyparisobutusa*. The natural forest is the thelauro-fagaceous type of evergreen broad-leaved forest (EBLF) ecosystem, which used to cover the Southern half of the Japan Archipelago, of which only 1.6 per cent of the whole country area now exists.

Japan is located in the northern limit border area of EBLF of tropical origin (Fig. 4) (Ohsawa 1990, 1993). The forest type is unique, and the "Japanese Evergreen Forest" is classified as a separate category in Udvardy's Biogeographical Classification System (Udvardy 1975). In general, the subtropical latitudes around 30°N is below the climate of subtropical highs (anticyclone), and thus the dry type of ecosystems such as deserts, savannahs, sclerophyllous forests of the Mediterranean type prevail. The East Asian maritime climate, in which Japan is included, is, however, classifised as a strong monsoon climate, and has an even distribution of rainfall (>50 mm/month) throughout the year (no drought stress).

The Ministry of the Environment (then the Environmental Agency) of the Japan government conducted a nationwide survey of vegetation and identified that the subtropical and/or warm-temperate evergreen broad-leaved forests (EBLF) of Aya town and its surroundings are the largest remnants (EA, 1996), which cover nearly the Southern half of Japan (Ohsawa 2013). The Southern half of the Japan Archipelago has been intensively utilized for agricultural development and residential areas since ancient times, and therefore the forests are fragmented into small patches and sometimes remained only in sacred places like shrines and temple forests. The newly designated Aya BR is one of the largest among the remaining EBLF.

There are several nationwide nature reserve networks in Japan. Most of them are intended to preserve nature from the impact of development activities, and so in general those areas have only a “core area (± buffer zone).” Such “naked-core area”-type reserves are often subjected to the direct impacts from the surrounding non-reserve areas in various ways. For example, one of the five wilderness areas of Japan, the Oi-gawaGenryu-bu wilderness area in central Japan, has no buffer or transition zones and was heavily impacted by grazing wild Japanese Sika-deer (*Cervusnippon*). Within the wilderness area, hunting is strictly prohibited and therefore the deer population increased –some deer hide in the reserves, which results in a high concentration of population that causes serious problems of over-grazing of understory/ground vegetation or even bark-peeling of bole trees.

To the contrary, the zoning system of UNESCO MAB-BR, in which the core area is surrounded by a buffer zone and further transition area, is expected to be effective for the better protection of the core area to avoid direct impact from outside, and at the same time it can be utilized to benefit the livelihood of local people through various ecosystem services such as organic farming, small-scale cottage industry and the brewing industry. Education and/or recreation activities in the transition area are one of the most important activities as MAB-BR.

3. The climate change impacts on tertiary relic species of EBLF in East Asia

The changes in mountain forest zonation along latitudinal gradients are pronounced, particularly in humid monsoon Asia where there is continuous extension of humid forest climate from equatorial mountains to the northern latitudinal limit of forests in the Arctic zone (Wolfe 1979, Ohsawa 1990, Ashton 2003).

Japanese EBLF is situated around the Northern limit of evergreen broad-leaved forests of tropical type (Ohsawa 1990). The Northern limit of this forest type is marked by winter coldness (CMT=-1°C), which damages evergreen leaves during winter (Ohsawa 1990). Thus, beyond this EBLF limit, deciduous and/or coniferous forest of temperate type is dominant, and there is a clear boundary between tropical evergreen broad-leaved forests and temperate deciduous forests in the transition zone of these two forest types (tropical and temperate at around 30°N). Moreover, in this transition zone, notably the tertiary relic trees of both coniferous/deciduous habits can survive (e.g. *Cryptomeria, Chamaecyparis, Metasequoia, Ginkgo*, *Magnolia,* etc.) (Tang et al. 2011, 2012, 2013). The relic trees can survive only where the competition with the modern trees is ameliorated at around the marginal habitats for these modern evergreen and deciduous broad-leaved trees (cf. Bond 1989). Therefore, if the climate change causes a local shift of the critical climatic factor such as CMT equals -1°C isotherm, which controls the Northern limit of evergreen broad-leaved forests of the tropical type (cf. Fig. 4), it may push the neighbouring species' habitat out (Ohsawa 2006). Even such a small change in temperature can do harm. If the condition appears in a critical season like a winter of temperate latitudes, it may cause serious effects at the interface between different life forms of tree species such as evergreen vs. deciduous and angiosperm vs. gymnosperm. These conditions are particularly important where there are many relic species that could have survived past climatic changes through symbiotic relations with human beings or a traditional way of life, e.g., protected by the belief of 'Feng-shui' forests of local people in East Asia (Tang et al. 2013).

4. Synergistic impact of habitat destruction and climate change

Human-induced alterations affecting the ecosystem on earth are interacting with processes related to various human enterprises, such as the agricultural, industrial and tourist industries, as well as globalization and many other factors. These activities resulted in changes in land use, global biogeochemistry and biotic additions from invasive species, and losses of species by hunting and fishing, and all these alterations resulted in global climate change through increased greenhouse gasses and land cover changes, and loss of biological diversity through extinction of species or even loss of ecosystems (Vitousek et al. 1997). The land use change through human-induced activities and social and/or economic changes in a certain local community strongly interact with the other component. The changes in human activities alter the global as well as local environments (Fig. 5) (Ohsawa and Kitazawa 2009).

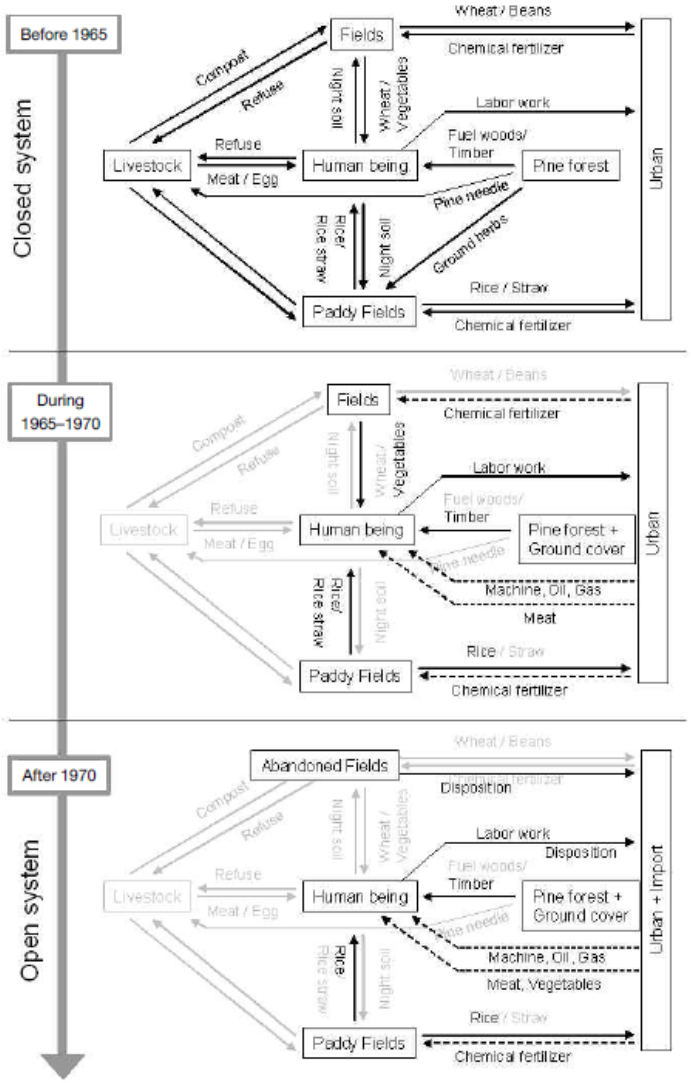


Fig. 5.Changing pattern of ecosystem components, structure, and dynamics of goods and energy in Japan's rural community since 1965 (after Fujii 1981). The compositional changes induced the subsequent changes in system characteristics; from a closed system to increasing characteristics of openness that require import of goods and energy from outside, leading to the characteristics of an open system (Ohsawa and Kitazawa 2009).

In the suburbs of Tokyo, mechanization and intensification of

agriculture after the high economic growth periods in the 1970s introduced tractor power instead of raising horses or cattle working animals. The change of this biological component into mechanization caused drastic changes in matter cycling in rural villages, and it inevitably forced the import of other materials such as fuels for machines, chemical fertilizers, and even products from the cattle or horses such as meat, milk and others.

The quality of ecosystems is also important. For example, compared to man-made mono-specific plantation forest, the natural forest has a higher degree of species diversity, and is functionally more diverse and effective to provide various ecosystem services such as water and leaf-litter (organic manure) sources and landslide regulation in terms of the Millennium Ecosystem Assessment (Hassan et al. 2005).

Human-caused habitat destruction increasingly limited the natural biota to small patches of original habitat isolated by extensive areas of human-dominated urban or agricultural lands. Habitat destruction in conjunction with climate change may surely cause species extinction and loss of adequate ecosystem services. To mitigate this, the measures to enhance colonization of new biota habitats, such as ecological corridor to ensure the species population regeneration through complex habitat mosaics with various disturbance regimes within reserve area, may surely enhance the probability of survival of a multi-species system.

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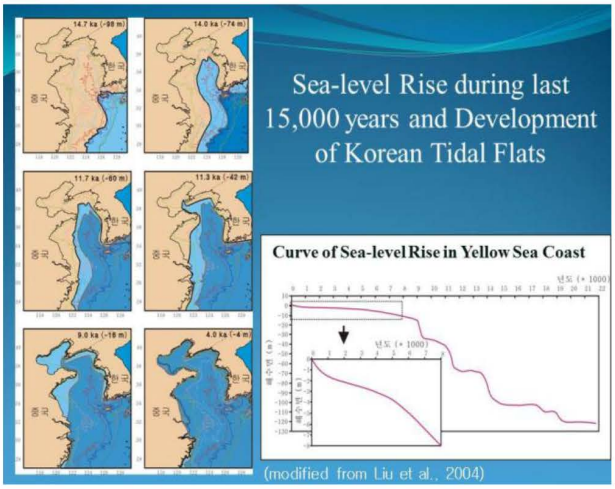
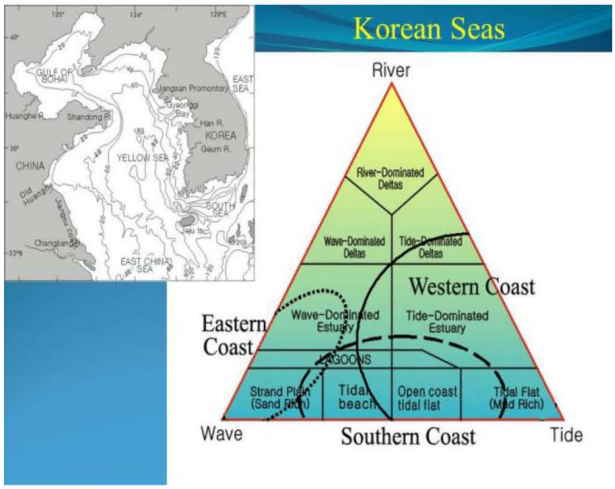
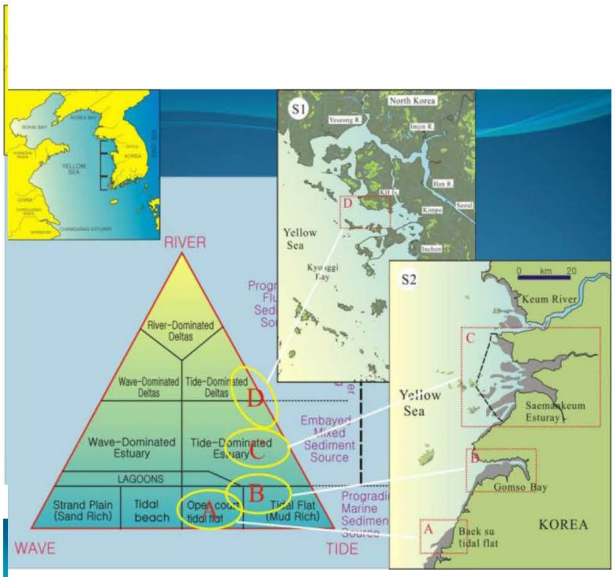
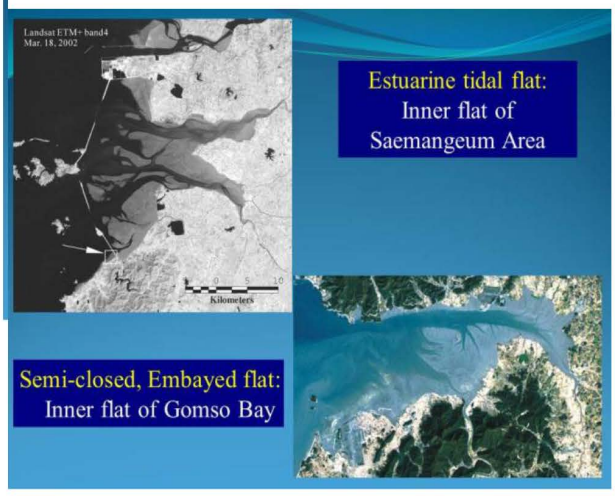
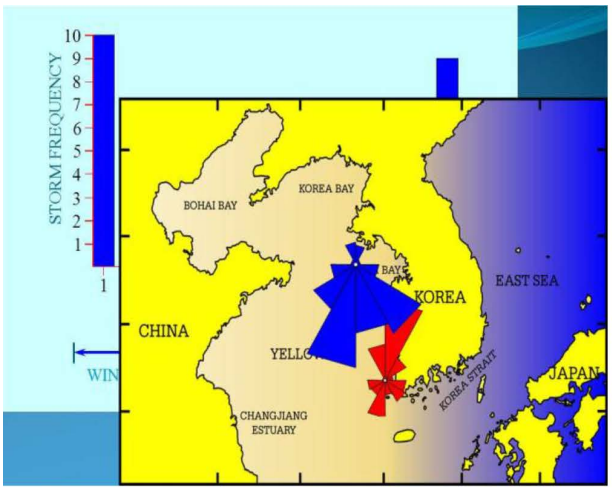
3.7 The current Status of the Coastal Protected Area of the Republic of Korea and its Prospects, Prof. Seung-soo Chun, Republic of Korea



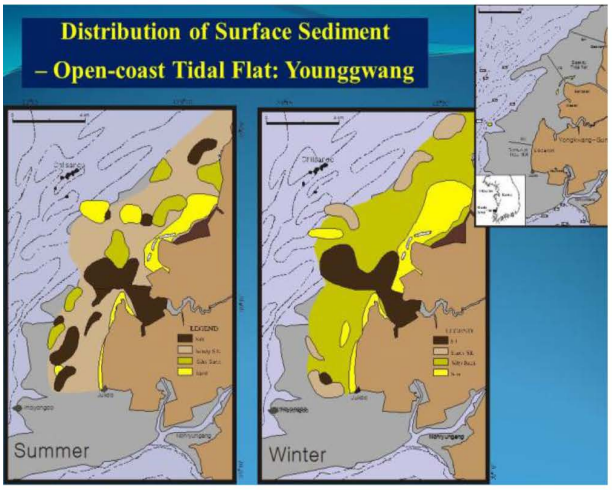


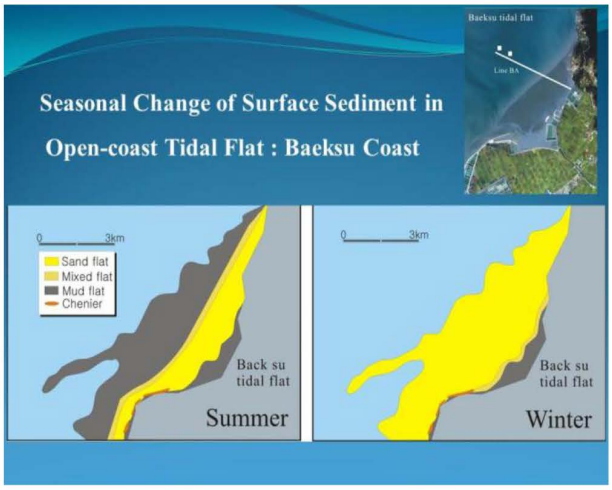




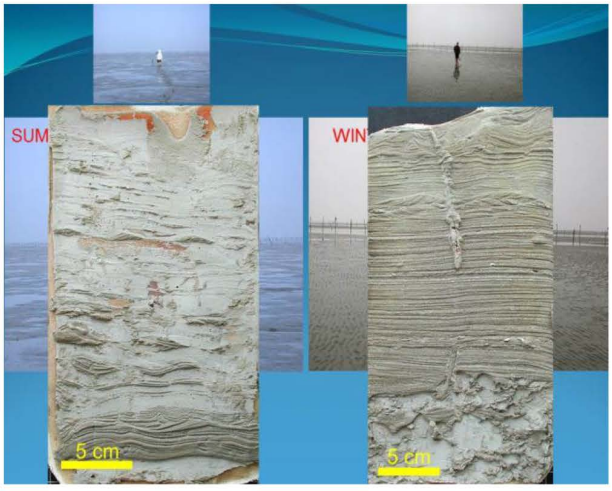

STORM FREQUENCY
10
9
8
7
6
5
4
3
2
1
BOHAI BAY
KOREA BAY
KOREA
EAST SEA
CHINA
JAPAN
KOREA STRAIT
CHANGJIANG
ESTUARY

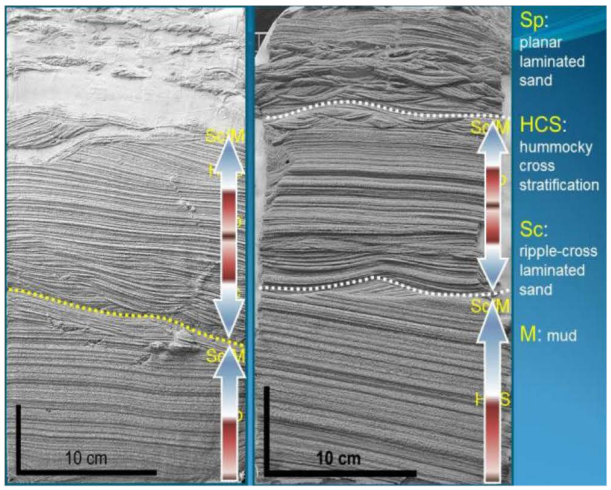

해양보호구역 현황
범례
경기도
강원도
충청북도
충청남도
경상북도
전라북도
경상남도
전라남도
제주도
Protected
Coastal Wetlands
(Tidal Flats) and
Marine Protected
Area in Korea

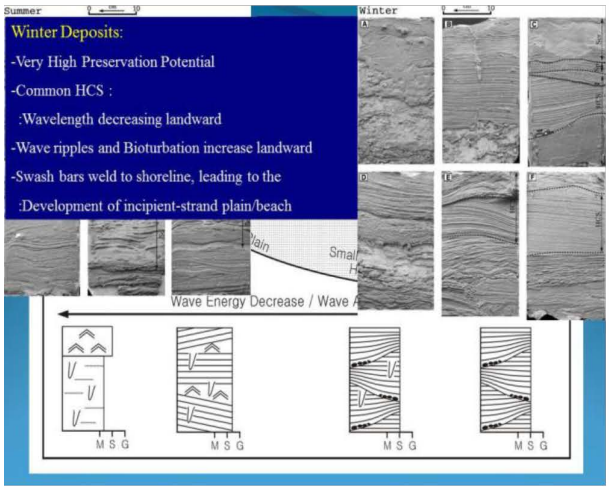

Distribution of Surface Sediment
– Open-coast Tidal Flat: Younggwang
Summer
Winter


Seasonal Change of Surface Sediment in
Open-coast Tidal Flat : Baeksu Coast
Baeksu tidal flat
Line BA
0
3km
Sand flat
Mixed flat
Mud flat
Chenier
Back su
tidal flat
Summer
Winter


Spring (March, 1999)
Summer
Mud Patch
Fall (September, 1999)
Winter

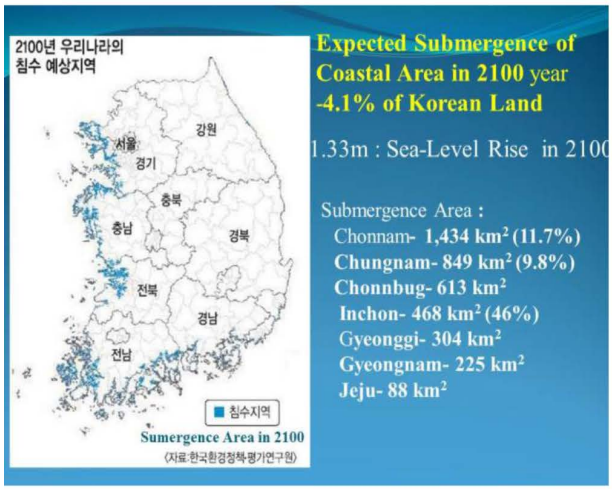

SUM
WIN
5 cm
5 cm





Seasonal Change of Sedimentation & Evolution Pattern

	Seasonal Change	Dominant Facies		Important Depositional Processes		Vertical Pattern With Sea-level Rise
		Summer	Winter			
A Open-Coast	Clear	Mud Flat	Sand Flat	Wave>Tide Migration of Swash bars	C - U	Retrograding Erosion of Surface
B: Embayed	Outer- Clear	Mud Flat	Sand Flat	Wave>Tide Migration of Swash bars	C	Retrograding Erosion of Surface
	Inner- Slight	Mud Flat	Mud Flat	Tide>Wave Vertical Settling	F - U	Prograding No Erosion
C: Estuarine	Outer- Slight	Mixed Flat	Sand Flat	Tide>River>Wave Tide/Wave Mixing	C - U	Retrograding No Erosion
	Inner- Not Clear	Mud Flat	Mud Flat	Tide>River Tidal Current Vertical Settling	F - U	Prograding No Erosion
D: Deltaic-to-Estuarine	Not Clear	Sand/Mixed/Mud Flats		River>Tide>Wave River Input	C - U	Prograding No Erosion


2100년 우리나라의
침수 예상지역
강원
서울
경기
충북
충남
경북
전북
경남
전남
침수지역
Sumergence Area in 2100
(자료:한국환경정책평가연구원)
Expected Submergence of
Coastal Area in 2100 year
-4.1% of Korean Land
1.33m : Sea-Level Rise in 2100
Submergence Area :
Chonnam- 1,434 km² (11.7%)
Chungnam- 849 km² (9.8%)
Chonnbug- 613 km²
Inchon- 468 km² (46%)
Gyeonggi- 304 km²
Gyeongnam- 225 km²
Jeju- 88 km²

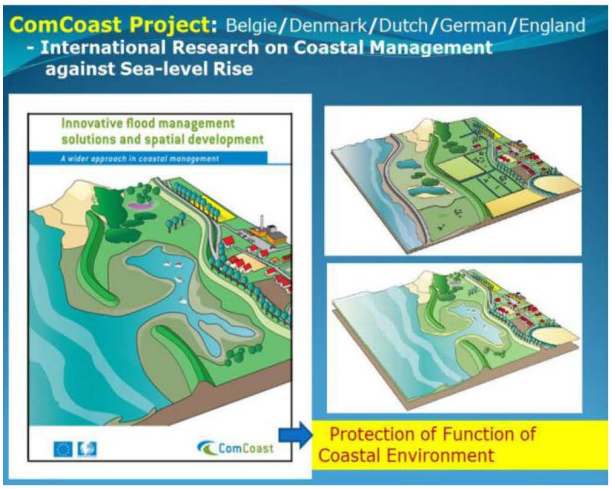

German Coast : Dyke and Salt Marsh


Restoration of German Salt Marsh

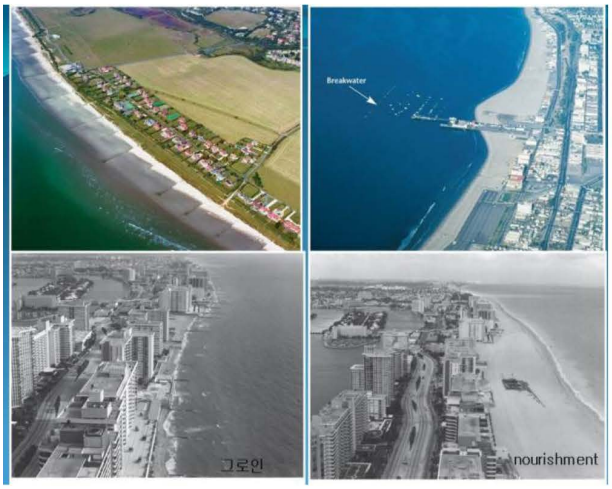

Coastal protection in Wadden-Sea Area


Restoration of Salt Marsh in German and Dutch Coast


1996
8.2m
1.9m
1982
6.3m
Rise in Height of
German Dyke
Against Future
Sea-level Rise


ComCoast Project: Belgie/Denmark/Dutch/German/England
- International Research on Coastal Management against Sea-level Rise
Innovative flood management solutions and spatial development
A wider approach in coastal management
ComCoast
Protection of Function of Coastal Environment


DELTARAAD
From line defence to coastal defence zones


Breakwater
그로인
nourishment


German Case: Lahnung (bush fence)
Restoration of Dune
Gentle lower slope of Dyke & Dune


Future of Korean Yellow-Sea Coast!
Sea-Leve Rise!
Coastal Erosion and Submergence!
Severe Change of Coastal Environment & Habitats as well as Human's
What can we do for future?


We need to make programs for:
Restoration of Coastal Environments & Habitat
Salt Marsh Restoration
Dune Restoration
Restoration of Estuary (Big and Small Rivers)
Prevention of Tidal Beach and Tidal-Flat Erosion
Stabilization of High-tide Coastal Line
Increase of Sediment Supply
Decrease of Coastal Slope (also Dike Slope)
No More Collection of Marine Sands and Gravels as Construction Material
Dyke Reconstruction in Some Sensitive Area
Thank you for your attention!

3.8 Mitigation Planning to Balance Development and Conservation at Landscape Scale, Mr. D. Galbadrakh, TNC, Mongolia

The world is changing more rapidly each day. Fast-paced development threatens some of our most cherished lands, waterways and wildlife. Over the next two decades, energy and infrastructure companies will invest more than US$22 trillion in new projects around the world, with the potential of enormous environmental impacts.

Most of the development is likely to happen in developing countries such as Mongolia. As of March 2012, 0.3 per cent of Mongolia's land has active mining leases and 15.9 per cent has active prospecting leases. Much more land is open for mineral and oil leases. It is a challenge for the country on how to balance its development needs with conservation goals.

The Nature Conservancy has developed a tool called 'Development by Design' to help our partners to make a balanced decision about development and conservation. 'Development by Design' is a science-based mitigation planning process that balances the needs of planned development, such as mining, oil and gas, and infrastructure, with those of nature conservation. The aim is to bring efficiencies to mitigation planning that are transparent and transferable to industry and regulators, complementary to the environmental assessment process, and support "no net loss" of biodiversity values.

'Development by Design' is applied at two distinct spatial scales: first at a landscape level to evaluate conservation priorities, assess cumulative impacts in the region, and ensure conflicts between conservation priorities and development conform to the mitigation hierarchy (Steps 1 &2); and second at a project level to assess site-level biodiversity impacts and design an offsets strategy for mitigating these impacts (Steps 3 & 4). This four-step process is summarized below.

1. Develop a landscape conservation plan: Where are the highest priority areas for conservation and ecosystem services in the region?

Key tasks:

- Assemble stakeholder groups to support analysis with expert and stakeholder opinion.
- Compile list of representative biological targets and gather spatial data.
- Develop eco-regional conservation portfolio.
- Incorporate ecosystem services and climate change factors.

2. Blend landscape planning with mitigation hierarchy: How can development conform to the hierarchy (i.e., when impacts should be avoided and when offsets are appropriate)?

Key tasks:

- Compile data on existing and projected cumulative impacts on the region.
- Identify conflicts between the conservation portfolio and potential impacts. Make recommendations for applying the mitigation hierarchy based on biodiversity criteria of vulnerability (degree of threat) and irreplaceability (rarity/uniqueness), and potential for "re-drawing" the conservation portfolio to meet conservation goals elsewhere in region.

3. Determine project impacts and identify portfolio of best offset opportunities: how will offsets deliver values ecologically equivalent to those lost, be located at an acceptable proximity from the impact site, and contribute to landscape conservation goals?

Key tasks:

- Estimate expected direct and indirect project impacts on biological targets; goals for offsets are established based on these impacts.
- Identify optimal offset opportunities using site selection algorithm (i.e., Marxan) at increasing spatial extents from the project site..

4. Evaluate offset options in terms of their potential contribution to conservation goals and their cost effectiveness: **to what extent will offsets compensate for**

impacts? Which offsets provide best return on investment– highest conservation value at least cost and risk?

Key tasks:

- Estimate potential contribution of offsets to conservation goals. Consider "additionality" (i.e., offset conservation value additional to existing values), probability of success, and time lag to conservation maturity (i.e., how long it takes for offsets to deliver conservation at a maturity level similar to what was lost at the impact site).
- Estimate cost of implementing the offsets in portfolio. Evaluate this cost and expected conservation value to identify offsets that will provide the highest conservation return.

For more information: Visit the Development by Design website at: www.nature.org/aboutus/development/

3.9 Managed Resource Areas and Its Perspective in Mongolia, Mr. B. Chimed- Ochir, Director, WWF office in Mongolia

Introduction

The Mongolian Law on Special Protected Areas (PA) of 1995 allows the local parliament at respective levels to establish aimag, capital city, soum and districts level protected areas with the purpose of conserving spiritual, cultural and natural sites.

Additionally the Government of Mongolia developed a National Programme on Biodiversity in 1996 and a National Programme on PAs in 1998, which aims at safeguarding its wide variety of cultural and biological heritage by protecting 30 per cent of its territory through PAs until 2050. Mongolia's MDG goals and indicators (approved by the Parliament in 2005 and amended in 2009) and MDG-based National Development Strategy (approved by the Parliament in 2008) have re-enforced these commitments, integrating them into more specific national development strategies. Moreover, the MDG indicators for PAs in Mongolia do include both Local and National PAs and aim to cover at least 15 per cent of the territory to be protected through the local PA scheme. Consequently, the new draft of amendment for PA law, actually pending for approval, is recognizing local PA as part of the PA network.

The management of these locally protected areas is regulated by the Law on Land, as it is considered to be a specific land use type and a government regulation derived from the law on the PA, which provides generic guidelines on designating land under the local protection makes the protection regime somewhat similar to IUCN category 6.

However, the policy on environment to facilitate the function and management of these local protected areas is poorly developed. In fact, there are no specific management structures for local PA at national and local levels, although local government is responsible for their management. In contrast to state protected areas, aimag or soum administrations can transfer to the management of local PAs to NGOs,

enterprises or private persons. Therefore, there is still a need to streamline the legal environment for LPA establishment and management if Mongolia indeed aims to achieve its global commitment to establish a sound and effective PA network covering 30 per cent of the territory – the size of France.

As mentioned above, the Law on Land considers local PAs as specific land use types. This enables regional or local governments to exert important influence on their environment by modelling their objectives, functions and even management of local PAs. Classical protection goals from a national or international perspective are eligible, and also local priorities and particularities, which is an important precondition for effective and sustainable management at a local level.

Actually existing local PAs in Mongolia typically aim at the protection of sacred places and the safeguarding of fauna and flora. However, some of them already desire future exploitation, as hunting concessions for national or even international tourists or ecotourism in a broader sense. An interesting option for the mostly pastoral oriented rural population presents the idea of soum or inter-soum pasture reserves, which would avoid important loss of livestock in fallow years (zud), and at the same time maintain the spirit of conservation. All in all, the flexibility of local PAs enables a variety of economic perspectives.

A case for local PA 'Gulzat'

'Gulzat' LPA was established in 2007 in UvsAimag with technical and financial support from WWF, and covers 1268 sqkm. The Gulzat range on the Mongolia-Russian border is the most Northern part of the distribution range of the Altay Argali *(Ovisammonammon)* populations, one of the economically important wildlife species in Mongolia. The estimates of the official Argali population in Mongolia between 1986-2001 show a 76.6 per cent decrease. The major reasons for the sharp decline in the Argali population are: a) habitat fragmentation due to increased competition with domestic livestock and poaching; and b) current trophy hunting practices in Mongolia do

not support the conservation of Argali, because the revenue from trophy hunting is not linked to wildlife conservation.

Altai Argali was, and still is, a species of fundamental concern for the WWF in Mongolia. A feasibility study on Community Based Wildlife Management (CBWM) using Argali as a target species has been conducted by WWF Mongolia during the preparation phase of Altai-Sayan project, financed by GEF. Unfortunately, the feasibility study has not been realized during the implementation phase of the Altai-Sayan project. Finally, WWF Netherlands agreed to finance the CWBM project at the Mongolian-Russian border area in Uvs Province. There are three major reasons: a) the trophy hunting of big game species in Mongolia is the foreign hunters' privilege due to the high prices and special permission issued by the government; and b) Argali is highly desired, and one of the most highly priced trophy animals in the world, and therefore of great economic interest to domestic hunting companies and to the government; c) most importantly, the survival of Argali depends on herders, who are using the same habitat for their livestock. The ultimate goal of the programme was to ensure revenue re-direction from trophy hunting to the herder and the stewardship of their resources e.g. pasture and wildlife, because both depend on healthy pasture for survival.

After four years of implementation, WWF Mongolia can present certain achievements such as: a) an agreement with local administrations to halt Argali trophy hunting until sustainable management is in place; b) a regular monitoring system has been established based on local herders and border guards; c) the establishment of a local protected area, which covers the most important habitats of Argali in Uvs Province; d) the formation of herder groups, which are responsible for habitat management and Argali protection against poaching; and e) certain communication efforts at the policy level. The major achievement is that the Argali population has increased substantially, and a considerable decrease in mortality during the last harsh winter in the project area was attained.

3.10 Grazing and Social Impacts on the Orkhon Valley Cultural Landscape

Ms. B. Oyuntulkhuur, UNDP Mongolia

The Orkhon Valley Cultural Landscape (OVCL) lies in the central part of Mongolia, approximately 360 km southwest of Ulaanbaatar. The site covers more than 250,000 ha of grassland along the historic Orkhon River, and includes a buffer zone of 98,000 ha. The archaeologically rich Orkhon River basin was formerly the home of successive nomadic cultures and empires, and was the venue of their activities in trade, politics and religion over centuries. Orkhon Valley served as a crossroads for civilizations, linking the East and West across the vast Eurasian landmass, for which OV was registered as a World Heritage Site by UNESCO. The Orkhon Valley's Cultural Landscape encompasses an extensive area of pastureland on both banks of the Orkhon River and includes numerous archaeological remains dating back to the 6th century. The site also includes Kharkhorum, the 13th- and 14th-century capital of Chingis (Genghis) Khan's vast Empire. Collectively the remains on the site reflect the symbiotic links between nomadic, pastoral societies and their administrative and religious centres, and the importance of the Orkhon Valley in the history of Central Asia. The grassland is still grazed by Mongolian nomadic pastoralists.

The study to assess carrying capacity of pastureland in Orkhon Valley was conducted in 2011 with the support of the UNDP project named 'Strengthening Protected Areas Network in Mongolia' (SPAN). The study covers a total of 154,646 ha of pasture in four soums of the Orkhon Valley National Park (OVNP). The assessment was carried out in Khujirt and Kharkhorin soums (districts) of Uvurkhangai aimag (Province), Khashaat and Khotont soums of Arkhangai aimag, with the towering involvement of local residence/herders and local governments effectively utilizing participatory approaches. Due to the assessment, the current state of herders' social relations, pastureland condition and its utilization in soums were reviewed. Moreover, fodder reserves of pastureland were estimated, and pasture use plans for four Baghs (the smallest administrative unit) Uujim and Berkh baghs of Khujirt soum and Orkhon and Nariin Khur

baghs of Kharkhorin soum were developed and integrated into the 2012 soum-level land use plans.

According to the assessment, 10 per cent of 154,646 ha of pastureland has slightly degraded or is in its normal condition; 38 per cent of the pastureland has moderately degraded, and 52 per cent of the pastureland has been severely degraded. Pasture along the banks of the Orkhon River is used by herders around the year with no seasonal movement, hence sees moderate and severe degradation. Severe land degradation may directly affect 589 people or 288 households in those four soums. Land degradation in dry land systems, also referred to as desertification, is characterized by a reduction in the biophysical potential of a system and translates into a reduction in the ability of the land to support human populations, livestock, and wild herbivores. Analysis is also made towards current pastoral management practices at household level. Traditionally, Mongolian herders have seasonal interior migration, with distances covered ranging from 40-50 km and even more. While in target soums, heavy degradation occurred near 'urban centres' as the herders did not want to pursue distant grazing routes, which in turn led to a decrease in the radius of movements and a concentration of livestock near roads and wells. Moreover, it is estimated that within a 1 km distance there are 28-35 households – without any movement- all pasture is being used all year around and at one and the same site, which definitely leads to overgrazing and other negative social impacts.

Rangeland degradation is a common problem across all sites and is one of the primary motivations for the formation of the community-based rangeland management programmes. In a case study, an elderly woman says, "We always used the pasture to graze all our livestock, but never seriously thought that it is prone to degradation…the local government and the herders rarely talked about rangeland conditions, its management and utilization." Application of appropriate pasture management practices will save ecological capacity for pasture to recover naturally. With trust, cooperation and power restored within the pastoral communities, herders are able to establish and enforce rangeland regulations to reduce degradation. Pastoral cooperation and self-

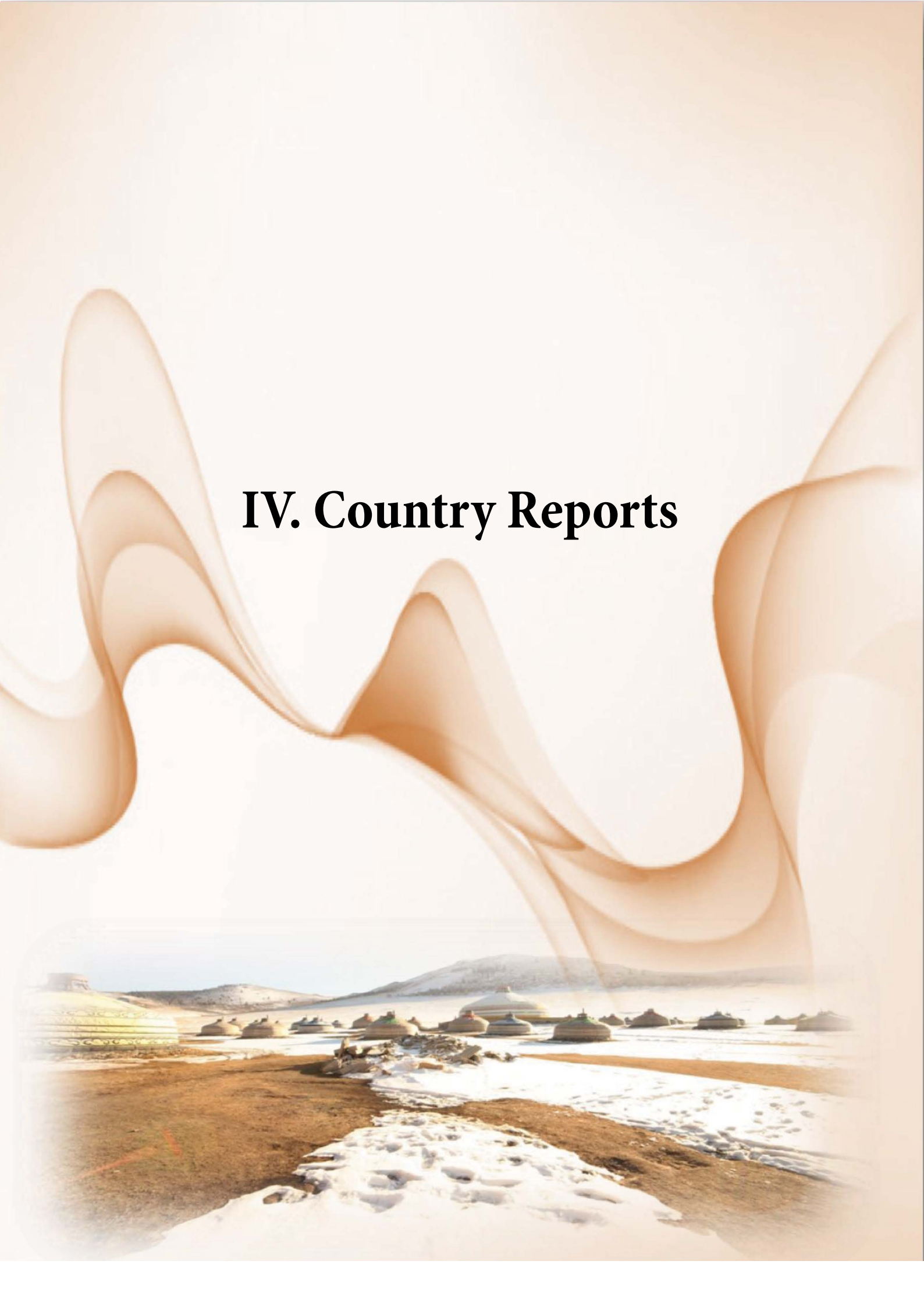
organization has strengthened grassland use rights. Aside from sharing grazing lands, herders are also sharing other aspects of their livelihoods, where groups build stalls, yurts and wells together and also share the burden of long distance migrations.

In close cooperation with the park administration of Orkhon Valley, the SPAN project focuses on activities towards the forming of community groups within the protected area and the buffer zone and provides training on nature and wildlife conservation, alternate livelihood options, and those communities contracted with PAAs on certain activities, such as signing the board, pasture protection, improving waste management, wildlife inventory, and conducting research, etc.

Further, the presenter proposes the following ways to improve grazing management in protected areas:

- Build capacity of herders, especially young herders in traditional grazing management
- Facilitate community-based rangeland management that reduces vulnerability and increase resilience of pastoral socio-ecological systems to climate change and socio-economic changes
- Introduce tax system based on the animal numbers
- Integrate pasture rotation plans into soum land management plans
- Ensure coherence of concerned legislations and regulations with regard to pasture management in Mongolia

IV. Country Reports



4. COUNTRY REPORTS

4.1 MAB Programme in Kazakhstan: Current Achievements, Dr. R. Jashenko, Kazakhstan

The Kazakhstan MAB Committee was established in 1978 as a part of the Scientific Council concerning the problem 'Nature Protection and Rational Use of Natural Resources' (Resolution of the Presidium of Academy of Sciences of Kazakhstan on 30 July 1978). The main goal of the MAB Committee at that time was to be postulated as coordination of scientific research on the status and protection of the environment. Three years later the plenary session of the Scientific Council on 10 April 1981 approved the following important matters:

- Leading institutions and project leaders of the MAB UNESCO Programme.
- Temporary Regulation on the Kazakh Committee for the UNESCO programme 'Man and Biosphere'
- Research Programme for 1981-1985

The list of the institutions consisted of 38 organizations, including research institutes of the Kazakhstan Academy of Sciences (Institute of Zoology, Institute of Botany, Institute of Microbiology and Virusology, Institute of Hydrogeology and Hydrophysic, Institute of Geology, etc.), as well as Academy of Agricultural Sciences (Institute of Agriculture), several national and normal universities (Kazakh National University, Karaganda National University, Kazakh Normal University, etc.), botanical gardens and strict nature reserves (*zapovedniks*). According to the Temporary Regulations, the main goal of the Kazakhstan MAB committee was to be a coordination of scientific research on the status and protection of the environment. Within the general soviet MAB programme, the Kazakhstan participants took part in six large projects (from the 14 projects, the index of which is according to the general project list):

- *Project 3*: the influence of human activities and land use on pastures and grassy savanna landscapes (Institute of Botany, 7 research themes)
- *Project 4*: the influence of human activities on ecosystem dynamics in dry and semi-arid zones, including the use of pastures and the consequences of irrigation (Institute of Soils, 3 research themes)
- *Project 5*: the environmental impact of human activities on the resources of lakes, marshes, rivers, deltas, estuaries and coastal areas (Kazakh National University, 9 research themes)
- *Subproject 6à*: influence of human activity on mountain ecosystems (Main Botanical Garden, 5 research themes)
- *Project 8*: the conservation of natural areas and contained genetic material *subproject 8à*: Biosphere Reserves (Institute of Zoology, 8 scientific themes), *subproject 8b*: species and its productivity in the range (Institute of Zoology, 5 research themes).
- *Project 9*: ecological assessment of the control of agricultural pests and use of fertilizers in terrestrial and water ecosystems (Institute of Land, 1 scientific research theme)
- *Project 10*: the influence of the main types of engineering works on humans and the environment (Institute of Geography, 9 research themes)
- *Working Group* on nature conservation education and training (Kazakh National University, 3 research themes)

Since 2004 the Kazakhstan National Committee of MAB has been the authority of the National Commission for UNESCO of the Republic of Kazakhstan. The Committee was periodically reorganized to enhance the work, including the elaboration of innovative ideas and expanding of scope. The last reorganization of the committee took place in April 2011. The first session of the renewed Kazakhstan MAB Committee was held on 15 July 2011, when the committee worked out the basic documents and devoted to its activity – the Basic Regulation, Strategy and Working Programme for the period 2011-2021. The general goal of Kazakhstan MAB Committee was to formulate th the “development of a national network of Biosphere Reserves in the Republic of

Kazakhstan and its integration into the global and regional network of Biosphere Reserves, analysis and synthesis of international experience in the development of specially protected areas, as well as the study of the conservation of biological diversity and ecosystem, the relationship between man and the environment and dissemination of environmental knowledge in the UNESCO programme 'Man and Biosphere'." The main purposes are as follows:

1. Establishing and promoting national network of Biosphere Reserves in Kazakhstan
2. Monitoring the national network of Biosphere Reserves in Kazakhstan
3. Integrating national network of Biosphere Reserves into global and regional network of UNESCO
4. Analyzing and generalizing international and national experience on the theory and practice of the development of Biosphere Reserves
5. Conservation of biological and ecosystem diversity, studying of general problems, exploring common issues of relationships between human beings and the biosphere
6. Providing information concerning the UNESCO programme 'Man and Biosphere' to the public, and distributing ecological and environmental knowledge
7. Promoting the Kazakhstan sites to the UNESCO World Heritage lists (nature and mixed values)

The primary goal of MAB activity in Kazakhstan in the last three years was to develop a network of Biosphere Reserves. Using the ecosystem approach to the study of natural processes and the results of several national and GEF-UNDP international projects undertaken in Kazakhstan during the last decade, the Kazakhstan MAB Committee worked out several national proposals for nominating some Kazakhstan Protected Areas as Biosphere Reserves. The first Biosphere Reserve 'Korgalzhyn' was approved by UNESCO in 2012, and 'Alakol' as the second Kazakhstan Biosphere Reserve approved by UNESCO in 2013. The General Director of UNESCO, Irina Bokova, handed over the UNESCO certificate concerning the Alakol Biosphere Reserve

to Kazakhstan authorities at a ceremony during her visit to Astana on 24 August 2013 (see Picture 1).

New proposals for Biosphere Reserves in 2013

New proposals from Kazakhstan were prepared and sent to MAB UNESCO in September 2013 for further evaluation. It consisted of 3 nominations for the status of Biosphere Reserves for three Kazakhstan protected areas – Akzhayik (Delta of Ural River in northern Caspian Sea), Aksu-Zhabagly (west Tien Shan) and Katon-Karagay (Altai).

Akzhayik Biosphere Reserve *(see pictures 2-8)*

The total terrestrial area of Akzhaiyk Biosphere Reserve is about 340,846 ha. The main core is 36,077 ha, the buffer zone is 104,769 ha (according to legislative acts: buffer territory of 75,423 ha and buffer border protected territory of 29,346 ha of the State Nature Reserve), and the development zone is about 200,000 ha. The marine area is about 55,500 ha and consists of a 500 ha core zone, 25,000 ha buffer zone and 30,000 ha transition zone.

The main zone of the Biosphere Reserve is a strictly protected zone of the nature reserve regime of Akzhayik State Nature Reserve, which represents the natural wetland complex of the Ural River delta and coastal lands of the Caspian Sea with adjacent water territories. The legal basis for the creation of the Akzhayik nature reserve is a Resolution of the Government of RK № 119 as of 6 February 2009.

The buffer zone of Akzhayik Biosphere Reserve comprises the lands of buffer and protected territories of the state reserve. Legal basis for the use of this territory as a buffer is the Resolution of the Government of RK № 119 as of 6 February 2009 and Decree of the Akim of Atyrau oblast № 108 as of 7 April 2011 on the designation of a protective 2km zone along the border of the nature reserve. The Decree of Akim indicated that designation of the protective zone is carried out without withdrawal of land from the land users. According to Article 50 of Chapter 2 in the Law of RK 'On SPNA',

“buffer zone — the area used for ecologically oriented economic activity and stable reproduction of biological resources.” This zone is created to protect specified protected natural territories from adverse influences from the outside, which includes a prohibition of any activities that may negatively influence the condition and the restoration of the ecosystem of the territory.

The transition zone (collaboration zone) of Akzhayik Biosphere Reserve is located on the territory of Atyrau and Makhambet district of Atyrau oblast. This zone comprises lands of six rural districts: Atyrau district, Atyrau, Damba, Yerkinkala, Kenozek and Chkalovsk, and its total approximate area is 200,000 ha. In this zone there are nine production cooperatives, seven of them are fisheries and two cooperatives of multi-directional production, employing only 30 per cent of the total number of working age population, as well as many small private enterprises. In addition, there are two active sturgeon farms (Atyrau and Damba farms), hiring about 150 local people. In Chkalovo village there is Pervomayskiy Ltd – the main and largest agricultural company of Atyrau oblast, processing milk and growing meat and dairy cattle. The territory of the Biosphere Reserve's transition zone is used for hayfields, fallow lands, pastures, numerous wetlands and villages. It represents mostly areas that were developed and settled a long time ago. It is necessary to organize the restoration of renewable natural resources on those territories. First of all, it is considered wise to rehabilitate fallow lands and to establish organizations for sustainable fishing and hunting. One of the prospective directions for improvement in regards to this zone is to develop ecological tourism.

The territory of the Biosphere Reserve is located in the desert zone, within the subzone of semi-deserts (steppified northern deserts) on brown desert soils and, considering its botanic-geographical location, belongs to the Sahara-Gobi desert district, Iran-Turan subdistrict, northern-Turan Province, and the northwest-Turan subprovince. In general, the Biosphere Reserve is representative of the Ural-Caspian region and includes both aquatic ecosystem complexes and elements of the southern semi-desert and desert. There are 29 ecosystems gathered in the following main groups: 1)

terrestrial natural – anthropogenic, 2) island and coastal natural (transitional from terrestrial to marine), 3) aquatic natural with participation of the anthropogenic, 4) aquatic natural, 5) and terrestrial anthropogenic disturbed. In regard to vegetation types, the territory of the Biosphere Reserve also encloses: 1. desert vegetation with domination of annual saltworts and perennial (semi-dwarf shrubs, semi-shrubs) saltworts and *Artemisia;* 2. Meadow vegetation – (marshes, true, halophyte) with domination of hygromesophyte and mesophyte grasses, mainly cereals, on meadow soils; 3. Marsh vegetation – grass marshes with domination of hygrophytes formed on marshy soils, periodically flooded and drying areas of water-land transition zone; 4. Flood-land forests fragmentally formed on river-bed ridges of the Ural River, delta channels and in local groups along the sloped banks of the channels, with domination in the tree layer of *Salix alba*, *Elaeagnus oxycarpa,* and sometimes, in little abundance, *Salix caspica*; 5. Shrub (Tamarix) thickets are observed everywhere in small parts on marine plain and in the delta along riverbeds and channels; 6. Water-submerged vegetation of water reservoirs may be divided into associations with domination of 'submerged attached to the bottom' higher water plants and large algae, *air-water associations* with domination of higher plants – hygrophytes, including floating on the surface (water lillies, water caltrop, etc.) and a layer of under-water plants (*Ceratophyllum, Myriophyllum,* etc.).

The Biosphere Reserve mainly occupies wetlands of the Ural River delta and adjacent territories of the Caspian Sea coast, which are located in one of the largest Eurasia Caspian-Black Sea-Eastern African migration routes. This territory is included in the Ramsar Convention's List of 'Wetlands of International Importance' and is a concentration site for more than 240 migrating bird species, of which about 110 are water birds, including 18 highly protected species. This Biosphere Reserve is a nesting site for about 70 water birds, of which eight are highly protected natural objects. It is also a haven for the rare Dalmatian Pelican (*Pelicanus crispus*, VU), with a population that reaches more than 600 nesting pairs (12 per cent of the global population). There are 292 bird species recorded in the Ural River delta and adjacent sea coast in total, and 26 of them are listed in the Red Data Book of Kazakhstan and IUCN Red list.

According to expert evaluations, the total number of birds during migration goes up to 3 million specimens.

At the present time, the Ural River delta and adjacent aquatic and terrestrial ecosystems are the last unspoilt areas of wild nature in the region and serve as sanctuary for many species of wild fauna and flora, specifically for sturgeon fishes that are threatened with total extinction. Out of six sturgeon species inhabiting the Caspian basin, four come to the Ural River for spawning: those are Beluga (*Huso huso*), Starry Sturgeon (*Acipenser stellatus*), Russian Sturgeon (*Acipenser gueldenstaedtii*), Bastard Sturgeon (*Acipenser nudiventris*). Two other species – Sterlet (*Acipenser ruthenus*) and Persian Sturgeon (*Acipenser persicus*) – are sometimes observed in this river delta. In total, aquatic ecosystems of the Biosphere Reserve are inhabited by 76 out of 126 species and subspecies of fish and cyclostomes, registered at the Caspian Sea and belonging to 17 families. The dominant position is occupied by carp fish (42 species and subspecies), followed by gobies (32-35), and herrings (18 species and subspecies). All other families, including sturgeons, are represented by not more than one to seven species. The delta itself is supporting 47 species, five of which are listed in the Red Data Book of Kazakhstan. Amphibians are represented by two species, and reptiles by 20 species, of which two species of snakes are listed in the Red Data Book of Kazakhstan – the Four-lined (Snake *Elaphe quatuorlineata)* and Caspian Whipsnake (*Hierophis caspius)*.

There are 48 mammal species of seven orders recorded on the territory of Biosphere Reserve, with rodents and predators being most representative. Aquatic parts of Biosphere Reserve are nowadays the only protected territories for conservation of endemic relict species (at the same time the only representative of mammal fauna in Caspian Sea), such as the Caspian Seal (*Pusa caspica*), which is listed in the Red List (IUCN, Endangered). Bobrinski's Serotine, which is another species registered in the Red Data Book, is found here. It is possible that occasionally a very rare and highly protected species – Desman – comes to the delta from the middle stream of the Ural and nests on the territory of the Biosphere Reserve. Species that are quantitatively

dominant are: mammals, such as Muskrat, the House Mouse, Tamarisk Gerbil, raccoon, fox, wolves, badgers and wild boar.

Fauna of terrestrial and aquatic invertebrates numbers about 2,000 species, including 24 species listed in the Red Data Book of Kazakhstan. Macrozoobenthos of Ural River delta with the adjacent coast of the Caspian Sea is represented by 67 species and forms of six groups, among which are: Hydrozoa (1), sponges (1), worms (11), crustaceans (30), molluscs (5), and insect larvae (19). Zooplankton of the lower stream of the Ural River contains 315 species and subspecies, including 30 protozoans, 154 rotifers, 71 cladocera and 54 copepods; the rest are plankton's optional inhabitants. Insect fauna of the Biosphere Reserve is represented by 820 species of 61 families and 15 orders. The basis of insect fauna is made of dragonfly species (order *Lestidae, Coenagrionidae, Aeschnidae, Libellulidae*), praying mantis (*Mantidae*), homopterans (*Cicadellidae, Aphidinea),* heteropterans (*Corixidae, Nepidae, Miridae, Lygaeidae*), orthopterans (*Acrididae, Gryllidae, Tettigoniidae*), beetles (*Dytiscidae, Carabidae, Staphylinidae, Coccinelidae, Scarabaeidae, Elateridae, Tenebrionidae, Chrysomelidae, Curculionidae*), butterflies (*Geometridae, Noctuidae, Pyralidae, Pieridae, Lycaenidae*), hymenopterans (*Ichneumonidae, Braconidae, Sphecidae, Eumenidae, Formicidae*), and dipterans (*Culicidae, Chironomidae, Asilidae, Bombyllidae, Muscidae, Syrphidae, Ephydridae*).

The nominated territory of the Biosphere Reserve contains 229 species of higher plants of 141 genera, and 56 families. Among them seven species are relict and four species are rare and specially protected. Aquatic flora is represented by 23 plant species. Six types represent the main vegetation associations: desert, meadow, marsh, forest, shrubs, and water-submerged plants. Vegetation associations are dominated by halophyte perennial saltworts (semi-dwarf shrubs, dwarf shrubs, shrubs) – *Halocnemum strobilaceum*, *Kalidium caspicum*, *K. foliatum*, *Anabasis salsa*, *Halostachys caspica* – and annual saltworts of genera *Salsola*, *Climacoptera*, *Petrosimonia*, *Suaeda*, *Atriplex*, etc. There are two species listed in the Red Data Book of Kazakhstan: *Tulipa schrenkii* and *Trapa kasachstanica*.

Akzhayik Biosphere Reserve is located on the lands of Makhambet district and Atyrau city of Atyrau oblast. The population of its 11 settlements is more than 17,000, 98 per cent of them are Kazakh and two per cent are Russian, Tatar and other ethnicities; population density is 23 people per 1 sqkm. Economical mix of the region is fishery and animal stock production.

Industry and agriculture: there are nine active production cooperatives in the collaboration zone of Akzhayik Biosphere Reserve, and seven of them are fisheries and two are diversified cooperatives (farming and animal breeging): TES, Yerkinkala, Rakusha, Dzhambyla, Amangeldy, Kurmangazy, Manash, Kyzyl-Balyk, and Standart, employing only 30 per cent of the total working age population. Also, there are two fishing plants in this zone: Atyrau Sturgeon Plant (right bank of the Ural River near Yerkinkala village) and Damba Sturgeon Plant (left bank of the Ural River near Damba village), employing about 150 local people. The fishing industry also includes several small fish processing facilities.

Agriculture (mainly animal breeding) is developing only in the private sector whereas local people usually breed cattle, sheep, camels and horses. The private sector is represented by the following farms: private enterprise Gvozdika (flowers' greenhouse production), private enterprise Khairushev (horses and camel breeding), agricultural cooperative Amanat-Arna, private enterprise Talapker, and Kyzyl-Zhar (animal breeding and farming). One of the main agricultural enterprises of Atyrau oblast – Pevomaiskiy Ltd. – is situated in Chkalovo village. It is a large enterprise of milk processing, meat and dairy cattle breeding. It runs a greenhouse for vegetable production. It plans introduce new technologies for animal fodder provision, such as green fodder production using hydroponics.

In the villages situated far from Atyrau (Damba, Amangeldy, Kurmangazy, Atyrau, Zhanatalap and Yerkinkala) there are small private shops, restaurants and cafes. People living in the villages close to Atyrau prefer purchasing at city markets.

Unfortunately, there are not enough jobs for the whole population and some citizens, specifically young people, are forced to work in Atyrau. Ecological tourist development in the framework of the nominated Biosphere Reserve will provide additional working opportunities for local people.

Ecological tourism: contemporary ecological tourism has not been developed; daily recreational press in the buffer zone does not support more than 15 people. In September 2011, with the support of an Italian-Kazakhstan project, the Ural River Park Project (sponsored by Italian company ENI and Bologna University), the buffer zone of the reserve was equipped with observational spots in order to scrutinize birds and large mammals. Additionally, bicycle and hiking routes were created on the basis of two protection stations (cordones 1 and 2), and water routes on the Ural River and its delta channels were organized. In the future, the Biosphere Reserve will help developing tourism resorts in villages located along the main road from Atyrau to Peshnoye village: Peshnoye, Damba, Zhanatalap, Kurmangazy, as well as on the right bank of the Ural River in Yerkinkala village. Analysis of transport and planning structures showed that the optimal location for a visitor centre is in Damba village. The centre will have links between the reserve and local people, especially in ecological education. At the same time it will serve as a basis for scientific tourism and international scientific connections. There will be two hiking routes going through the territory of the buffer zone and collaboration zone: Damba – Zarosloye – Zhanatalap (left bank of the Ural River delta), and Kamennyi – Kyzyl-Zhar (right bank of the Ural River delta). A water route for motorized boats, flat-bottomed rowing boats and canoes, organized from Peshnoy Village to Caspian waters, will be created.

The Biosphere Reserve is managed by Akzhayik Biosphere Reserve Coordinational Council, created in 2012. Before that, the territory of the core and buffer zone was managed by the administration of Akzhayik State Nature Reserve, which is still in charge now, and the collaboration zone is managed by Akimats of Makhambet district and Atyrau city. At the present time, the Coordinational Council is a collegiate public body created to introduce policies of effective management and sustainable use

of resources from the Biosphere Reserve, alternative activities, resource conservation and resource-restoring technologies. The Coordinational Council of the Biosphere Reserve consists of representatives of state agencies (territorial agency of forestry and hunting, oblast territorial agency of fishery), the state nature reserve, Akimats (department of land resources, agriculture, etc.), local NGOs and land users, and is necessary to provide collaboration and problem-solving opportunities for all stakeholders. Local communities are involved in the development of the Biosphere Reserve Management Plan by participating in the Coordinational Council in the integrated reserve's management. Complete management of the core and buffer zone is conducted by the administration of Akzhayik State Nature Reserve, but local NGOs and local communities receive full information on natural complexes of the zones that will be used for education, as well as for tourist routes in the buffer and transition zones, development of scientifically based sustainable nature use, etc.

Aksu-Zhabagly Biosphere Reserve (pictures 9-19)

The total area of the territory of Aksu-Zhabagly Biosphere Reserve is 357,734 ha. The main core zone (territory of Aksu-Zhabagly State Nature Reserve) is 131,934 ha, the buffer zone is 25,800 ha (2-3 km border along the perimeter of the nature reserve), and the development zone is about 200,000 ha.

All three zones are connected and complement each other. The core zone is closed for visits and represents reference areas of regional natural complexes, as well as important genetic reserves of wild flora and fauna species; this zone has been long-term controlled and continuous monitoring activities have been carried out. Protective measures are also applied to the buffer zone but here human activities are allowed up to a restricted extent (such as tourism, scientific research, educational programmes, partial use of natural renewable resources, etc.). Both zones serve for conservation of natural complexes and partially for sustainable development. The transition zone is used for the lives of local people, development of the economy, culture and education. There is no strict protection regime of natural complexes here, but there are some restrictions on nature use (e.g., ecologically dirty production is prohibited). As a whole,

this zoning provides conditions for eliminating conflicts between socio-economic development and protection of wild natural complexes, so that an opportunity for stable development of the economy and culture is given.

The core zone represents one area of the North-western part of Talasskiy Alatau, with its long Western and partly the Northern ranges, and adjacent to the main ridge North-Eastern slopes of Ugam ridge. There are two paleontological sites, Aulie and Karabastau, near the Biosphere Reserve (120 km) on the territory of Algabas district of the South-Kazakhstan oblast with a total area of 225 ha. Altitudinal limits of the Biosphere Reserve in the main part vary from 1,300 to 4,200 m above sea level. Ranges of the main ridge represent separate water-dividing ridges of considerable altitude. From the East, the nature reserve is limited by the side ridge, dividing the Arabiik and Koksay river basins. A little West from that, the tops of the main Sarytau ridge (3,657.2 m) and Aksuat (4,027.4 m) are the origins for the ridges that are water-divides of the Koksay, Aksay and Zhabagly rivers. The highest altitudes alongside the water-divide ridges change form 3,401.1 m to 3,977.1 m. The canyons of Koksay and Aksay rivers have a meridianal stretch (South-North) and are steeply sloped, V-shaped valleys. The Koksay and Aksay rivers are the only rivers in the nature reserve that belong to the Talas River basin. The Mountain centre in the area of Aksuat gives origin to a whole range of ridges: Alatau (Kaskabulak top, 3,831.9 m), Bugulutor (3,926.3 m) and Aksu (3,795.8 m). All of them have a mostly latitudinal direction and serve as water-divide ridges of the Arys River basin, and large right-side inflow of Syrdarya River. Zhabaglytau ridge, limiting the nature reserve from the North, is not as high (highest point 2,913.1 m), but it is adjacent to the plateau-like Topshak area of Aksay-Zhabagly water-divide. From the southern slope of Talasskiy Alatau in the South-western direction goes a large ridge – Ugam – limiting the Maidantal River valley (Pskem River inflow) from the North. The highest point of Ugam ridge is Sairamskiy top (4,238.6 m), which is the South-westernmost point of the reserve.

The buffer zone of Aksu-Zhabagly Biosphere Reserve comprises the lands of the buffer and protected territories of the state reserve. According to Article 43 of the Law of

RK ‘About SPNA’: “buffer zone — the area used for ecologically oriented economic activity and stable reproduction of biological resources.” This zone is created to protect specially protected natural territories from unfavourable influences from outside, with prohibition of any activities that may negatively influence the condition and restoration of the ecosystem of the given territory.

The transition zone (collaboration zone) of Aksu-Zhabagly Biosphere Reserve is located on the territory of Tulkibas, Tole Bi, and Baydibek districts of South-Kazakhstan oblast, and Zhualy district of Zhambyl oblast. The total approximate area is 200,000 ha. The most favourable conditions for local people are in the foothill areas with altitudes of 1,500 m above sea level due to climatic conditions. As a result, most of the settlements are concentrated in the foothill areas near the main rivers and streams. Thus, the entire Northern and Western parts of the buffer zone are full of villages and small settlements. The territory near the buffer and transition zones of the reserve is the most densely populated region of South Kazakhstan (from 20 to 40 people per sqkm). Nearby (up to 75 km) there are settlements near the oblast centres: Shymkent and Taraz cities, with a population density of 50-60 or more people in 1 sqkm. Most of the lands adjacent to the nature reserve are in state possession and are given on the right of constant or temporary land use. They may be divided into the following categories: lands of specially protected natural territories (reserves); lands of forest funds; lands of agricultural use; reserve lands; and lands for industry, transport, communication, defense and other non-agricultural use. Lands of forest fund are administered by Shymkent, Tyulkibas and Zhualy state institutions for forest and animal protection, and hunting for large mammals is permitted there. The lands are registered and used by numerous local farmers and production agricultural cooperatives and units, with intensive use of the lands for growing plant cultures, cattle pasture and haymaking. Reserve lands are not used due to their distance from the settlements, very rugged terrain and difficult access in the highlands.

The Biosphere Reserve is managed through Aksu-Zhabagly Biosphere Reserve Coordinational Council, created in 2012. Before that, the territory of the core and buffer

zone was managed by the Scientific-Technical Council of the Nature Reserve (until July 2012). The Coordinational Council is a collegiate public body created to introduce policies of effective management and sustainable use of resources of the Biosphere Reserve, alternative activities, resource conservation and resource-restoring technologies.

The Aksu-Zhabagly Biosphere Reserve is located in the Western part of the Tien Shan Mountain system at the junction of sub-boreal (temperate) and dry sub-tropical (warm-temperate) climatic zones. This creates a complex structure of landscape and soil zoning, and mixing and interpenetration of these two zones. Consequently, there is high vegetation diversity and a complex structure of vertical zoning, which differs from Western to Eastern parts of the reserve. Aksu Zhabagly is a territory of high, medium and low mountains of the Western end of the Talas Alatau and the North-eastern edge of the Ugam ridge. Its territory covers the upper part of the left tributary basins of the Arys River to Zhabaglysu, Aksu and Sayramsu. The territory of the reserve is characterized by very strong compartmentalization and prevalence of steep and very steep slopes, especially in the Aksu River basin. The altitudes of the territory range from 1,300 m (Alatau Mountains Southern of Zhabagly - previously Nov- Nikolayevka) to 4,229 m (Sairam peak in Ugam Ridge, in the South of the reserve).

There are five natural altitudinal zones in the Aksu-Zhabagly Biosphere Reserve:

1. Highland nival level**,** 3,600 (3,800) m is characterized by an almost complete absence of higher vegetation, domination of ice, firn, naked rocks and rocky alluvial deposits. This level is very important in regulating river flow. There are no soil formations on the nival level.
2. Highland alpine level, 2,800 (3,000) - 3,600 (3,800) m, with appearance of sparse short vegetation which mostly consists of steppe and meadow-steppe herbs, including characteristic highland species.
3. Highland sub-nival level, 2,200- 2,800 (3,000) m is characterized by a little more dense vegetation cover formed of not high meadow-steppe herbs with

islands of creeping junipers, which occupy up to 20-30 per cent of the slope surface.

4. Medium montane level (1,500 - 2,200 m) of meadow-steppe juniper sparse forests, shrubs and shrub semi-savannas. It is characterized by vegetation cover of two types: slopes of the Northern exposition are dominated by dry juniper light park forests with meadow-steppe vegetation in the forest and in the meadows, which dominate in area (50-90 per cent of total surface); and slopes of the Southern exposition are dominated by shrub large herbs semi-savannas, partly with juniper sparse forests. There are also apple forests in the canyons.
5. Lowland level (below 1,500 - 1,600 m) of shrub large herbs, partly steppe semi-savannas

Vegetation of the reserve is subdivided into four large type groups: 1. trees and shrubs, 2. grass, 3. prickly-shrub and 4. vegetation of rocks and screes.

Aksu Zhabagly is extremely important for preserving biodiversity of West Tien-Shan. There are 52 species of mammals, accounting for 85.2 per cent of West Tien Shan theriofauna. Among them are rodents (44 per cent) predators (24 per cent), bats (18 per cent), ungulates (9 per cent), and lagomorphs and insectivores (3 per cent each). Ungulates include Argali, Ibex, Roe Deer, Maral and Wild Boar, carnivores such as bears, badgers, Stone Martens, Lesser Weasels and stoats, and rodents and lagomorphs such as the Long-tailed Marmot, Indian Porcupine, Tolai Hare and Muskrat. The Red Data Book of Kazakhstan lists 10 species of rare and endangered mammals. Exceptional attention should be concentrated on the protection of three mammal species – the Snow Leopard, listed in the IUCN Red List, endemic to West Tien Shan, Menzbier's Marmot and the current endangered endemic subspecies of Argali.

There are 267 bird species in total, including 130 nesting species and 137 migrating, wintering or occasional birds. The Red Data Book of Kazakhstan lists 11 species. Moreover, two more bird species are recognized as globally threatened by

IUCN, namely the Corncrake (*Crex crex*) and White-winged Woodpecker (*Dendrocopos leucopterus*). Herpetofauna is represented by 11 species of reptiles and three species of amphibians, which is more than 70 per cent of the regional fauna. Three species are listed in the Red Data Book of Kazakhstan. Fish fauna includes five species, including the Common Marinka (*Schizothorax intermedius*) and Scaleless Osman (*Diptychus dybowskii*).

Fauna of mollusca includes 53 species of 24 genera of 14 families, or about 60 per cent of the regional fauna. Five species are endemic to the Talasskiy Alatau: these include *Pupilla striopolita*, *Pseudonapaeus entoptyx*, *Turanera leptogyra*, *T. stshukini*, and *Leucozonella reitteri*.

The most studied insect flora includes small orders such as cockroaches, stick insects, earwigs, beetles, heteropterans, true butterflies and dragonflies. About 2,500 insect species are registered on the territory of the Biosphere Reserve at the present time. In Aksu-Zhabagly there are 77 species of orthopterans, including five species of cockroaches, four species of praying mantis, one species of stick insect, nine species of stoneflies, three species of earwigs and 53 orthopteran species. Currently, 388 species of hemipterans have been found on the reserve's territory, including 113 homopteran and 275 heteropteran species. Beetle fauna of the reserve comprises not less than 906 species of 358 genera of 41 families. Under-studied fauna of hymenopterans consist of 175 species. According to estimations, fauna of this group amount to no less than 1,000 species. Contemporarily, there are 463 butterfly species on the territory of the reserve and the species composition of Rhopalocera includes 118 species of seven families.

The flora of Aksu Zhabagly Biosphere Reserve includes 1,737 species, including 235 species of fungi, 64 species of lichens, 63 species of algae and mosses and 1,312 species of higher plants. The reserve plays a prominent role in the preservation of endemic genera. Ensuing from 64 endemic Central Asian genera in Aksu- Zhabagly, 19 genera are found: *Korolkowia* (Liliaceae), *Rhaphidophiton* (Chenopodiaceae), *Botschantzevia* (Brassicaceae), *Pseudoclausia*, *Galagania*, *Hyalolaena*, *Mediasia*,

Oedibasis, *Pilopleura*, *Schrenkia*, *Sclerotiaria*, *Schtschurovskia*, *Sphaenolobium*, *Pseuderemostachys* (Lamiaceae), *Stephanocaryum* (Boraginaceae), *Cylindrocarpa*, *Sergia*, *Lepidolopha*, *Ugamia*. There are 57 species listed in the Red Data Books of Uzbekistan, Kazakhstan and Kyrgyzstan. In Aksu-Zhabagly Biosphere Reserve there are 72 wild relatives of cultural plants. All of the useful plants can be found in this area: fodder, medicinal, food, technical, ether- oil crops, decorative, and nectariferous. About 30-40 species were traditionally used by local people and authorities (fruit, medicinal, tannic, saponin-bearing). In the 1940s, roots of tannic plants, such as *Rheum maximoviczii*, *Polygonum coriarium*, *P.nitens*, as well as bulbs of food plants *Koralkowia sewerzowii* and *Allium pskemense,* were produced. At the present time, populations of these species are restoring.

Aksu-Zhabagly Biosphere Reserve is located on the lands of Tulkibas, Tole Bi, and Baydibek districts of South-Kazakhstan oblast, as well as Zhualy district of Zhambyl oblast. Near the Biosphere Reserve there are 26 settlements, of which 11 are located in Tulkibas district, nine in Tole Bi district and six in Zhualy district. Most of the population are Kazakhs, and rather less are Russians, Uzbeks, Karakalpaks, Turks and Azerbaijanis. Kazakhs who live in that region belong to older juz (ancestor branches occupying specific territories). The major economic orientation of the region is agriculture. There are several crops growing on agricultural land: in the rain-fed area – cereal cultures (wheat and barley); on irrigated arable lands – forage cultures (corn, clover, alfalfa) and technical (sunflower, safflower, tobacco). Local people usually breed cattle (mainly the Aulieatinskaya dairy meat breed), sheep (South-Kazakh Merino), goats, horses (trotters and Donskaya breed) and poultry (chicken and turkey). Most of the villages have plumbing; others take water from wells and rivers. Roads are mostly paved or gravel. Houses are heated by wood, charcoal and dung (dry horse or cow manure).

In the late 1990s to the early 2000s local people cut down a lot of tree plantations due to problems of natural gas supply, which are now currently restored. In all major towns and every village hospitals or aid stations and shops are available. Among the

most significant factors, the ways in which the local population affects the local environment are logging, harvesting of dead wood and poaching.

Eco-tourism, which ensures a constant flow of visitors and therefore particular equipped routes including appropriate infrastructure, were constructed in order to pursue the purpose of tourist inflow, These routes and appropriate infrastructures were virtually non-existent in Aksu Zhabagly until 1992, but in the late 1990s and 2000s began develop. At present, scientists and amateurs interested in flora and fauna, as well as ordinary sightseers, visit the territory of the buffer zone. In accordance with 10 routes for scientific and educational tourism, visitors move through the reserve on trails and roads, and for rest stops use previously constructed field bases and traditional camping sites. Currently, the potential of eco-tourism for educational purposes is still insufficiently developed, although Aksu Zhabagly is one of the most famous tourist spots for birdwatchers all over the world.

On a regional scale, the experience gained out of the development of ecological tourism could be successfully used in Kazakhstan, Kyrgyzstan and Uzbekistan. Proximity of the reserve to the main cities Taraz and Shymkent, as well as financial and cultural centres such as Almaty, with its well developed tourist infrastructure (international airport, railroad and bus stations, hotels, tourist companies, restaurants, etc.), gives tourists a potential possibility to stay in comfortable conditions in the city with short-term (without night stays) visits of the sightseeing areas. In the future, these tourist services will be developed on the territory of Biosphere Reserve (villages in the collaboration zone) in the form of private guest tourism, with additional services from local people (hiring and using the boats, horse-riding, fishing, etc.), and with realization of local fresh produce and local souvenir markets.

Katon-Karagay Biosphere Reserve (pictures 20-26)

The total area of the territory of Katon-Karagay Biosphere Reserve 1,231,940 ha. The main core zone occupies 126,432 ha, the buffer zone is 655,508 ha, and the

development zone is about 450,000 ha. The main and buffer zones correspond to the territory of Katon-Karagay state national nature park.

The main zone of the Biosphere Reserve is a strictly protected zone of the nature reserve regime of Katon-Karagay state nature national park, which the represents natural mountain complex of Western Altai. According to Article 45 (paragraph 1) of the Law of RK 'About SPNA': "the buffer zones of Katon-Karagay Biosphere Reserve are 3 zones of Katon-Karagay state national park: a) ecological stabilization zone; b) zone of tourism and recreational activity; c) zone of limited economic activity, as well as specially established protective zone of the reserve, which includes a 2-3 km stripe along the national park's perimeter." The transition zone (zone of development, collaboration) of Katon-Karagay. Biosphere Reserve is located on the territory of Katon-Karagay administrative district of the Eastern Kazakhstan oblast. The protective zone is for protection from unfavourable influence on natural territories that require high safeguarding measures. Hereby, a prohibition of any activity that negatively influences the state and the restoration of ecosystems of the territory within the border of this zone is stipulated. The transition zone (zone of development, collaboration) of Katon-Karagay Biosphere Reserve is located on the territory of Katon-Karagay administrative district of the Eastern Kazakhstan oblast.

All three zones are connected and complement each other. The core zone is closed for visits and represents reference areas of regional natural complexes, as well as the important genetic reserve of wild flora and fauna species; this zone is being controlled and monitored in the long-term. The buffer zone is also under a protective regime, but limited human activity is allowed, taking into account conservation and restoration of objects of the state nature reserve fund and by corresponding agreement with state authorities. Tourist and recreational activities in this zone are carried out by the state national nature park or physical and legal bodies if they have the license to undertake tour operator activity. Physical and legal bodies are responsible for keeping the site in the condition to provide conservation for the objects of the state nature reserve, and to comply with environmental protection requirements. Both zones serve

the conservation of natural complexes and partially for the purpose of sustainable development. The transition zone allows the main types of traditional economic activities of land users, providing stable use of nature resources, but prohibiting or limiting types of nature use and economic activity, or negatively influencing ecological systems. Limitations on economic activity of land plots owners and land users in the protective zone of the state national nature park are established by the resolutions of local authorities of oblast, cities of Republican importance, and capitals, in accordance with the present law. The local population uses this zone for living, for development of the economy, culture and education and it provides a platform for stable development of the territory.

As a whole, this zoning provides conditions for eliminating the conflict between socio-economic development and the protection of wild natural complexes, and gives an opportunity for stable development of economy and culture.

The Biosphere Reserve is managed through Katon-Karagay Biosphere Reserve Coordinational Council, created in 2012. Before that, the territory of the core and buffer zones was managed through the Scientific-Technical Council of the national park (up to September 2012). The coordinational Council is a collegiate public body created to introduce policies on effective management and sustainable use of resources in the Biosphere Reserve, alternative activities, resource conservation and resource-restoring technologies.

The territory of the Biosphere Reserve in the upper part of Bukhtarma, Belaya and Chyornaya Berel rivers includes the Southern slopes of Listvyaga and Katunskiy (with the Eastern top of Belukha Mountain), and the ridges of the left bank of Bukhtarma River: Sarymsakty, Tarbagatay (Southern Altai part) and the Southern Altai. The Northern part that includes the part of Katunskiy ridge has altitudes from 2,000 to 4,506 m (Belukha Mountain). The Southern part is from 850 m (Bukhtarma River valley) to 3,487 m (Southern Altai ridge). Relative altitudes in the area of Belukha Mountain are 2,500 - 3,000 m.

There are four main altitudinal zones on the territory of the Biosphere Reserve, which include all characteristic landscapes of the region:

I. Nival zone:
    - subnival belt

II. Tundra-meadow:
    - mountain-tundra
    - mountain-meadow-alpine
    - mountain-meadow-subalpine

III. Mountain-forest:
    mountain-forest subalpine
    mountain-forest taiga

IV. Mountain-forest-meadow-steppe.

Katon-Karagay Biosphere Reserve represents the extremely important natural complex of conservation for South-western Altai biodiversity. Plant life forms are represented by arboraceous, semi-arboraceous, and herbaceous vegetation.

Field research on the territory of the Biosphere Reserve registered 56 species of tree-shrub flora of 28 genera and 13 families, which is 5.4 per cent of species of Southern Altai flora. The total area of reserve forest fund is 267,202 ha. Forests are mostly mixed, and herbaceous and moss layers are often conserved when dominating tree species change. There are 40 forest types recorded for the territory of with domination of cedar (20.3 per cent) and larch (21.4 per cent) forest type plantations. A considerable area is occupied by shrub forest type, particularly subalpine dwarf birch (37.7 per cent). Among pine forests, the dominating forest type is herbal cedar (7.3 per cent), which occupies medium and lower parts of mountain slopes at the altitudes of 1,500 - 1,700 m above sea level. In the dense undergrowth there is mostly currant and honeysuckle. Herbaceous cover is dense with *Calamagrostis*, *Carex*, *Aconitum*, *Equisetum*. The dominating forest type among spruces is cereal – motley grass spruces – 12 per cent, which inhabits flat, often medium sloped mountain slopes at the altitudes

of 1,750 - 1,800 m above sea level, in the North-north-east, and rarer in the North-west and West. Undergrowth is rare, with separate rose and spirea; herbaceous cover is well developed, with the domination of *Calamagrostis*, *Brachypodium* and *Bromus*. In addition, xerophile motley grass – *Artemisia*, *Iris*, *Rubus* – is quite characteristic.

The dominating shrub type is subalpine dwarf birch, distributed at the altitudes of 2,000 - 2,300 m above sea level on different relief forms: from rocky flat ridges to flat and depressed slope parts. Dwarf birch tundra is distributed in all mountain ridges. Semi-arboraceous forms (semi-dwarf-shrubs) include almost all *Artemisia*, many species of *Chenopodiaceae* and other plants. Herbaceous form, or grass, is the most numerous group, with domination of perennial herbs, mainly xerophytes.

There are 30 species of rare and endangered plants on the territory of Katon-Karagay Biosphere Reserve: *Cladonia rangiferina* (L.) Harm., *Diphasiastrum alpinum* (L.) Holub, *Huperzia selago* (L.) Bernh ex Schrank et Mart., *Adonis vernalis* L., *Allium pumilum* Vved. in Bull. Univer. As. Centr., *Astragalus glycyphullus* L., *Cyprepedium calceolus* L., *Cyprepedium macranthon* Sw., *Cymbaria daurica* L., *Dactylorhisa fuchsii* (Druce) Soo, *Daphne altaica* Pall., *Drosera rotundifolia* L., *Erythronium sibiricum* (Fisch. et Mey.) Kryl., *Epipogium aphyllum* (F.W. Schmidt) Sw., *Gymnospermium altaicum* (Pall.) Spach., *Lilium martagon* L., *Macropodium nivale* (Pall.) R. Br., *Orchis militaris* L., *Oxycoccus microcarpus* Turcz., *Paeonia anomala* L., *Paeonia hybrida* Pall., *Paris quadrifolia* L., *Pulsatilla patens* (L.) Mill., *Rhaponticum carthamoides* (Willd.) Iljin, *Rheum altaicum* Losinsk., *Rhodiola rosea* L., *Sanicula europaea* L., *Sibiraea altaiensis* L., *Stipa pennata* L., and *Tulipa heteropetala* L.

The animal world of the Biosphere Reserve is very interesting, because it combines fauna species of European complex, which inhabited this region after the ice went from the West, with animals of the taiga complex, which came from the East. Mammals are represented by 69 species, including insectivores such as shrews; bats – Ikonnikov's Bat; predators – Lynx, Roe Deer, Marmot, Squirrel, Fox, Wolf, Stoat, Sable, Mink, Otter; rodents – Squirrel, Marmot; and ungulates – Maral, Elk, Roe Deer, Musk

Deer. The Red Data Book lists four species. Ornithofauna includes 277 species of birds, including 20 species listed in the Red Data Book. Reptiles comprise six species, amphibians three species, and fish eight species, one of which is listed in the Red Data Book of Kazakhstan.

Katon-Karagay Biosphere Reserve is situated on the territory of Katon-Karagay administrative district of Eastern Kazakhstan oblast a tthe following borders: North and East – borders with Russia (Republic of Altai); South-East – borders with People's Republic of China; West – to Belkaragay and Soldatovo villages; South – Northern slopes of Southern Altai ridges: Sarymsakty, Tarbagatai, Narymskiy – border of Muz-Bel forest station of Shyngistay forestry and along administrative border of Katon-Karagay and Kurchum districts to the border with China in the East.

Biosphere Reserve's length from North to South is about 60 km, and from West to East about 150 km. Land plots with a total area of 515,538 ha, belonging to Berel and Katon-Karagay state institutions for forest and animal world protection, were given for permanent use for organization of core and buffer zones of the Biosphere Reserve. Also, additional land plots with total areas of 127,939 and 268,463 ha were given from reserve lands of Katon-Karagay administrative district of Eastern Kazakhstan oblast.

The Biosphere Reserve's transition zone includes large settlements, lands of rural districts, cattle roads, transport centres and channels. The central office of the Biosphere Reserve is in Katon-Karagay village, 90 km from the district centre (Bolshenarymskoye village) and 350 km from oblast centre (Ust-Kamenogorsk city).

The local population living in the transition zone of the Biosphere Reserve mainly practices breeding of cattle, sheep, deer, horses and Siberian stags. Plant production is an additional activity, and the main plantations are occupied by fodder perennial and annual herbs and cereal fodder cultures (barley, oat) for feeding cows, Siberian stags, horses and sheep in the winter period. Private farms are dominant in the cattle-breeding sector of the region. The majority of those farms have small numbers of animals – less

than 40 sheep. In the structure of land use, the largest agricultural territories are located in Belovskiy rural district (39.6 per cent), with a little less in Korobikhinskiy (14.5 per cent) and Belkaragay (12.2 per cent) rural districts, and the smallest area of agricultural lands are situated in Urylskiy, Zhambylskiy, Chernovinskiy, Katon-Karagayskiy rural districts (from 7.9 to 9 per cent). At the present time there are 881 registered and active agricultural formations on the territory of the Biosphere Reserve. Organization of UNESCO Biosphere Reserve will stimulate development of promising sectors of the local economy – ecological and health tourism, attracting both Kazakhstan and foreign tourists. Now there are several health spa complexes based on Siberian stag farms in the territory of the Biosphere Reserve, but their potential has not yet been developed.

Near-term plan: new UNESCO BR nominations and World Heritage sites

According to the committee's plan, within the next five years we would like to create several new Biosphere Reserves, such as Barsakelmes, Naurzum, Karatau, Altyn-Emel and Almaty. At the same time, the committee plans to work on establishing three new transboundary Biosphere Reserves: Altai (with Russia), North Caspian (with Russia) and West Tien Shan (with Kyrgyzstan and Uzbekistan).

Based on 2013, the committee is planning to prepare the proposal for the establishment of the three new World Heritage sites: Altai-Golden Mountains (mixed value), Altyn-Emel (mixed value) and Almaty (nature value).

Proposed changes to national ecological legislation (2013-2014)

Kazakhstan MAB Committee worked out and proposed to the governmental authorized body some changes of national legislation devoted to protected area systems in Kazakhstan. These changes to the Law on Protected Areas include:

1) Establishing new chapter – International Protected Areas
2) Establishing two new and high priority categories of PAs:
   a) Biosphere Reserves (recognized by UNESCO)
   b) Transboundary Biosphere Reserves (recognized by UNESCO)

Description of both categories is based on the basic UNESCO documentation on BR and Proposition for a Model Law (proposed by Marie Bonnin and Mireille Jardin).

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4.2 Activities of MAB Japan in the Past Two Years, Akiko SAKAI, Japan

I report following topics as a country report for the term between 12th and 13th EABRN.

1) New BRs – one registration and two nomination sites

2) Improvement of old-type BRs

3) Institutional progress of MAB in Japan

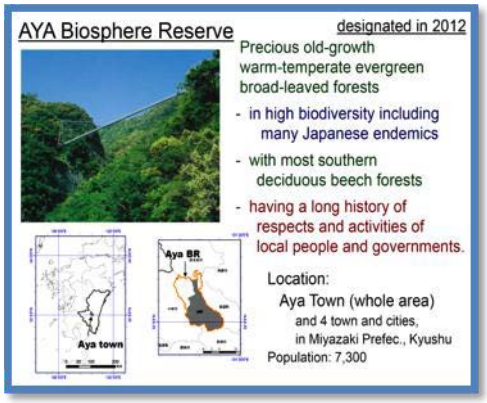


Fig.1 Biosphere Reserves and sites studying BR

New Biosphere Reserves

Aya BR

There are five BRs and two nomination sites in Japan (Fig. 1). In addition to four BRs designated in 1980, Aya Biosphere Reserve was approved last year, which is a monumental achievement for MAB Japan.

Fig. 2 Location and outline of Aya BR

Aya BR is located at the most Southern part of Japan, in Miyazaki Prefecture, Kyushu Island, and includes multiple small towns and cities (Fig. 2). It has been designed, established and managed under the initiative of the municipal government of Aya town, which has a population of 7,300, and with cooperation of various sectors, i.e., local people's NGO 'Teruha no mori', the Nature Conservation Society of Japan (NACS-J), the Kyushu branch of the National Forestry Agency and the JCC-MAB.

All areas of core and transition zones, and most areas of buffer zone, are set in Aya town. The whole area of the town is included in the BR.

Aya town has employed a retired vegetation scientist for environmental subjects since before consideration of the BR, and he has become the key person at the BR.
The core area is covered with an old-growth broad-leaved forest that is a typical ecosystem in the warm-temperate humid region of East Asia (Fig. 3).

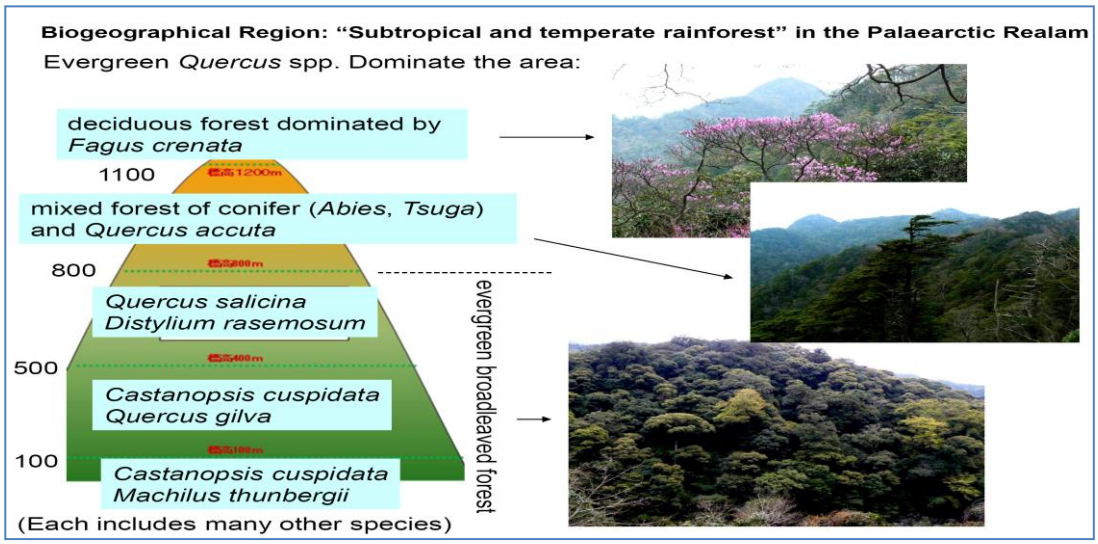


Fig.3 Vegetation of Aya BR

It was dominant in South-west Japan in the past, but only 1.6 per cent remains now, and Aya BR includes the main remnant of this ecosystem. Because of its conservation value, mechanisms of regulation and management for land use have been developed, and were a base of zoning during the BR planning (Fig. 4). The buffer zone includes restoration areas where evergreen broad-leaved trees were cut for economic purposes in the past. A Long-term ecological research site has been established (Fig. 5), and the NGO, NACS-J and others conduct many logistics activities.

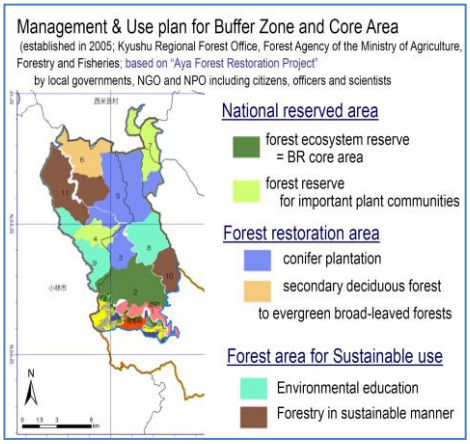
In the transition area, various economic activities for sustainable development are promoted using natural resources (Fig. 6), under town official guidelines that were established in order to change the regional economic base from unsustainable forestry to industries in harmony with nature. Remarkably, Aya town is famous as

the first municipal government in Japan to establish a comprehensive system of organic agriculture and marketing strategy of its products, including a certification protocol. After the designation, the town has accepted many visitations from other local governments nationwide because of its success story: the population is sustained owing to immigration of young people, and tax income from non-inhabitants is rapidly increasing – there is is a payment system in Japan where people can select preferable sites themselves to pay part of their tax. We believe that Aya BR continues to develop as a model in the world network.

Minami-Alps

The nomination and designation of Aya BR inspired other local communities, and now we have two candidates submitted to UNESCO this year – Minami-Alps and Tadami (Fig. 1). The Minami-Alps BR nomination site is located in Central Honshu, where Japan's highest mountains are concentrated. It includes the 2nd and 3rd highest mountains of Japan, and has high conservation values especially for alpine biodiversity, including species with Southern limits of their distributional range in the Northern Hemisphere. Small settlements are dispersed under the mountain chain, where unique cultures have been developed because they are somewhat isolated from each other by deep valleys and high ridges. Ten of the cities, towns and villages together sought a framework for regional development, and after consideration of the World Natural Heritage, they met and agreed the MAB concept and BR system.

Fig 4 Land use plan for core and buffer in Aya



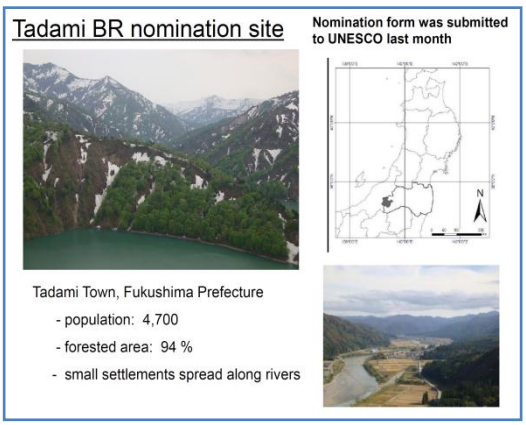


Fig. 7 Location and Outline of Tadami

Tadami

Tadami BR nomination site is planned by the Municipality of Tadami town, which is located in Fukushima Prefecture, Northeeastern Honshu (Fig. 7). This region is in a cool-temperate climate zone and characterized by heavy snow (Fig. 8), which accumulates to some metres in residential areas and more on the mountains, where spatial structures of topography and vegetation are regulated by snow: snow avalanches denude mountain slopes, limit forests to develop and alternatively sustain unique shrub communities dominated by Quercus crispula var. horikawae and Hamamelis japonica subsp. obtusata in large areas. Ridges are typically narrow and steep, and a conifer, Pinus parviflora var. pentaphylla, distributes lineally. Foot slopes are developed with rich soils deposited at lower slopes, providing suitable habitats for tall trees; remarkably including Fagus crenata, a typical species known to have the ability to tolerate snow pressure. Because of the steep terrain, large areas are not accessible, and thus primary ecosystems remain, which are protected as a National Forest Reserve and through other legal mechanisms (Fig. 9).

However, local communities suffer severe circumstances: the population is diminishing and an ageing society has come much earlier than on average in the country. To sustain the local society, as a background of methodology to overcome the difficulties, they recognized that local communities have historically depended on the benefits from snow in terms of income and culture (Fig. 10). For example, a past significant industry was the production of quality zenmai, or young shoots of royal fern. Because it emerges on nourished soils at the front of snow melting, the harvest continues for two months.

This brought the largest share in the country in the past and is still used in high-class Japanese style restaurants in urban areas. Given the consideration for such assets, instead of tree cuttings or escaping from snow, the municipality adopted an idea as the first priority town concept (Fig. 11), i.e., they

took up the challenge to establish a brand value, with the slogan Nature Capital Tadami'. The town government constructed a museum for practice, and invited scientists for consultation and management. Remarkably, non-expert town people support the museum activities, including collection of display materials that they renew once every few months.

Dr Wajiro Suzuki, the current director of the town museum, who is a forest ecologist employed by the town government, introduced the MAB programme, and communication started in 2010. In 2011, the economic situation was deteriorated due to rumours from the accident of the Fukushima nuclear power plant, irrespective of such a long distance from the plant. The town government accelerated study, and as a conclusion they decided to campaign for the BR (Fig. 12).

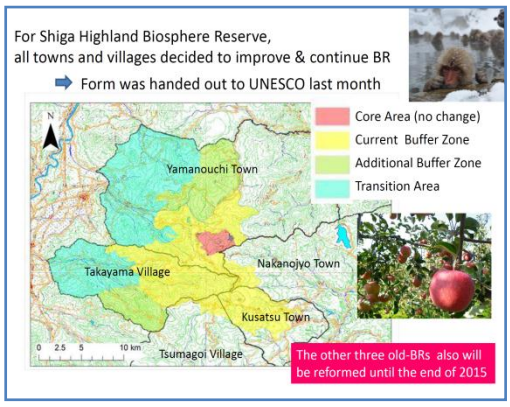


Fig. 13 Re-zoning of old type BRs in Japan

Improvement of old-type BRs

There are four Biosphere Reserves in Japan that were designated in 1980 (Fig. 1) without substantial communication with local communities, as well as transition areas. We have made efforts in each region to develop mechanisms to use and continue the BRs, and the achievement of this year is the submission of an application to UNESCO for revision of zoning in the Shiga Highland BR (Fig. 13). This area is famous as a winter resort, where the Nagano Olympics was held in 1998. However, it faces the problem of diminishing visitors. A tourism association was first interested in the BR, and then local governments were motivated to study the BR further.

For the other three BRs, the National Committee conducted meetings last year, and communications have started. All local governments agree to improve the BRs until the time limit of applications at the the end of 2015.

Institutional progress of MAB in Japan

The MAB network

The Japanese Biosphere Reserves Network (J-BRnet) was started in 2010, firstly as a mailing list by JCC-MAB for persons who had been somewhat involved in MAB activities. As an increasing necessity of dialogue and sharing information among BRs, committees and governments in these years, the National Committee held the first meeting of the J-BRnet in October 2013 at the Tadami BR nomination site (Fig. 14). Closed sessions and an open session were held on two days, and subjects and issues related to BR were discussed, as well as introductions of national governmental plans related to BR activities by the ministries concerned.

A bottom-up approach is a key concept of our actions in local societies for promoting BRs. I explain the general scheme of the MAB programme repeatedly for several hours at the beginning. When this is understood, it is necessary that local people themselves interpret it in a local context. Municipal officers in Aya, Minami-Alps and Tadami act as coordinators of local societies, and are expected to be in charge of design, handling the road to the BR and management after designation. When attempting to be nominated as a BR, these municipal officers have to explain the concept of their planning for the BR, such as aims, strategy and zoning, at the meeting of the National Committee for the MAB Programme. As evidence of these bottom-up activities established in MAB Japan, the 1st meeting of J-BRnet was held at Tadami town: they appealed that such a meeting is essential to promote MAB in Japan. The town provided costs on meeting place and travel expenses for other BR managers. Also, Yamanouchi town, the leading municipality of Shiga Highland BR, expressed the hope of hosting an EABRN meeting.

The MAB programme can be a feasible method to overcome difficulties in rural societies, which is a common issue nationwide. The Japanese MAB is evolving day by day, and multiple sites will likely follow in the near future.

4.3 National Report, Dr. Chung-il Choi, Republic of Korea

The Republic of Korea (hereinafter ROK) has tried to promote the MAB programme at the national, regional and global level. There are five Biosphere Reserves in ROK: Mt. Sorak, Jeju Island, Shinan Dadohae, and Gwangneung Forest, Gochang. Gochang was designated just this year. The MAB National Committee of the ROK (hereinafter MAB-ROK) has worked with local governments, local residents and NGOs to raise awareness of BRs through workshops, posters and social networking services (SNS), and has contributed to strengthening regional networks by providing financial support and participating in EABRN. Also, MAB-ROK has been making efforts to include the concept of Biosphere Reserves in national legislation for systematic management and financial support of BRs. ROK has actively implemented the Madrid Action Plan (hereinafter MAP) as follows:

1. MAP 3: integrated information and communication strategy

The managers from each Biosphere Reserve in ROK have exerted their efforts to promote public awareness of BRs. Jeju Special Self-Governing Province utilized about 30 online supporters to promote Jeju Island BR and World Heritage sites. They have introduced its tourist attractions, local events and BR news through various social networking services. The Korea National Arboretum, which is responsible for managing the core area of Gwangneung Forest BR, made posters to publicize Gwangneung Forest BR and its rich biodiversity, and distributed them to local governments and relevant agencies. Gochang held a workshop on 'Understanding the UNESCO Biosphere Reserve' for officers and local people, which was hosted by the Governor of Gochang CXounty. Gochang introduced the BR area in detail and announced its plans to promote the marketing of local products, which will contribute to increasing the income for local residents.

2. MAP 5: enhanced cooperation between experts and practitioners in relevant key issues

The Korea Forest Service and the Korea National Arboretum held the 'Centennial Celebration Symposium of Korea National Arboretum Ground of Gwangneung Forest' in Gwangneung Forest BR on 25 October 2012 with the support of the Korean National Commission for UNESCO. This symposium aimed to introduce the 'Biota of Gwangneung Forest,' the MAB Programme and the BR to local people. During the Symposium, the Korea National Arboretum tried to establish a network between Gwangneung Forest BR and public officials in other protected areas.

3. MAP 7: functional MAB National Committee in each country, managed in a manner to ensure adequate representation of Biosphere Reserve coordinators and other key stakeholders

The 15th MAB National Committee of ROK was inaugurated in November 2012 with 25 experts from governments, universities, research institutes, academia and NGOs. This year, two MAB-ROK meetingwas were held in Seoul and Gochang in which around 30 governmental officials, experts, and managers from five Biosphere Reserves (Mt. Sorak, Jeju Island, Shinan Dadohae, Gwangneung Forest, and Gochang) attended. Managers of the Biosphere Reserves shared their 2013 action plans and discussed how to improve the management of Biosphere Reserves.

4. MAP 9: all Biosphere Reserves undertake periodic review and related actions to update zonation, management and other changes to meet Seville & MAP requirements and recommendations

Mt. Sorak BR and Jeju Island BR submitted periodic reviews in September 2012, which were accepted by the 25th MAB-ICC. Management plans in and nearby each BR, including research and monitoring plans, were gathered and reviewed. Based on the review, an umbrella management plan was made.

5. MAP 11: enhanced legal recognition of Biosphere Reserves where appropriate

With the recognition that national legislation is necessary to sustainably support Biosphere Reserves, the Nature Environment Conservation Law was revised, stipulating the financial support for BRs. Additionally, the government is planning to include the concept of Biosphere Reserves in the national legislation this year.

6. MAP 12: analysis of zonation of all Biosphere Reserves

The Ministry of Environment of Korea and the Korea National Park Service, which has the authority to manage Mt. Sorak BR, are discussing ways to expand the transition area of Mt. Sorak BR, which accounts for only one per cent of the total Mt. Sorak BR. As part of this undertaking, MAB-ROK will start research on expanding the transition area in 2013 in close cooperation with related local governments.

***7.* MAP 21: a Decade of Education for Sustainable Development (DESD) programmes with educational and research institutions**

ROK promoted its Biosphere Reserves as learning sites to promote education for sustainable development and demonstrate trade-offs and balanced interaction between humans and the environment.

Mt. Sorak BR has been running diverse education programmes, such as Citizen University, for local people, children and visitors. It aims to collaborate with local people in management of Mt. Sorak BR. Through the programme, local residents will understand and appreciate the concept of Biosphere Reserves, natural and historical resources.

Jeju Island BR is running environmental education programmes for local residents through 17 organizations. Most of the programmes are related to the nature of Jeju Island, but they also contain key environmental issues such as climate change and green growth.

Shinan Dadohae BR runs diverse programmes related to its tidal flats. Tourists can join various ECO-TOURs such as making natural dyes and traditional foods with local people. Also, the Migratory Birds Centre of the National Park Research Institute is running several programmes such as eco-guiders (full season) and education on bird ringing (twice a year) to increase public awareness on the importance of biodiversity.

As for Gwangneung Forest BR, it has various education programmes on forest biodiversity. For instance, the Green School Programme has inquiry-based lessons and hands-on activities, which are followed by an exploration of a greenhouse, the forest, and/or arboretum grounds by selection. Programmes may incorporate video watching, story-telling, sensory explorations, or making use of experiments, observation, hand crafts, and sketching activities

During the World Conservation Congress in September 2012, the Korea National Park Service organized a workshop on ESD through National Park Experiences in cooperation with the Korean National Commission for UNESCO. The case of Mt. Sorak BR was presented at the workshop, and strengthening the linkages between ASPnet and BRs to promote ESD was highly recommended.

9. MAP 25: improved financial mechanisms for Biosphere Reserves and regional networks

ROK supports establishing the project on Poverty Reduction, Biodiversity Conservation and Sustainable Development in Sub-Saharan Africa. This project is called the Green Economy in Biosphere Reserves (hereinafter GEBR**).** The Korea International Cooperation Agency (KOICA) will provide financial support for Africa through Funds-in-Trust to UNESCO from 2013-2015 as an ODA support. MAB-ROK is going to join this project as an expert body.

The purposes of the project are:

1. Diversify the economy through improved and alternative biodiversity related livelihoods.

cooking purposes.

3. Build the capacity of communities in a holistic manner to ensure the sustainability of the biodiversity and to conserve the resources of local businesses.

Project budget	Total Project budget: US$1,804,029.18
Project period	3 Years
Target	Ghana (Bia Biosphere Reserve, Juabeso and Bia District) Nigeria (Omo Biosphere Reserve, Ijebu, Ogun State) Tanzania (East Usambara Biosphere Reserve, Muheza District)

10. MAP 26: improved generation of profits and livelihood benefits in Biosphere Reserves through sustainable production, harvesting, processing and marketing of Biosphere Reserve products

Through partnerships with businesses, the ROK could promote and develop the marketing of local BR-branded products.

Local residents near Mt. Sorak BR produce traditional sauces (soybean paste, hot pepper paste, etc.) and promote and market their products through *Weekend and Train Shop*, a magazine of the Korea Railroad.

Jeju Island BR is preparing the branding of local products. Jeju Special Self-governing Province made its own BR emblem and worked on partnerships with producers to sell eco-friendly local products such as tangerines and potatoes.

Gwangneung Forest BR created its own BR emblem and is implementing a system to maintain the high quality of local products this year.

MAB-ROK will constantly promote cooperation among BRs with various activities to share best practices and also make efforts to publicize the value and importance of BRs through environmental education programmes.

4.4 Country Report, Dr. Yun Chol Nam, Democratic People's Republic of Korea

1. Introduction

The government of DPRK, desiring a thriving nation, has been paying great attention to eco-environmental protection in view of significance in building a thriving nation. This has led to accomplish the massive movement for restoration of destroyed ecosystems, afforestation and landscaping of the country.

Last year, the respected Marshal **Kim Jong Un**, who is the Supreme Leader of the Party and people, issued his immortal classic work entitled 'On bringing about a revolutionary turn in land administration in line with the demands for building a thriving socialist country', in which he instructed to change our country into a socialist paradise by renewing the native appearance in keeping with the demands for building a thriving nation.

Great successes have resulted from the implementation of the Party's militant call for protection of the eco-environment; such as arranging material and technical foundation of landscaping and afforestation throughout the whole country, and making progress in forestation and forest conservation.

DPRK-MAB National Committee, as a core administrative structure, is playing an important role in implementing the political demands of Party and government, i.e. to periodically investigate species of plants and animals, and its habitats, and to ensure biodiversity through conservation on threatened and rare species.

2. DPRK-MAB Activities from 2012 to 2013

2.1 Preparation of periodic report on Biosphere Reserve

The 2nd periodic report on Mt. Paektu Biosphere Reserve has been prepared by the Centre for Biodiversity, State Academy of Sciences, according to the mandatory of DPRK-MAB National Committee. During that time, they held conferences twice among experts, while relevant stakeholders met three times. A draft report was finally

reviewed to be revised in the conference held in January 2013.

2.2 Preparation of nomination document on new Biosphere Reserve

Nomination document on Mt. Chilbo Biosphere Reserve was prepared for submission to the MAB Committee, UNESCO, on September 30 2013, which will be the 4th Biosphere Reserve in DPR Korea. From ancient times, Mt. Chilbo, located at the East Sea coast of Korea, has been known as one of six famous mountains and as a scenic spot of Korea. Mt. Chilbo has diverse nature landscapes with a series of spectacular forests, valleys and mysterious rocks and cliffs, rising into the sky solemnly at the East Sea coast of Korea. The Mt. Chibo area is ideal for a Biosphere Reserve, due to its diverse ecosystems, such as mountain ecosystem, forest ecosystem, freshwater ecosystem, marine ecosystem, and agro-ecosystem. It is sufficient in condition to foster sustainable development of ecosystems and the regional economy, while it is of the great potential for developing eco-tourism, as it already has infrastructure and rich resources with about 160 noted places for tourism. Mt. Chilbo, which is expected to be a new Biosphere Reserve, will play a key role for the comparative study of ecosystems with existing Biosphere Reserves in DPR Korea, i.e. Mt. Paektu Biosphere Reserve in the North, Mt. Kuwol Biosphere Reserve in the South, and Mt. Myohyang Biosphere Reserve in the West, and in regional sustainable development.

2.3 Assessment on wetland biodiversity

In our country, there are many wetlands compared to others. However, with lack of public awareness of them and the inaction of international cooperation and exchanges in this field, continuous over-exploitation of wetlands has been bringing about habitat loss. The ‘Study on protection and sustainable utilization of wetlands’ has been selected as a focal task of the 3rd 5-Year Plan for National Scientific and Technical Development, aiming to solve the problems mentioned above. As a result, biodiversity of all wetlands in the country have been evaluated, and the scientific and technological foundation has been prepared for wetland management and its reasonable use. Besides this, the priority of wetland protection and management has

been decided, and the 'Wetland Action Plan, DPRK' prepared. This led to the completion of preparatory documents for signature to the RAMSAR Convention.

2.4 Establishment of system for biodiversity information and management

The government of DPRK focuses on biodiversity conservation and its sustainable utilization as one of state policy, which holds an important place in building an eco-environment proper to the appearance of a thriving nation. Therefore, DPRK-MAB Committee has set the establishment of a system for biodiversity information and management as an important study. This study aims at promoting the development of biodiversity conservation and sustainable management, and implementing its duty as a member state for Convention on Biodiversity by collecting, arranging and disseminating the information of biodiversity at home and abroad, as well as by contributing to decision-making and improving public awareness of biodiversity. In future, this study will be largely planned through basic, model and diagram databases. Among them, the basic database is divided into species, threatened species, genetic resources, ecosystems, specimens, in-site and ex-site, exotic species and relevant socio-economics. The model database will be composed of categories including dynamic key species, analytic species viability, and ecosystem assessment, while the diagram database will include several types of maps for reserves, vegetation, distribution and land use. As a result, such individual databases will support the integrated biodiversity information system.

2.5 Eco-environmental assessment of nature reserves

The number of nature reserves and their area was promulgated by Cabinet Decision No.1063 in 2003, and has not been revised since. As discussions are open to reevaluate and reestablish nature reserves, eco-environmental assessments of nature reserves have been selected as an important study to be performed. Relevant researchers have identified the ecosystem assessment indicators of nature reserves, and the eco-quality of reserves will be evaluated. They also have designed 13 regional networks for enhancement of eco-environment protection and management of nature reserves. Therefore, the proposal for construction of KBRN (DPR Korea

Biosphere Reserve Network) has been drawn up, organically combining 13 regional networks through ecological corridor. In addition to this, enlarging the reserve area from 7.3 per cent to 15 per cent of land has been scientifically assured.

2.6 Overall survey of freshwater fish resources

During the past two years, an overall survey on freshwater resources has taken place to confirm the amount of resources and the distribution of 124 species of freshwater fish in the country, and to ensure areas and criteria of rivers, lakes and reservoir scapable for fish breeding, as well as take a measure for conservation and proliferation of freshwater fish.

The measures for conservation and proliferation are as follows:

a) Great attention should be paid to conservation and proliferation of freshwater fish and prohibition of fishing in spawning season (from April to June) at the request of the 'Law on fish breeding DPRK' and the 'Law on protection of aquatic resources DPRK'.
b) All units concerning fish breeding should thoroughly carry out the plan by the order of state for releasing fry in rivers.
c) Land and environment protection agencies should be responsible for the management of special reserves in their role as supervisors.
d) All units in the sectors of metal-mining and chemical industries should prevent eco-environment contamination and damage in freshwater by thoroughly taking preventive measures against hazardous material leaks.
e) All yields of freshwater fish should not be exceeded, lest should any difficulty in breeding of filial generations should occur.

3. Cooperation with UNESCO

We participated in the 5th EABRN Training Course and 2012-joint research of EABRN on biodiversity sponsored by EABRN and UNESCO. The report has been issued with the title of 'Biodiversity and geological research of Mt. Paektu Biosphere Reserve'. The project entitled 'Assessment on resources of freshwater fish, DPRK' was successfully implemented with support from the UNESCO Office in Beijing. Two experts participated in the 3rd conference for the 'World Network of Island and Coastal area Biosphere Reserves'.

4.5 Activities of the Russian MAB Committee During the Last Two Years, Dr. V. M. Neronov, Russian Federation

On behalf of the Russian MAB Committee I wish to express sincere gratitude to our colleagues in Mongolia and in the UNESCO Beijing Office who, in a very short time, undertook the responsibility to organize and host this EABRN meeting. Of course, we are very sorry that plans to conduct such a meeting at the coast of Baikal Lake have been cancelled due to *force majeure* conditions in the Russian Academy of Sciences. According to the agenda of the EABRN-13 meeting, I am pleased to present a brief review of what was done in our country after the meeting in Shinan Dadohae Biosphere Reserve, Republic of Korea up to this meeting here in Ulaanbaatar. Some proposals for future actions are also included into this report. Following the recommendations of the EABRN-12 meeting, we tried to do our best in implementing the Madrid Action Plan into our national network of Biosphere Reserves, which is subdivided between EABRN (16 BRs) and Euro MAB (25 BRs). Among our achievements, we believe, there was the approval at the 24th session of ICC MAB for our 41st Biosphere Reserve – Bashkirskiy Ural – which is situated in the European part of the Russian Federation (hereinafter RF), but very close to a territory which belongs to EABRN. Recently we submitted to UNESCO one more nomination form, for the Daghestanskiy reserve, which lies close to the frontier of the Republic of Azerbaijan. After approval of this candidate by ICC MAB in 2014, it could be involved in transboundary cooperation with protected areas in Azerbaijan, which still has no Biosphere Reserves despite its rich biological and landscape diversity and cultural heritage.

Beside regular work with the selection of candidates and preparation of nomination forms for UNESCO (we still didn't close some gaps in the national network of Biosphere Reserves, particularly to the East of the Ural Mountains) during the last two years in connection with implementing the Madrid Action Plan, we paid special attention to securing comprehensive legislative support to existing Biosphere Reserves. The problem lies in the fact that until now, questions regarding the

organization of three necessary zones and activities covering the sustainable development of adjacent territories are not fixed in the legislation of RF. The experiences of other countries where these questions are already successfully solved, including the recommendations of UNESCO in the 'model' law for Biosphere Reserves, were not used in our country in any way. We collected suggestions from our Biosphere Reserves, organized roundtable discussions at the International Forum 'Great Rivers' in Nizhnii Novgorod and during the Russian-German Days o then Environment in Kaliningrad, and tried to convince the Ministry of Natural Resources and Ecology of RF and the relevant Committee of State Duma (Parliament) of RF to include several sections in the Federal Law on Strictly Protected Areas (1995) to cover specific tasks of Biosphere Reserves and their structure. It is pity, but these efforts did bring the desired results. Even the amendment to this law to include transboundary cooperation of regional protected areas prepared by the Kaliningrad Regional Duma in consultations with our MAB Committee was rejected. So, any suggestions from EABRN country members and the UNESCO MAB Secretariat on how to solve this problem in the near future will be appreciated.

To strengthen our cooperation within EABRN, we signed bilateral agreements with several MAB committees (from Republic of Korea to Kazakhstan) and we are very pleased that in September 2013 at the International Eco-Forum in Changbaishan (China) such an agreement was signed with the MAB Committee of China. It should help to promote transboundary or site-to-site cooperation between the Biosphere Reserves of our two countries. One such twinning was already approved – for Sikhote-Alinskiy BR (Russia) and Changbaishan BR (China), and now they are preparing an Action Plan to implement tasks included into the agreement. In this connection it is necessary to recall that in 2011 in the frame of an intergovernmental agreement between China and Russia on cooperation in environmental protection, a strategy for formation of transboundary network of strictly protected natural areas within the basin of the Amur River was approved. Based on the just signed agreement on cooperation, both MAB Committees must prepare plans for enlarging a number of Biosphere Reserves within the basin of this great river, which this summer flooded,

resulting in enormous damage to the territories of both countries. Monitoring conducted through the network of Biosphere Reserves should help to prepare reliable forecasts and plans for necessary advance actions to mitigate such damages in future. In principle, closer cooperation through the whole network of Biosphere Reserves of East Asia is necessary for solving this task. So, in addition to already signed agreements with several MAB Committees we will be very glad if during this meeting it will be possible to discuss conditions and possible time for signing similar agreements with the MAB Committees of DPRK and Japan. We are also sure that based on the experience obtained in the frame of cooperation between Sikhote-Alinskiy BR (Russia) and Changbaishan BR (China), it will be possible to find in EABRN new candidates for similar twinning. During the last two years our MAB Committee had some changes, which should also be mentioned. In 2012, the Presidium of Russian Academy of Sciences nominated a new chair of the MAB Committee (academician Yu. Yu. Dgebuadze, Deputy Director of the Institute of Ecology and Evolution, RAS, Moscow) and expressed thanks to academician V. N. Bol'shakov, Director of the Institute of Plant and Animal Ecology, Ural Branch of RAS, Yekaterinburg for his 10 years of successful leadership of the MAB programme in Russia. A new draft Statute of the Russian MAB Committee and a new list of its members were prepared but not yet approved due to unforeseen reforms in the Russian Academy of Sciences initiated by the Ministry of Education and Science of RF and supported by the State Duma (Parliament) of RF. In light of such 'reforms' we were confronted with difficulties in funding of our MAB Committee's activities, and we don't know what exactly will happen with our committee in near future. Anyhow, for this particular EABRN meeting, we have been able to collect necessary data and prepare a collection of 16 illustrated posters to show how our Biosphere Reserves situated in Siberia and the Far East participated in the MAB program and in EABRN activities. It is possible to see and discuss the content of these posters at the exhibition organized with help of the EABRN Organizing Committee.

In 2012 and 2013 in the framework of the International Forums of 'Great Rivers', regularly held in Nizhnii Novgorod, we have been able to organize two MAB Seminars

with special tasks to enlarge and diversify inputs of Biosphere Reserves into sustainable development of the Volga River basin. 13 Biosphere Reserves are situated in this basin and such meetings (in total we already had four of them) helped to share their experience in implementing different tasks of Biosphere Reserves – monitoring of changes in the environment, conservation of the whole biodiversity and rare plant and animal species, and how to ensure participation of the local population in managing and supporting some projects. We have been very pleased that in this year a representative of the MAB Committee of China took part in the forum and presented at our seminar a valuable paper on law enforcement for protected areas in China. We hope that after acquaintance with our experience in implementing the basin approach for Biosphere Reserves it will be possible to apply it to the basin of the Amur River, as already mentioned above.

One more successful activity of our MAB Committee should be mentioned. Some time ago in a close collaboration with the US MAB Committee, the standard computer programs MAB Fauna and MAB Flora were developed and widely used in our Biosphere Reserves. Necessary data from protected areas (not only from BRs) have been collected, and it was possible to publish several database directories: for vertebrate animals, higher and lower plants, and invasive species. In 2012, long-term work was completed and the Directory on soil cover in Reserves and National parks (with maps of different scale) was published. Now we are trying to obtain funding for a similar update of our knowledge on vegetation cover. It is a more complicated task, but in connection with evaluation of impacts of global changes and human activities on territories adjacent to Biosphere Reserves we have to know any changes in vegetation cover, which is an important component of biodiversity conservation. In most cases for mapping of the current state of vegetation cover it will be necessary to use data of aerial or satellite monitoring. For preparing unified techniques, it will be necessary to conduct pilot projects in some Biosphere Reserves selected for twinning and we hope that such projects could be organized with the help of the Beijing UNESCO office. Results of the attempt to show the current state of Korean pine-broad-leaved forests in the Far East, as a preferable habitat of the Amur tiger, will be presented at this meeting. Since we are

taking part in the EABRN meeting on the hospitable land of Mongolia I wish to call attention to achievements of MAB Committee of Mongolia and to some recommendations how to use its experience. At the EABRN-12 meeting some results of the Joint Russian-Mongolian complex biological expedition, presented at the International Conference devoted to the 40-years Jubilee of this Expedition, have been described. Specialists taking part in researches of the Expedition made many valuable inputs to the development of the MAB programme. Among them special attention should be given to the map of *Ecosystems of Mongolia* in scale of 1 mln (a first of its kind in the world). This map, without any doubt, is a good basis for current ecological monitoring of global change's impacts and for taking relevant mitigation decisions on mitigation, as was recommended in the UNESCO Strategy for Action on Climate Change (2009). So, it will be necessary to use this valuable experience and prepare similar maps for other country-members of EABRN, if such a task will be approved at the final session of this meeting. In the course of studies conducted in Mongolia, spatial data on distribution of rare and endangered plants and animal species and unique ecosystems have been obtained and used for creating a national network of strictly protected natural areas. Now this network, including different categories of protected areas, covers up to 17 per cent of the whole territory of Mongolia and it is important that there are already six Biosphere Reserves in this network and some more nomination forms for UNESCO are under preparation. We have to congratulate our Mongolian colleagues with such achievements and do our best to follow up to this good example.

In the framework of bilateral cooperation between Mongolia and Russia we have good results in transboundary cooperation of Biosphere Reserves situated in Daurian steppes and in Ubsunurskaya Depression. Relevant reports describing the results of joint research are presented at this meeting. In this year, the Government of RF took two important decisions: in Altai Mountains, the Sailyugemskiy National park finally became operational and in Transbaikal kray 318 thousand ha were added to the Sokhondinskiy Biosphere Reserve to create its buffer zone along the frontier with Mongolia. Such decisions present good opportunities for creating two new Mongolia-Russia transboundary protected areas and for improving conservation of migrating

animals. Now, the Onon-Baldj national park in Mongolia is situated close to the Sokhondinskiy BR and it will be possible to create the joint large transboundary Biosphere Reserve. Even the name for this future TBR was proposed as 'Upper reaches of Amur River', and a preliminary project proposal was prepared. We hope that participants of this EABRN meeting will support this proposal and a 'green light' will be given for further preparatory work and the signing of an intergovernmental agreement for creating and securing effective functions of such TBR. Another prospective area for creating a TBR between Mongolia and Russia are the Altai Mountains, and we are prepared to start necessary negotiations with the MAB Committee of Mongolia about this matter - possibly including into this TBR a portion of the Transboundary World Natural Heritage site in the Ubsunurskaya depression (and the proposed site in the Daurian steppes). We hope participants of the EABRN-13 meeting will also support this proposal. In this connection it is worth mentioning that in Russia nine BRs are already included into the List of World Natural Heritage. It guarantees their better protection, and we have established close working contacts with the Russian national committee for World Heritage to enlarge the list. Currently, nominations of two more Biosphere Reserves (Daurskiy and Bashkirskiy Ural) for inclusion on the List of World Natural Heritage have been submitted to UNESCO.

In recognition of the importance of transboundary cooperation for conservation of biological and landscape diversity, it is necessary to remind participants of the EABRN-13 meeting about our proposal presented at the previous EABRN meeting to start negotiations with UNESCO on the possibility of adopting an international convention on transboundary protected areas. The forthcoming 37th session of the UNESCO General Conference (Paris, 5-20 November 2013) is a very suitable event at which to call attention to this proposal and conduct consultations with other delegations to seek their support. The improvement of transboundary cooperation is an enormously urgent problem for many countries, but first of all we hope this proposal will be supported by all EABRN country-members. During September 2010 in Hustai Nuuru Biosphere Reserve, which we are planning to visit according to the Agenda of EABRN-13 meeting, the International Conference 'Eurasian Steppes: Status, Threats and Adaptation to Climate

Change' was held. Participants of this conference paid special attention to many critically endangered plants and animal species and steppe ecosystems in Eurasia transformed by human-induced activities. Based on the results of this conference, the Hustai Declaration on Eurasian Steppes was elaborated (Annex 1), which should help to reverse steppe destruction and to respond to the challenges of climate change. Proceedings of this conference have been published and highly appreciated by specialists. Steppe ecosystems cover large areas in several EABRN countries and accordingly recommendations of the Hustai Declaration should be taken seriously – and not only in EABRN country-members. I can assure you that in our country they received adequate attention and currently a special project on conservation of steppe ecosystems is conducted in the Southern areas of Russia with the support of UNDP/GEF. In the framework of this project, the Institute of Steppes, Ural Branch of RAS in Orenburg has proposed to declare 2014 as the 'Year of Steppes' to secure the wider international cooperation in protecting the Steppe biome. The relevant decision of the EABRN meeting is very important for promoting this useful proposal and we hope that it will be included into the final documents of this meeting.

For one of the valuable but now endangered ungulate species inhabiting the Eurasian Steppes – the Saiga antelope – it was possible (with help of two international conventions (CMS and CITES) for five range countries (Mongolia, Kazakhstan, Uzbekistan, Turkmenistan, Russian Federation), to sign a Memorandum and Action Plan for its conservation and sustainable use. Now the numbers of this species is improving in different parts of its geographical range and it is possible to expect that this species will be saved from extinction. To avoid such critical situations in future with another endemic species of ungulates in Eurasian Steppes – the Mongolian gazelle (or dzeren) – it is desirable to prepare and sign similar documents that were used for the Saiga antelope. The Mongolian gazelle now inhabits and migrates widely across three countries (Mongolia, Russia and China). Our MAB Committee will be pleased to take part in a new endeavour to save this unique species. We hope that specialists in Mongolia – where this species has the largest portion of its geographical range – will take the initiative to begin negotiations for obtaining support from CMS and CITES.

In conclusion, I would like to assure the distinguished delegates of the EABRN-13 meeting that, in spite of current difficulties, the Russian MAB Committee will continue its active participation in the further development of EABRN, as we did in previous years. After completing the Madrid Action Plan for Biosphere Reserves together with other EABRN country-members, we should make necessary inputs into the new Strategy for MAB, which is now under preparation in UNESCO.

Appendix 1

The Hustai Declaration on Eurasian Steppes:
To Reverse Steppe Destruction and to Respond to the Challenges of Climate Change

The Eurasian steppes form a belt of natural temperate grasslands that stretch from the plains of North-east China into the *puszta* of Hungary. The steppes gave birth to the evolution of many familiar animal species like horses, sheep and camels. Flowers like the tulip, iris and anemone find their origin on these grasslands. During the 20th century the steppe landscape has been highly altered by human activities, driven by population growth and the economy of markets. In large parts of the steppes the original grassland has been converted to crop land, and many of the original animal and plant species disappeared. In Europe itself, undisturbed steppes have become very rare and in need of protection and restoration. Larger tracts of original steppe only remain in Asia, in Kazakhstan, in Mongolia and in some parts of Russia and China. Nowadays climate change is putting additional and severe pressure on the steppe ecosystems, with serious consequences for steppe biodiversity and for the people that depend on the products and services delivered by the steppe ecosystems.

Protection and restoration of steppes has shown positive results in some isolated places inside the steppe belt, from Slovakia to Inner Mongolia in China. There is an urgent

need to connect these individual activities into one coherent package in order to reverse the trend in steppe degradation and to cope with the impact of climate change.

An appeal to the world community at an international conference in 2010 – the UN declared International Year of Biodiversity – at Hustai National Park in Mongolia brought together scientists and managers of steppe ecosystems to discuss the present state of the steppes. The conference concluded that it was obvious that during the twenty years since the United Nations Conference on Environment and Development in Rio de Janeiro, the conservation of steppe did not receive the attention that these ecosystems deserve. Protected areas in the steppe belt mostly cover specific biotopes like lakes or mountains. The steppe themselves are seriously underrepresented.

Participants of the conference therefore make an appeal to national governments of the steppe belt and to the international community to put the conservation of steppes high on the policy agenda, and more specifically, to:

- **Develop and implement national strategic conservation programmes for steppe ecosystems, their conservation and wise use**, covering all sectors of society: from conservation to mining, from agriculture to education and public health, and beyond. These conservation programmes should ensure that ongoing degradation of the steppes will be halted and that future development programmes will respect the integrity of the steppes.
- **Establish national and international monitoring networks of steppe ecosystems in order to follow closely their evolution** and ecological functioning, and to adapt their management where negative trends will be observed
- **Promote scientific collaboration by strengthening existing scientific research on steppe management and restoration**, creating new research institutions where they do not exist and organize regular international exchange of scientific findings among scientists and steppe managers
- **Raise awareness and improve knowledge about the importance of steppes and their wise use** among the general public and among (future) resource

managers and planners in particular, and/or by integration of steppe conservation and management in school and university curricula.

- **Strengthen and facilitate community based management of steppe ecosystems**, assuring controlled access to the natural resources of the steppes for the local communities, creating synergy by bringing together scientific and traditional knowledge.
- **Develop innovative policies and legislation that harmonise the challenges of modern times with the ecological** advantages of traditional lifestyles of the steppe communities, capable to cope with the risks of the capricious and changing climate of Eurasia.
- **Establish an ecological network of protected areas covering at least 10 per cent of the total steppe area**, and to be connected by ecological corridors. This ecological infrastructure will serve as an ecological backbone for steppe conservation. It will strengthen the resilience of steppe ecosystems and of the livelihoods of communities that live in and depend on the products and services provided by the steppes. This 'green girdle' should cover the entire Eurasian steppe, from the foothills of the Alps in the West to the Amur Basin in the East.

Hustai National Park, Mongolia, 11 September 2010

4.6 MAB Mongolia Country Report, Mr. Tuvshinbat, Mongolia

In 2011 the justification of Khan Khentii Reserve was designated and submitted to the MAB Secretariat, and in 2011-2012 the justification of the Onon Balj Reserve was also developed. In 2013 , we were working on the preparation of materials of Toson Khulstai natural reserve for designation as a BR site. Other progress includes:

* Working on the photo album of Mongolian BR sites
* Working on six BR sites information brochure
* Going into details of buffer zones （details are being made in six areas）.
* The management plan of the Great Gobi strictly protected area, Bogd Khan Mountain strictly protected area, and Uvs basin are renewed or newly made.

Great Gobi Biosphere Reserve

The International bear association, the Mongolian academy of sciences and biology departments have twice cooperated on the genetic survey of the 'Mazaalai' bear. Among the Great Gobi strictly protected area, four ground water wells have been built and supplementary foods often been grown. The study about expanding the territory of the Great Gobi strictly protected area 'Part B' has also been held. Four wild horses have been observed at a distance with the help of satellite signal collars.

Khustai Nuruu Biosphere Reserve

For the first time, the number of wild horses increased to 300. The new research centre, which uses renewable energy, was commissioned. In the last few years, wild sheep started to populate the area. The contract with the government was evaluated this year, and both parties decided to extend the contract.

Uvs Lake Basin Biosphere Reserve

With the condition of contract between two governments, delegates from Russia and Mongolia participated in the commission conference in Tuva, Russia, for the Uvs basin area's protection planning. A survey on endangered species such as Snow Leopard, wild sheep, Ibex, True otter and floral layers was carried out. Among the secondary

school children who live around the transboundary zones, international ecology training has been arranged for two years on the territory of Tuva. The boundary posts are regularly made at the border zone.

Bogd Khan Uul Biosphere Reserve

The Minister of Environment and Green Development has stopped giving permissions to use land plots for tourism in the protected area until 2014. A survey on potential tourist capacity has been made. Ibex have been located in the area. The official itinerary in the area has been stated and the people concerned started working on landscape management issues.

Dornod Mongol and Mongolian Daguur Biosphere Reserves

The nomination of protected area 'Daguur' has been prepared and sent to UNESCO for adding it to the list of UNESCO World Heritage Sites. Rangers are supplied with portable accommodation for constant check-ups to prevent illegal hunting. Introductory booklets are now published in English.

4.7 Country Report for the EABRM Meeting in Mongolia, Mr. Zhijun Yi, People's Republic of China

The report briefly summarized all the activities that were implemented by the China-MAB Committee in the past two years (2011-2013).

1. Nomination and periodic review of Biosphere Reserves

Maoer Mt. Biosphere Reserve in Guangxi Province, which was designated by UNESCO in 2011, has become the 29th Biosphere Reserve in China and the first site related to UNESCO Zhihong Xu, the Chairman of the China MAB Committee, met with. Liang Zhang Chen, the Vice Governor of the Guangxi Zhuang Autonomous Region, to discuss the sound management of Maoer Mt. Biosphere Reserve in April 2012.

The news that Maoer Mt. was accepted by the World Biosphere Reserve Network (WBRN) as one of its members, as well as its important forest ecosystem, was reported by local and national media. Niubeiliang, Jinggangshan and Snake Island were also designated by UNESCO in 2012 and 2013 as the No.30, 31 and 32 Biosphere Reserves in China.

The event of handing over certificates of new Biosphere Reserves to local managers was organized at the Great Hall of the People in Beijing. Representatives of local governments promised to conserve biological resources and develop the local economy. Taking Jingangsan Biosphere Reserve as one example, it not only contains rich biodiversity, but also forms a harmonious community between people and nature. Media agencies including CCTV, Xinhua News, CAS website, and *China Daily*, introduced the conservation practices of the aforementioned three sites and the local manager's commitment to sustainable development.

The China-MAB Committee conducted periodic review of three to four Biosphere Reserves each year. The whole process of each review can be divided into three stages. Different stakeholders are invited to involve into all the organized events to express their views on managing Biosphere Reserves. From 2011 to 2013, Baotianman, Saihaiwula, Dalai Lake, Yading and Yachenhavebeen were reviewed according to the Biosphere Reserve criteria.

The periodic review of Biosphere Reserves in China facilitates local government support for the Biosphere Reserves' management activities.

2. Chinese Biosphere Reserve Network (CBRN)

The CBRN currently consists of 158 members, including 32 Biosphere Reserves. Each year more than three sites are approved by the Committee as members of the Network. In 2011, the 13th Chinese Biosphere Reserves Network Conference and 40th Anniversary Celebration of UNESCO MAB Programme were held in Lhasa, China. The workshop on Ecotourism of Biosphere Reserve produced at the Maolan Biosphere Reserve in April 2011 was entitled, 'Libo Declaration on Ecotourism Development'. The 14th Chinese Biosphere Reserves Network Conference with the theme of developing a green economy was organized in Shenlongjiain in 2012. Cooperating with the Biodiversity-China National Committee, the China-MAB Committee opened a training course on the Species Inventory Database for CBRN members in April 2012.

The committee updated the basic articles of the CBRN and revised its application form for being a member of the network in 2012. Qunli Han, Director of the Executive Office of Natural Sciences at UNESCO, was invited to visit three sites in Henan Province on 11- 14 August 2012, and Zhihong Xu, the Chairman of the China-MAB Committee, attended many field investigations for nomination and review activities of the Biosphere Reserves

3. International cooperation and research projects

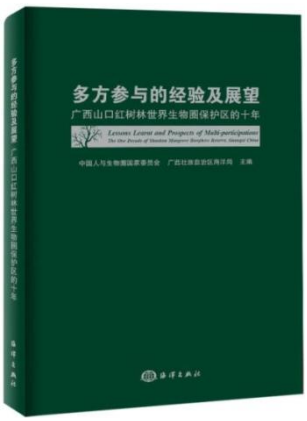
One of the successful events was the Changbaishan Mt. International Ecological Forum, which was organized by the China-MAB Committee, the State Forestry Bureau, the State Environmental Protection Ministry and the Chinese Academy of Sciences, the Chinese Academy of Social Sciences and the government of Jilin Province. More than 400 participants including representatives from 40 countries attended the forum to promote the concept of eco-civilization. The signed Memorandum of Understanding

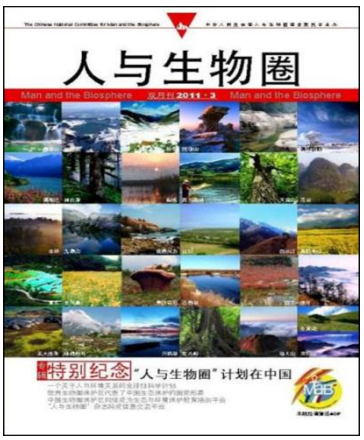
between the China-MAB Committee and Russia MAB Committee was highlighted during the Forum. The China-MAB Committee issued Conservation Awards to five experts, (Prof. Chong IL Choi, Prof. Valery Neronov, Dr. Thomas Shaff, Dr. N. Ishwaran and Prof. Wen Hua Li) for their great contributions to developing the MAB programme in East Asia, especially in China. Working with the Institute of Zoology of the Chinese Academy of Sciences (CAS), the China-MAB Committee launched a research project on Amur Tiger Conservation with RMB 3 million of funding. The first Sino-Russian Symposium on Amur Tiger Conservation occurred at Hunchun in October 2011. Another research project was supported by the Ministry of Agriculture (China) in 2012, focusing on public education of protection for the Yangtze Finless Porpoise. Closely working with the UNESCO Beijing office, the China-MAB Committee held the fifth EABRN training course on Biosphere Reserve management.

4. Publications

The Committee is in charge of one publicity publication – *Man and the Biosphere*. The publication plays a positive role in improving the level of management of natural reserves in China, carrying out education on the environment and popular science to the public, and other aspects. *Ecological Photography* and other special issues have been translated into English.

The Committee jointly published the experiences and lessons of multi-participation from the Shankou Mangrove Biosphere Reserve in 2012. At the same time, the 'E-database of Fauna and Flora of Biosphere Reserves in China' was disseminated to researchers.





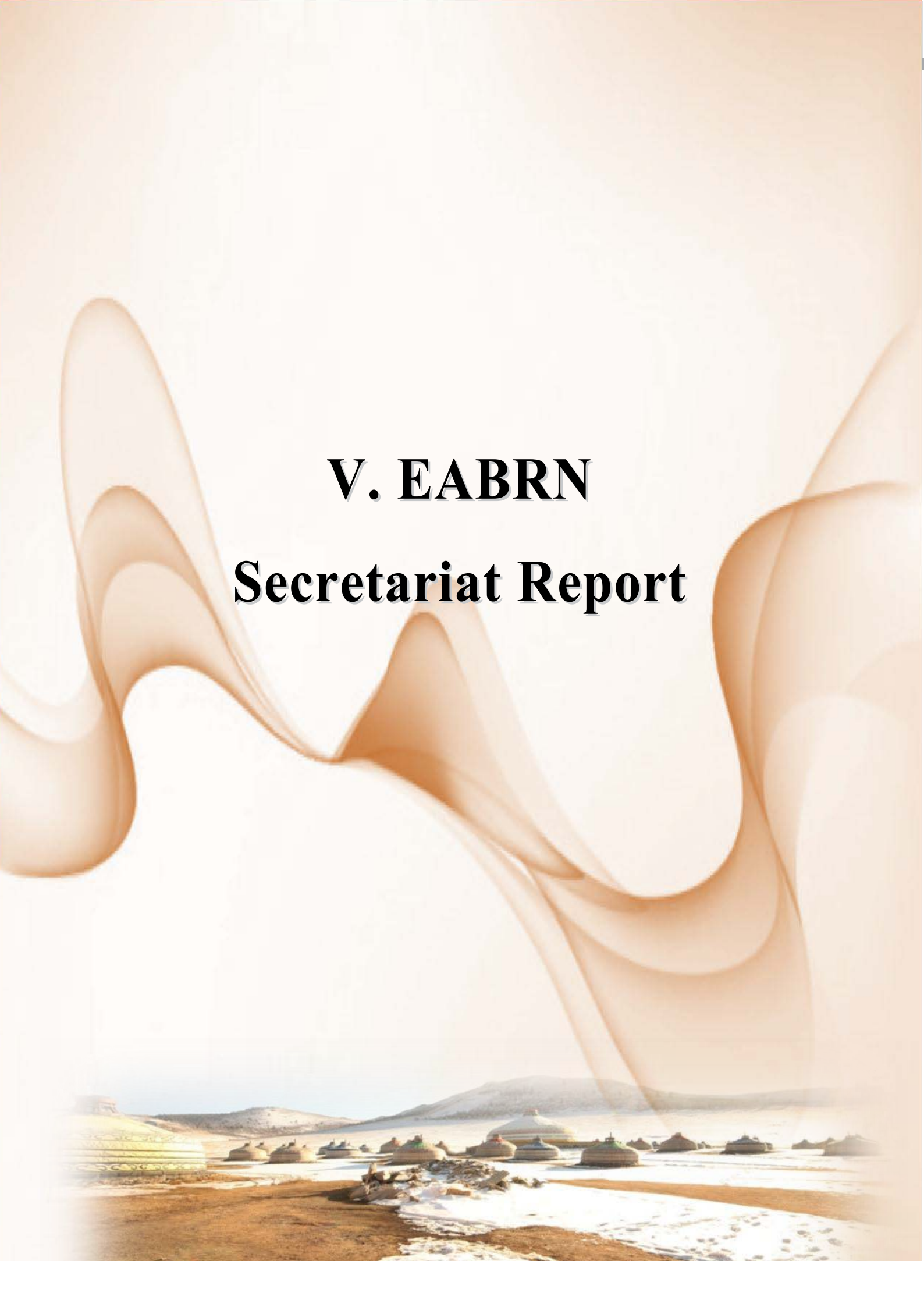
5. Updated information about the China-MAB Committee

In early 2013, the committee announced its new members. The updated members of the Committee are from research institutes, government agencies, and NGOs, etc., such as the Chinese Academy of Sciences, Chinese National Commission for UNESCO, Chinese Ministry of Environment Protection, Chinese Ministry of Agriculture, State Forestry Bureau, and State Oceanic Administration. Prof. Zhihong Xu acted as the Chairman of the committee. In addition, the three Vice-Chairmen are from the State Forestry Bureau, the Chinese Academy of Sciences and the Chinese National Commission for UNESCO.

Prof Ding Wang from the Institute of Hydrobiology takes charge as Secretary-General of the committee.

V. EABRN

Secretariat Report



5. EABRN SECRETARIAT ACTIVITY REPORT 2012-2013

1. Introduction

In 1993, the Twenty Seventh General Conference of UNESCO adopted a draft resolution proposed by the Republic of Korea and supported by several Member States – including Australia, China and Indonesia - calling upon UNESCO's Asia-Pacific Member States to strengthen cooperation in the implementation of the Action Plan for Biosphere Reserves.

In response to the General Conference resolution, a Cooperative Scientific Study of East Asian Biosphere Reserves was launched in 1994 by the Democratic People's Republic of Korea, Japan, Mongolia, People's Republic of China and the Republic of Korea, in cooperation with the UNESCO Offices in Jakarta and Beijing and the Man and the Biosphere (MAB) Programme Secretariat at UNESCO, Paris. As part of the study, two technical meetings of representatives from participating East Asian Countries were held during 1994.

At the second such meeting, held at the Changbaishan Biosphere Reserve in China, representatives from the five countries unanimously agreed to formalize the establishment of the East Asian Biosphere Reserve Network (EABRN). A statute for the new sub-regional network was subsequently prepared by UNESCO and approved by the EABRN member states. During 1998, an official request to join EABRN was submitted by MAB Committee of Russian Federation to UNESCO and was welcomed by the EABRN member states. In 2011, Kazakhstan was welcomed as the seventh member of the network.

This brief report is based on materials provided my Mr. Jayakumar, former programme specialist for natural sciences at UNESCO Beijing Office. It focuses on regional and outreach activities undertaken by the EABRN secretariat and does not cover activities included in the national reports of member countries.

2. Meeting / Conferences

12th EABRN Meeting

The 12th Meeting of the UNESCO-MAB East Asian Biosphere Reserve Network (EABRN-12), Shinan Dadohae Biosphere Reserve, Republic of Korea, 20-23 September 2011

One hundred and ten representatives (ninety from Korea and twenty international) participated in thematic discussions under the main topic **"Implementation of the Madrid Action Plan in the Biosphere Reserves of Asia and the Pacific with special focus on Coastal and Island BRs"**, and presented country reports providing details of national and cooperative biosphere reserves activities. Participants included representatives from five EABRN member countries (China, Japan, Mongolia, Republic of Korea, and the Russian Federation), as well as the Government of Republic of Korea, a representative of the Southeast Asian Biosphere Reserve Network SeaBRnet (Vietnam), the South and Central Asian Biosphere Reserve network SACAM (Maldives and Sri Lanka), the Kazakhstan National MAB Committee and UNESCO Beijing Office.

Session topics ranged from sustainable development, adaptation to climate change (with particular focus on coastal and island biosphere reserves) to regional cooperation among biosphere reserves. A field trip was organized to the Shinan Dadohae biosphere reserve, where more than five hundred islands around Shinan County together make up the reserve, which was originally established in 2009.

At the end of the 12th EABRN Meeting, the **Shinan Statement** was adopted. Calling for enhanced transboundary and joint research cooperation and calling upon UNESCO to assist the network in raising additional funding for an expanded suite of activities, the Statement captured the very positive and forward-looking spirit of the discussions.

Marking the first expansion of EABRN since Russia's entry in 1998, member countries approved an application from the Kazakhstan National MAB Committee to become a full EABRN member. The meeting also discussed and recommended topics for the 13th EABRN Meeting (October 2013) and 5th EABRN training (July 2012).

On the margins of the meeting, two EABRN Member State biosphere reserves, **Sikhote-Alin State Nature Biosphere Reserve** of the Russian Federation and **Changbaishan Biosphere Reserve** of China, signed a twining agreement on transboundary cooperation aimed at synergizing joint efforts in managing shared transboundary biodiversity, and agreed to explore the possibility of joint researches and activities together in future.

3. Training Workshops

The 5th EABRN-UNESCO Training Workshop "Biological Inventory and Database Construction for Biosphere Reserves Network" and Joint Research on Biodiversity, Changbaishan, China, 10-16 July, 2012

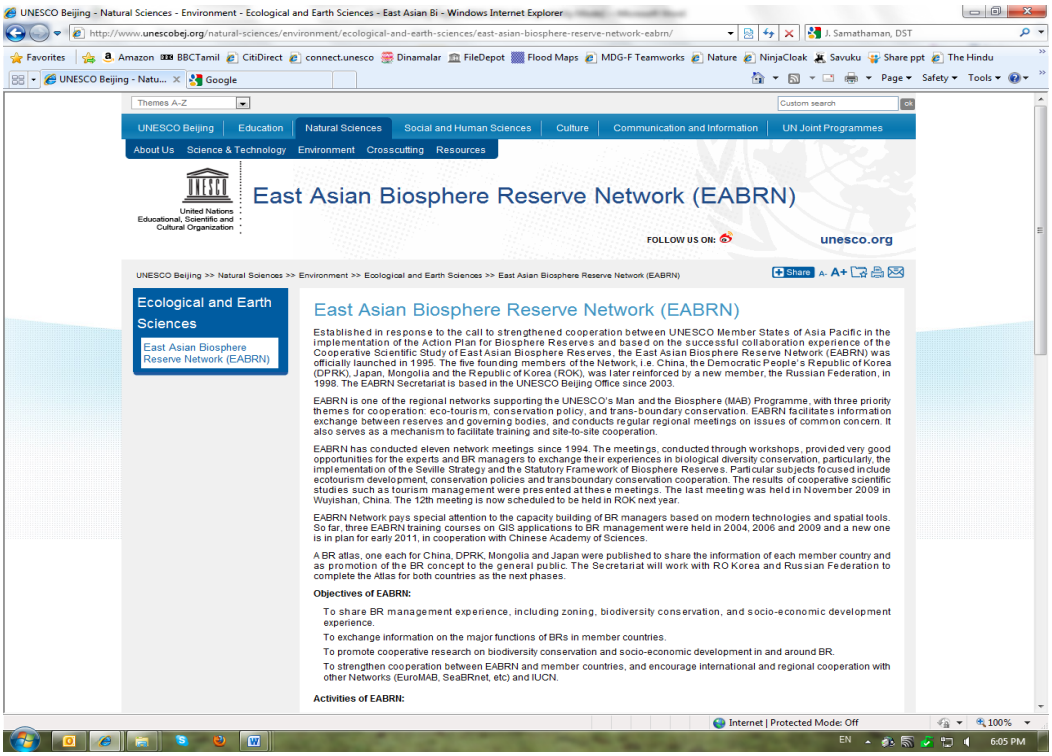
In the Shinan Statement adopted at the 12th EABRN Meeting (detailed above), EABRN Members agreed that capacity building of Biosphere Reserve managers and young scientists should be recognized as one of the main priority in implementing the Madrid Action Plan. In collaboration with the Biodiversity Committee, Chinese Academy of Sciences, and Chinese National Committee for MAB, the 5th EABRN Training Workshop "Biological Inventory and Database Construction for Biosphere Reserves Network" was organized alongside a joint biodiversity research meeting in Changbaishan, China during 10-16 July 2012.

The one week training focused on new technologies used in the processes of biodiversity inventory, including geographical information management, field survey, and data management. Seventeen participants from all seven EABRN member countries participated in the training and the trainees had a chance to practice the newly acquired skills in the one day field visit to Changbaishan Biosphere Reserve at the end of the training.

In parallel with the workshop, a meeting was held with the objective of advancing joint research on the impact of climate change on biodiversity and its long term monitoring. Experts from Changbaishan Biosphere Reserve (China), Mt Peakdu Biosphere Reserve (DPRK), Mr Sorakshan Biosphere Reserve (ROK) and Sikhote-Alin Biosphere Reserve (Russian Federation) discussed about the possibility for a joint research and agreed to start with a preliminary report.

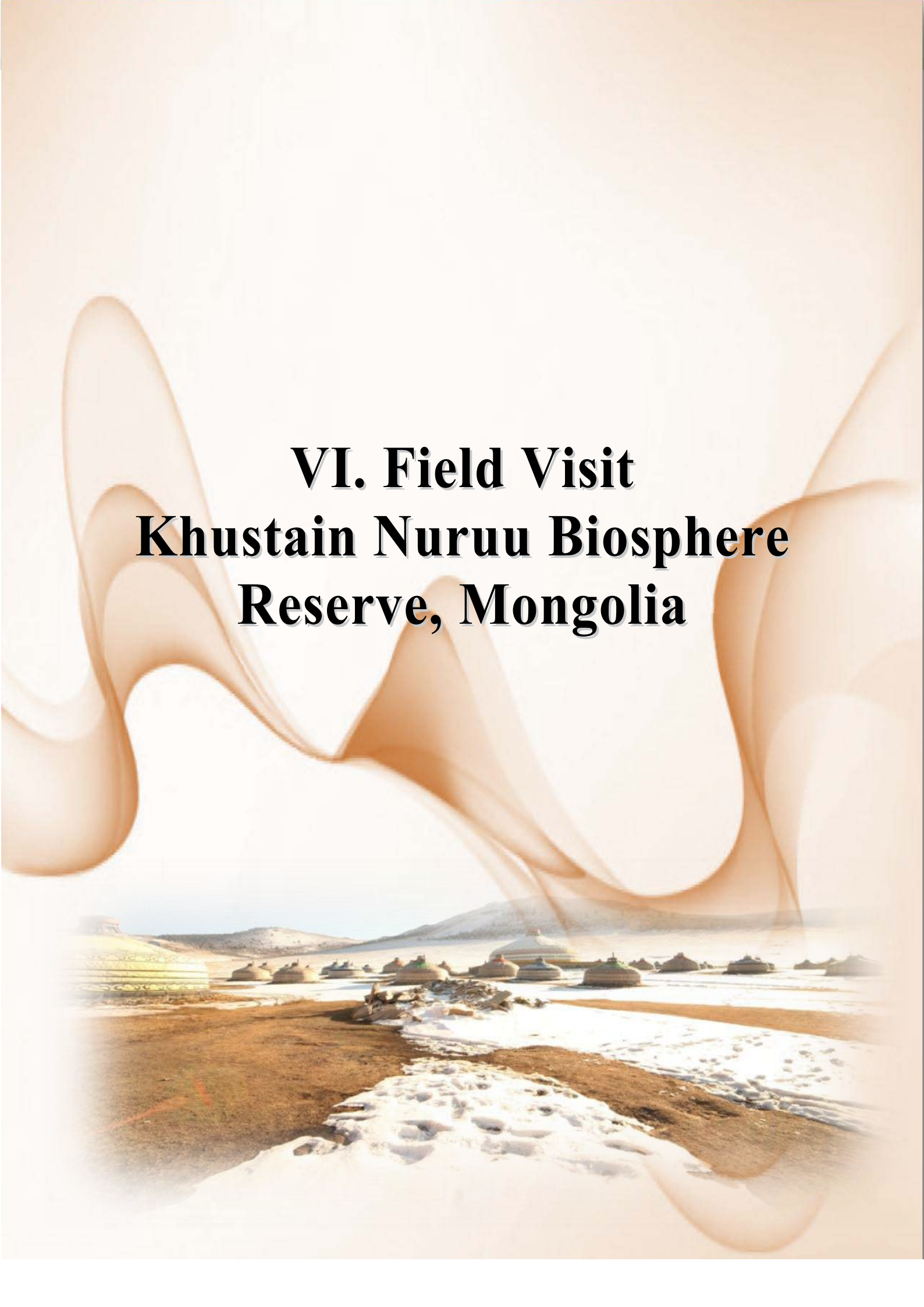
4. EABRN outreach

The EABRN Secretariat continues to maintain a dedicated web site with all reports and meeting documents available for download. In the coming months, the website will be reviewed, updated and redesigned. Comments, expressions of interest and guidance towards this process from EABRN member countries is warmly welcomed.



http://www.unescobej.org/natural-sciences/environment/ecological-and-earth-sciences/east-asian-biosphere-reserve-network-eabrn/

VI. Field Visit
Khustain Nuruu Biosphere Reserve, Mongolia



6. FIELD VISIT TO KHUSTAIN NURUU BIOSPHERE RESERVE, MONGOLIA

6.1 Management and Challenges of Hustai Nuruu Biosphere Reserve, Professor N. Bandi

A brief Introduction of Hustai Nuruu Biosphere Reserve-Hustai National Park

Hustai Nuruu Biosphere Reserve (HNBR) has numerous plant species due to its location in the Central Asian desert, mostly the Northern steppe and the Southern part of the North Taiga Forest. There are 456 species of 237 families, and 63 orders of vascular plants (food (17), medical (217), honey/meliferiuos (236), poisonous (43)), 85 species of lichens, 90 species of moss, and 33 species mushrooms (fungi) that have been recorded in the park.

There are 44 species of mammals, 223 species of birds, over 400 species of insects, two species of amphibian, three species of reptile, and 16 species of fish recorded in the Hustai National Park (HNP).

The HNBR is a hub of historical sites. The mountain slopes and valleys are marked with the graves and tombs of ancient people.

1. **Rectangular grave:** over 160 graves were counted around the park. Scientists say these graves are classic creations by Bronze Age people. They can be dated to the 2nd and 3rd centuries.
2. **Khirgisuur – sepulchre:** 19 large sepulchres were counted at the front of the HNP. They lay in circular or rectangular stone frames and piles of eight or nine stones lay in the corners or along the perimeter. They represent the customs and tradition of burial celebration and worship by ancient people, dated from 1,000 years ago.
3. **Ongot stones:** this is the largest collection of stone monuments, consisting of about 30 stone figures, not only in Mongolia but also in Central Asia. This collection came from the 6th to the 8th centuries as the Turkish Empire was

settling in Mongolian territory. There are 556 balbal standing stones in a line stretching from the Ongot to the South-east.

4. **Stone monuments.** there are three stones that are 187-1,198 cm tall, and some are carved and some are not carved. These stones are common in the Central, East and West Mongolia. Scientists say these stones came from ancient tribes that engraved deer stones, dated from 2,000 years ago.
5. **Deer Stone.** a deer with the beautiful antlers was engraved on the stone, dated from between 1,000 and 2,000 years ago.
6. **Petroglyph.** over 10 petroglyphs which represent wild animals were found in the mountain '*Ekhen shar choluu'* in the buffer zone of the HNP.

Management of the HNBR

HNBR is the only specially protected area in Mongolia managed by an NGO. Hustai National Park Trust-NGO contracted with the Ministry of Nature and Environment to conduct management of the park. HNP was registered in the Man and the Biosphere Programme of UNESCO in 2002. Hustai National Park Trust became a member of the IUCN in 2007.

The Hustai Trust carries out five major activities. They are to:

1. Protect and conserve ecosystems, historical and cultural sites of the HNP
2. Reintroduce the **Przewalski's** Horse and build an independent wild Takhi population in the future.
3. Organize international conference and workshops for Takhi, and conduct mountain steppe ecosystem studies.
4. Eco-tourism development.
5. Buffer zone development.

With the support of the Dutch Government, Hustai National Park successfully implemented projects on the conservation of the ecosystems, strengthened park facilities, developed rangers and other staff educationally and scientifically, ensured improved livelihoods in the buffer zone of the park, built its management capacity and

therefore achieved the award of the Best Specially Protected Area in Mongolia. The park administration carried out international projects with the financial support of the Embassy of the Kingdom of the Netherlands (EKN) as follows:

1. Hustain Nuruu – Nature Reserves (1993-1997)
2. Conservation of the biodiversity of HNP (1998-2003)
3. Support to the management of HNP (2004-2008)
4. Development of sustainable livelihoods in the buffer zone of the HNP (2004-2008)
5. Adaptation to changing conditions in Hustai National Park and its buffer zone (2009-2012)

We raise awareness of nature conservation and living in harmony with nature to local people in order to improve their efforts and develop community-based nature conservation. As a result, herding families understand the park activities positively and actively participate in the project activities. Also, over 20 volunteer rangers from local herding families work for the park.

Thanks to proper protection work on wildlife such as Red Deer, the number of marmot is increasing and several new species migrated into the Biosphere Reserve such as Argali Sheep and Mongolian Gazelle. At the moment there are over 1,000 Red Deer, around 10,000 marmots, 400 Mongolian Gazelles and 32 Argali Sheep.

Przewalski's Horse, the only living ancestor of wild horses, is reintroduced in three areas in Mongolia, and HNBR is one of them. A total of 84 Przewalski's Horses were transported to HNBR during 1992-2000. They are adapting very well in HNBR, and their number has reached 300.

The Hustai Trust became an international centre of field research on forest steppes, adaptation of the Takhi, biology, ethology and ecology. Our research directions are:

First – Biodiversities in the HNP and species composition, distribution and density.
Second – Monitoring of major ecosystem elements.
Third – Adaptation of the reintroduced Takhi in the HNP and wild behaviour.

Conducted research in the HNP in the past decades are reviewed as follows:

1. **Climate**. Hustai Centre has its own climate station and takes data three times a day in eight indices. The data is processed and integrated each quarter, each month and year.
2. **Soil.** Soil composition, characteristics, and degradation status.
3. **Water**. HNP's groundwater, its composition, characteristics and resource have been monitored since 2003.
4. **Plants and vegetation.** Vascular plants, lichens, moss, mushrooms and medical plant species' distribution, yields, and abundance have been studied. Also, pasture plants have been studied in the park and its buffer zone.
5. **Big mammals.** The populations of Red Deer, Roe Deer, Mongolian Gazelle, wild sheep, Grey Wolf, Red Fox, Corsac fox and Lynx are increasing.
6. **Small mammals.** Marmots and other small mammals have been studied, and their species, distribution and density were identified.
7. **Birds.** Migratory, summer and winter birds of the park were identified.
8. **Insects.** Monitoring on insect species, and in particular ants, butterflies, grasshoppers and soil insects, has been studied continuously.
9. **Reptiles and amphibians.** Species compositions are defined.
10. **Socio-economics.** Surveys of the socio-economy of the buffer zone people were carried out several times in local areas.

We have collaborated with national institutes such as the National University of Mongolia, Mongolian State University of Education, Ecosystem Institute of Agricultural University, Biological Institute of Mongolian Academy of Sciences, Geo-Ecological Institute and Institute of Botany, and the Wildlife Conservation and Research Centre. International institutes such as Wageningen University of the Netherlands, Zoo Institute of Czech Republic, Boizo University, US, Tokyo University and Tsukuba University have started collaborative research in the park.

The Hustai Trust has its own Scientific Council. This Scientific Council discusses and gives comments and recommendations on the park research reports and methodologies. Research summaries are integrated and published every two years.
Hustai Trust organizes courses and short training as follows:

1. Student internships
2. Master's and doctoral field research
3. Upgrading short training
4. National and international seminars, workshop and meetings

Students of national and international universities conduct biological, ecological and tourism field research every year. In 1997-2009, over 220 students from the National University of Mongolia, National State University of Education, Agricultural University, Ulaanbaatar University and Food Technology and about 60 international students from the Netherlands, England, Japan, the US, France and Belgium conducted research at the park. In the past decade, about 80 Master's and 15 doctoral candidates conducted their dissertation research.

The Number of PhD researchers who were conducted their field research in HNBR:

USA	*1*
UK	*1*
Holland	*1*
Italy	*1*
Japan	*4*
Mongolia	*7*

Since 1998, the Dutch Foundation for the Reserve for Przewalski's Horse grants the Jan Bouman Scholarship to one young Mongolian researcher each year to support him/her to participate in the research on Takhi biology, ecology and ethology, and therefore to conduct thesis works for his/her Master's degree. Over 10 scholars successfully completed their research. Short courses of computing, English language, and GIS are delivered to staff to improve their skills and experience.

The Hustai Trust organizes national and international conferences and meetings. International conferences were as follows:

- 1999 - Wolf ecology
- 2001 - Takhi reintroduction
- 2002 - Water birds
- 2003 - VIII Symposium, East Asian Regions, MAB
- 2004 - Asiatic Khulan
- 2005 - Tuul River: Threatened or Saved
  - Combating Livestock Theft
- 2006 - Environmental management
- 2007 - Voyage to the Future
- 2010 - Eurasian Steppe: status, threatens, and adaptation to climate change

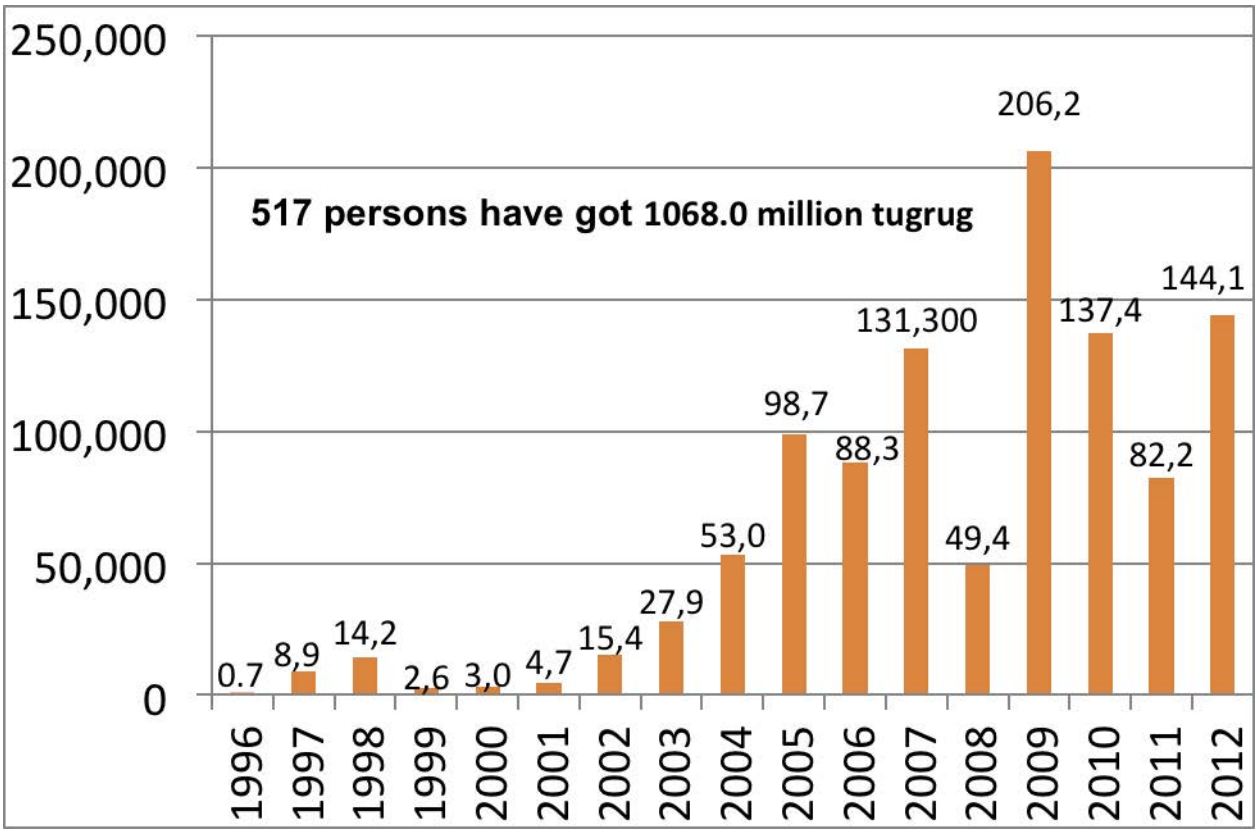
The Hustai Trust is able to receive 120 international tourists per day in summer, and 40 tourists in winter. The Hustai camp receives over 9,000 international tourists and 6,000 national tourists per year. Wildlife and historical sites are important attractions for tourists. Community-based tourism is developing in the buffer zone. Tourists stay with herding families, and experience traditional customs and nomadic culture. Also, the park organizes eight or 10-day travel itineraries through beautiful areas of Mongolia.

Development of the HNP Buffer Zone

Rural participation in conservation is compulsory to protect the ecosystems of specially protected areas. The park administration focused on the tight cooperation between the Hustai Centre, local people and local governors, and implemented appropriate measures. In the mid-1990s, small projects such as ‘buffer zone women’ and ‘strengthening facilities of buffer zone hospitals and health’ were implemented. Within the framework of small projects, three local hospitals received support in hospital maintenance, heating system renovation and repair, purchase of ambulance cars, equipping prenatal rooms, and pharmacy funds, as well as a training room established to deliver training in felt making, sewing, bakery, and carpet textiles, etc., to local

women. Also, a yoghurt factory was established in Bayankhangai and a Dutch cheese factory was established in Altanbulag. The Buffer Zone Committee was established in each of three soums, and a Buffer Zone Council under the Hustai Centre with regards to tightening the collaboration between Hustai Centre and local governors, and to organize activities to improve the livelihoods in the buffer zone. Each BZCommittee has own buffer zone fund, with funds of 30.0 million tugriks (tugrugs), and the BZCouncil has a buffer zone development fund of over 500 million tugriks. These funds provide grants and soft loans to buffer zone residents, supporting their efforts to improve their living standards and participate in conservation activities. The buffer zone management plan was also approved.

There are 39 herding communities that have been established in the buffer zone of the park. Five communities produce felt products such as mats, carpets, bags and souvenirs. They successfully trade their products at national and international markets.



The results are:

- Herdsmen started to engage in agriculture
- They are planting fruit trees
- A few dairy farms established
- Cottage industries have been set up (Dutch cheese, yogurt, smoked meat)
- Community-based tourism is developing
- Herdsmen are actively participating in the conservation of nature.

We have collaborated with national institutes such as the National University of Mongolia, Mongolian State University of Education, Ecosystem Institute of Agricultural University, Biological Institute of Mongolian Academy of Sciences, Geo-Ecological Institute and Institute of Botany, and the Wildlife Conservation and Research Centre. International institutes such as Wageningen University of the Netherlands, Zoo Institute of Czech Republic, Boizo University, US, Tokyo University and Tsukuba University have started collaborative research in the park.

Challenges of HNBR

One of our biggest challenges is to have sustainable financial resources. And we need to implement the following activities to overcome this challenge:

- Improve tourist camp services and facilities
- Involvement with international projects
- Implement sub-projects to fulfill our tasks with donor organization's support.

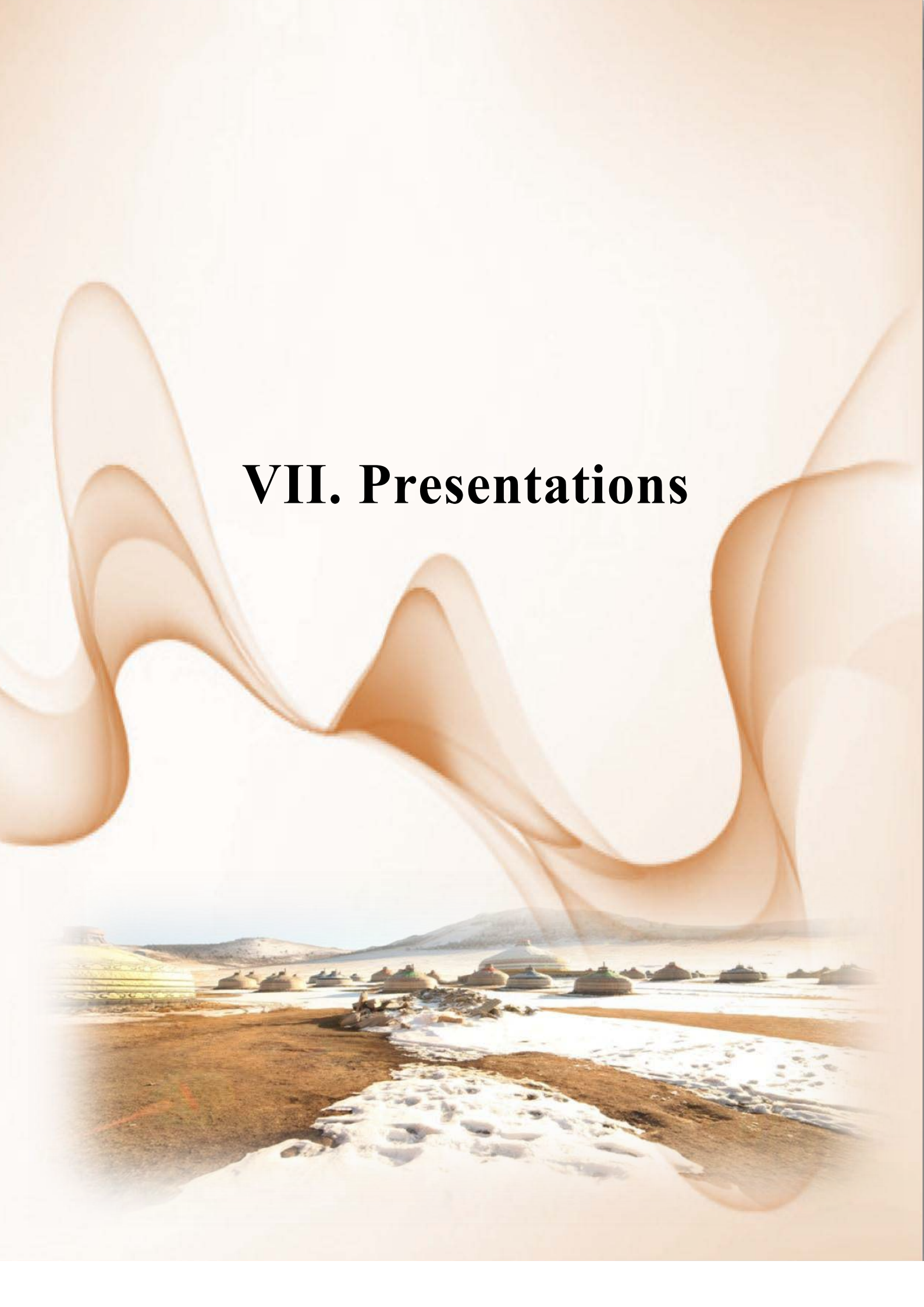
Also, we need to expand our cooperation with various national and international organizations to improve our activities and its implementation.

Global climate change is really happening in HNBR and its buffer zone. And we have to mitigate climate change's effects as much as possible. Therefore, we need to find a way to restore our birch forest and have sustainable water resources for wildlife.

Natural resources are limited. Therefore, we are working hard to give the right knowledge of sustainable use of natural resources to local people. Also, we stimulate local people to protect nature and the environment.

Because of overgrazing and climate change, there is huge pasture degradation in HNBR's buffer zone. Therefore, we need to change local herders' mindset and let them concentrate on quality of livestock, not on quantity. Also we are supporting them to have new income-generating activities such as vegetable gardening, community-based tourism, and handicraft manufacturing, etc.

VII. Presentations



Perspectives for Transboundary Cooperation and the Formation of AP-MAB

7. PRESENTATIONS: PERSPECTIVES FOR TRANSBOUNDARY COOPERATION AND THE FORMATION OF AP-MAB

7.1 Russia: International Collaboration within the Russian-Mongolian-Chinese Protected Area 'Dauria' with the Aim of Adapting to Climate Change, Dr. Olga Kirilyuk

The Daurian Steppe is a vast region situated in the Northern part of Inner Asia on the junction of the borders of three states – Russia, Mongolia and China. Among the Central Asian steppes, Dauria is distinguished by the peculiarity of climatic conditions, relief, vegetation and wildlife. Daurian Steppe is an example of well-preserved terrestrial ecosystems in Central Asia and has key significance for global biodiversity conservation. In the Dauria ecoregion and Dalainor-Torey hollow, the migration route of many bird species is narrowed in a so-called 'bottleneck'. Almost 360 bird species including representatives of mountain-taiga and tundra complexes stop in Dauria during their migration or nest, and near 25 species of them are included into the IUCN Red Data List as globally vulnerable, endangered or critically endangered. Among them there are four species of cranes (Siberian Crane, Red-crowned Crane, White-naped Crane and Hooded Crane), Great Bustard, Swan Goose, Baer`s Pochard, Baikal Teal, Relict Gull, Asiatic Dowitcher, and Saker Falkon. For many species, Daurian Steppe is the key habitat. For example, in the region there is nearly 13 per cent of the world population of Red-Crowned Crane, 80 per cent of the Swan Goose population, 66 per cent of Great Bustard, and 29 per cent of White-naped Crane. More than 90 per cent of the world population of Mongolian Gazelle inhabits the Daurian Steppe too. In 2000, the World Wildlife Fund included Daurian Steppe into the list of Global 200 ecoregions of the planet that have special importance for life conservation on Earth.

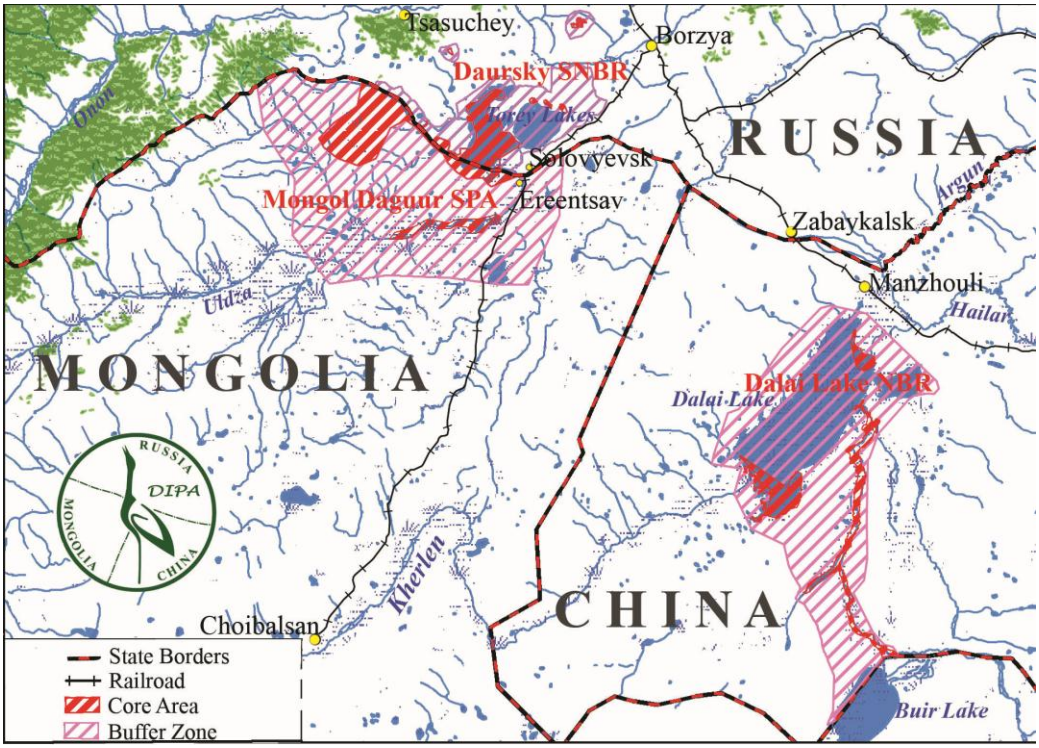


Fig.1. Location of the Chinese-Mongolian-Russian Dauria International Protected Area

For the protection of the Daurian ecosystem, the Chinese-Mongolian-Russian Dauria International Protected Area (CMR DIPA for short) was founded in March 1994 on the base of three reserves: State Nature Biosphere Reserve Daursky (Russia), Mongol Daguur Strictly Protected Area (Mongolia) and Dala Lake National Nature Reserve (Fig.1). All reserves that are included in DIPA have a status of Biosphere Reserve and Wetlands of International significance (according to the Ramsar Convention).

The most important tasks of DIPA are:

- Investigation, conservation and restoration of biological diversity of natural ecosystems and preservation in pristine state the protected natural complexes of Dauria ecoregion.
- Protection of migratory animal species.
- Investigation of processes and phenomena in typical and unique steppes, lake-steppes, forests and wetland ecosystems.

- Elaboration and implementation of programmes for conservation and restoration of fauna and flora species.
- Promotion of cooperation between Russia, Mongolia, and China in the sphere of nature protection and non-exhaustible nature-use.
- Monitoring concerted environmental programs and methods.
- Studying the influence of climatic change on the ecosystems' state, elaboration and realization of recommendations and programmes for long-term biodiversity conservation in Dauria ecoregion.
- Elaboration of a network of protected nature areas for providing long-term conservation of biodiversity in the ecoregion.
- Environmental education for the people of Dauria ecoregion.

Some of these tasks were formulated and added as a result of fruitful common scientific work within DIPA. Totally more than 90 joint scientific research expeditions have been held since the trans-boundary reserve's foundation. By now, investigations have covered about 300,000 sqkm, including spacious endorheic basins in the steppe area and nearly all the upper part of the Amur basin from it sources to the Great Khingan. The total duration of joint work is nearly 1,500 days, and the length of the routes more than 160,000 km. Extensive collected data on the fauna and vegetation was published in 10 joint scientific articles, some monographs and several dozen specialist publications in Russia and Mongolia (Goroshko at al, 2012). During the years of joint work, an inventory of flora and fauna of the reserve was conducted. At this moment, the information we have about habitation in the region shows there are more than 420 species of vertebrate fauna, 1,100 species of insects and more than 600 species of vascular plants. Also we have obtained new knowledge about the biology and ecology of some species, especially the threatened species. The information about routes of migrations and places of wintering of many birds' species habitats in Dauria (such as White-naped, Hooded, and Demoiselle Cranes, Whooper Swan, and Swan Goose) has been collected. Places that have key significance for world population of Mongolian Gazelle, Swan Goose, Great Bustard, White-naped and Red-crowned Cranes have been identified. On the basis of common work, some programmes for

preservation and restoration of endangered species were developed. The restoration of Mongolian Gazelle (Dzeren) (*Procapra gutturosa)* in the Russian part of DIPA is the most successful example of such programme implementation (Kirilyuk V., 2007). Before 1994, only winter migration of Dzeren to Russia was registered. Now thanks to good understanding of natural processes in Dauria and special measures (first of all effective protection), the number of animals in local groups of Dzeren in Daursky Reserve has grown from only a few before 1994 to about 5,000 in 2012-13. As we noted earlier, extensive scientific works revealed some key patterns of how the Daurian ecosystems function. The special importance of Dauria is the alternation of wet and drought climatic periods that causes considerable change of wildlife distribution area and exterior of the ecoregion vegetation and wildlife. The most significant cycles within a century have a duration of about 30 years (from 25 to 40) (Kirilyuk at al, 2012).

During these cycles, large-scale fluctuations of water level in the lakes occur, as well as considerable transformations of wetland and steppe habitats. In periods of drought many lakes dry out. For example, full drying of Barun-Torey Lake was registered in 1982 and repeated in 2009. Decrease of the water level of steppe lakes in dry periods leads to rise in water salinity, which, in turn, causes fish to die and changes in the number and composition of other hydrobionts. The food base of waterfowl and near-water birds changes radically, which influences their number. With the beginning of the wet period, the reverse processes take place, but they are not mirror images of processes taking place in the dry season. Besides common redistribution of bird populations in Dauria, climate change causes changes of bird migration routes and borders of animal's natural habitats. For example, the drying up of steppes caused relocation of the main places of Mongolian Gazelle breeding grounds and wintering habitats to the North. Sometimes the lack of fodder and water sources caused fast mass migration of gazelle (the last such migration took place in spring 2009). At the same time, the South border of habitat of Siberian Roe Deer was moving northwards. The important part of common work within DIPA is the analysis of human activities in Dauria in the light of the climatic characteristics of the region and its influence on biota and protected areas. Thus the DIPA research has shown the decline of nests of White-

naped Cranes and other birds in the dry season, when, in addition to the natural decline of suitable nesting sites, there are substantial increases in competition with humans for the use of surviving wetlands. Another example is the habitat fragmentation and fragmentation of the large groups of Dzeren because of the creation of artificial barriers on migration routes, and increased anxiety due to harassment during calving, etc. Also, we have analyzed the global tendencies of climatic change in Dauria and the change of some characteristics of plant communities in the Ecoregion during the dry period (Adaptation…, 2012).

Now the activities of DIPA are integrated into one programme of research and nature conservation called '**Impacts of Climate Change on the ecosystems of the Daurian ecoregion and ecosystem-based adaptations to them**' (Adaptation…, 2012). The key element of the programme is a system of long-term ground-based, remote-sensing monitoring of ecosystems in the trans-boundary upper Amur River basin.

The main tasks of the monitoring system are:

- To study the influence of climate variability on the upper Amur basin ecosystems and in particular on wetlands.
- To develop a scientific basis for sustainable adaptation of national and international policies of natural resources management to climate change and biodiversity conservation.
- To use monitoring results to guide development of specific adaptation measures.

The monitoring network includes more than 200 plots at floodplains and lake shores in an area of about 200,000 sqkm (Fig.2). Most of them are designed for monitoring both vegetation and animal populations.

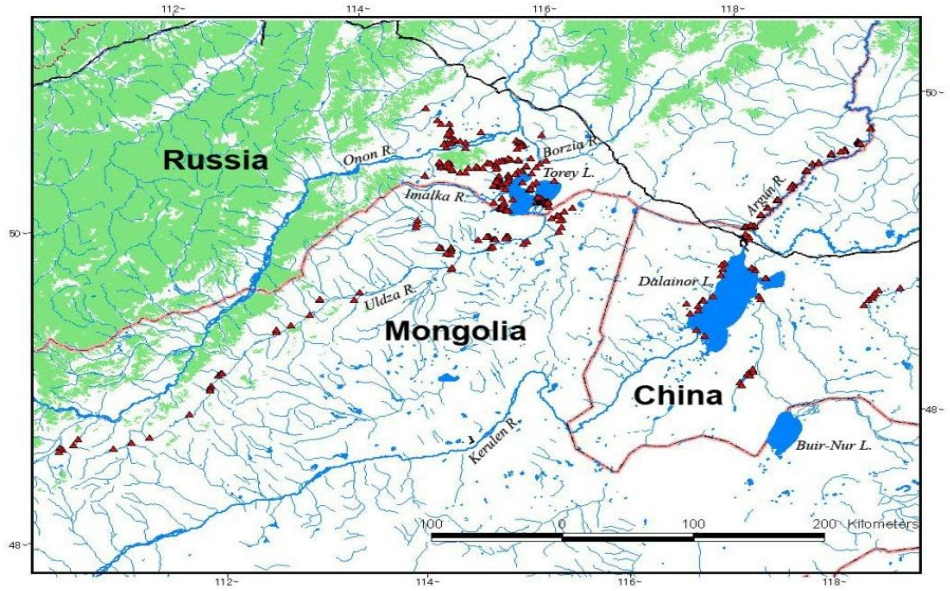


Fig.2. Location of the monitoring plots network in wetlands of Dauria Ecoregion (marked by triangles))

At the same time, transects for observing vegetation changes from semi-arid zones to boreal forest were constructed in Dauria (Fig.3). Long-term monitoring on these transects will provide objective data about regional differences in ecosystem dynamics and identify some general trends in changes to vegetation.

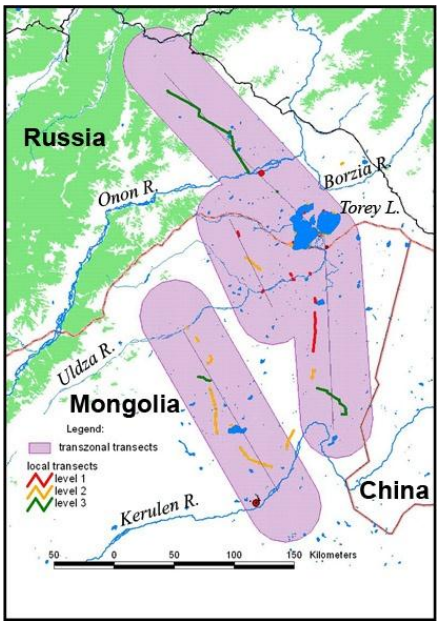


Fig.3. Location of the monitoring transects for observing vegetation

This wide network allows collecting of data on spatial and temporal dynamics of ecosystems. The key outputs of the programme are policy-relevant knowledge on the natural dynamics of ecosystems, which can be part of the basis of sustainable development of the region including sustaining globally valuable biodiversity in the face of climate change. Now we already know some general principles of climate cycles in the region and, connected to them, spatial and temporal differentiation of biota, the main factors and adaptations that help species to survive during critical multi-year periods. Monitoring results will guide the development of specific adaptation measures such as:

- New protected areas planning and region-wide spatial planning to secure refuges and corridors for species movements
- Development of allowable limits of anthropogenic impacts to establish environmental flow requirements for watercourses in changing climate conditions.
- Better planning of land-use and water consumption.
- Development of other climate adaptation measures, increasing resilience of traditional activities of local communities.

A very important circumstance is that creation and realization of the programme was supported by WWF Russia and the 'Steppe Project' of UNDP/GEF/MNR Russia, and publication of the first results in Russian, Chinese and English sponsored by the UNECE Water Convention Secretariat and Ramsar Convention (Adaptation…, 2012-13). For realization of the programme and vast plans of international monitoring work, the new scientific research station – the International Biological Station – is created now on the Torey Lakes in the Daursky Reserve with support of the Russian government and the 'Steppe Project' of UNDP/GEF/MNR Russia. In conclusion, we must mention another initiative that is realized today within activity of DIPA – creating the world natural heritage site 'Landscapes of Daura'. The work in this area began in 2012. Getting the International Reserve status of a World Heritage Site will not only give additional guarantees for preservation of ecosystems, but also give a new impetus to the sustainable development of these areas as valuable at the planetary scale.

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7.2 About the Experience of Cross-border Cooperation of the Russian-Mongolian Biosphere Reserves of 'Ubsunurskaya Kotlovina', Paper co-authored by Vladislav Kanzay* and M.Anhbayar**

*Biosphere Reserve 'Ubsunurskaya Kotlovina', Russian Federation
**The Management of Protected Areas of the Uvs Nuur Basin, Mongolia

Ubsunur Basin is one of the key areas of the Altai-Sayan ecoregion, covering the unique natural complexes of Russia, Mongolia, China and Kazakhstan. In 1991, in order to preserve and study the nature of Central Asia, in particular the Ubsunur Basin, an international team of scientists agreed on a proposal for the creation of two types of cluster reserves in Russia and Mongolia. This international team comprised representatives of the Ministry of the Environment of Russian Federation, the State Committee of Tuva and the Department of Environmental Monitoring, the Administration of Control over the environment of UVS aimag of Mongolia, and famous scientists of the International Scientific Programme 'The Experiment of Ubsunur'. This group has done a lot of work on the development of a project of the adjacent reserves (Institute of Geography, Russian Academy of Sciences Khrutsky VS, Fadeeva N.V., Tebleeva U.TS., Degtyareva A.K., Russian Ministry of Ecology M. Feldman, S- Petersburg State University -Yu.P.Seliverstov, State Pedagogical Institute of Kyzyl Arakchaa L.K. and the Ubsunur International Biosphere Research Center Kurbatskaya S.S. and V.V. Bugrovsky and other). The 'bylaw of the Government of the Russian Federation about Creation of the Nature Reserve Ubsunurskaya Kotlovina [No.52]' has been adopted from 24 January 1993. The reserve was formed then, consisting of five cluster areas over an area of 39,640 ha. Later, the 'Resolution of the Government of the Russian Federation About the Extension of the Biosphere Reserve Ubsunurskaya Kotlovina [No. 372]' was adopted from 21 April 2000, according to which the area of the reserve was increased to 323,198.4 ha, and an area of 601,938 hectares became the protected area.

Also in 1993, by the decision of the Government of Mongolia, the reserve was also organized and it included the unique areas of the Mongolian part of the basin. Statuses of Biosphere Reserve (1997) and the object of World Natural Heritage of UNESCO

(2003) were obtained by the adjacent nature reserves in a single category. The reserves of Ubsunur Basin are among the few of their kind in the world, covering all areas of the northern Palearctic – from glaciers and mountain tundra-steppe to wetlands, and the closed inland sea of Lake Ubsunur. The objects of historical and cultural heritage located here are also of great importance. In particular, they are represented by a cluster of 'Yamaalyg' (Russia) where the locations of 348 archaeological monuments, dating from the early Paleolithic are described with the use of GIS technologies. The indigenous population of the Ubsunur Basin leads a traditional nomadic way of life based on transhumance, typical for Central Asia. On the territory of the Republic of Tuva and of the Uvs aimag of Mongolia, there are no large industrial facilities, with the exception of coal, mining and forest resources mainly providing local needs. Therefore, the economic use in the buffer zone and adjacent areas to reserves is gentle, which does not contribute to the presence of anthropogenic factors.

The composition of the Russian Reserve:

№	Name of cluster areas	The area of the buffer zone (from 15.05.1996)	The area of the buffer zone (from 30.06.2000)	The core area, ha.
1	Tsugeer Els	50000	47000	4900
2	Ular	20480	20480	18000
3	Yamaalyg	4000	36850	800
4	Aryskannyg	11800	5080	15000
5	Mongun Taiga	99460 +700	125600	14950+940
6	Ubsunur		27200	4490
7	Oruku-Shynaa			28750
8	Kara-Khol		154928	122451
9	Khan Deer		184800	112917,4
	The total area	186440	**601938**	**323198,4**

The composition of the Mongolian Nature Reserve:

	Clusters of the reserve	The area, ha	The core area, ha
1	Uvs Nuur	424298	365350
2	Tsagaan Shuvuut	127331	10800
3	Turgen Uul	35970	2800
4	Altan els	148246	16800
5	The Nature Reserve of the r.Tes goal	101000	separately
	The total area	735845	

In 2012, there was a downsizing of the Directorate of Protected Areas of the Ubsunur Basin in Mongolia. The Directorate of Protected Areas, which included the cluster of the reserve 'Altan els', and the national parks 'Khan Huhy' and 'Hyargas Nuur', was picked out from the Management of Protected Areas of Ubsunur basin.

The following normative legal acts were the basis for the development of cooperation of adjacent reserves:

- Agreement between the governments of Mongolia and the Russian Federation on cooperation in the field of environmental protection by 15 February 1994.
- Ulaanbaatar Declaration on 14 November 2000.
- Agreement on trade, economic and cultural cross-border cooperation between the Government of the Republic of Tuva of the Russian Federation and the Administration of Uvs aimag of Mongolia from 2004.
- Ordinance of the RF government of 21 April 2011: 'About the Creation of a Russian-Mongolian Transboundary Reserve Uvs Nuur Basin [No. 631-r]'.
- Agreement between the Government of the Russian Federation and the Government of Mongolia on the establishment of the trans-boundary protected area Uvs Nuur Basin from 31 May 2012.

- Agreement on Cooperation of the Russian-Mongolian adjacent nature reserves of the Ubsunur Basin from 2004.

- A joint mid-term management plan of trans-frontier reserves for 2010 to 2014 was developed, agreed, approved and published (in Russian, Mongolian and English). According to it, annual plans for joint activities are developed.

Since 2004, in the framework of the provisions of the Cooperation Agreement, the neighbouring reserves implemented the following activities: Table 1

A list of the main activities implemented by the adjacent nature reserves within the framework of Cooperation Agreement between the reserves from 2004.

№	Description of measures	Date	Aims and Objectives
1	Adjacent reserves were included in the list of Biosphere Reserves of UNESCO	1997	The Convention on the Biodiversity Conservation
2	Adjacent reserves were declared the Object of World Natural Heritage of UNESCO in a single nomination.	2003	The Convention on the natural and Cultural Heritage
3	Mongolian part of a trans-boundary lake Ubsunur was included in the list of Wetlands of International Importance	2005	The Ramsar Convention
4	A joint management plan of transboundary reserves of Ubsunur Basin was carried out and approved by higher authorities.	2011-2015	Medium-term planning of joint activities
5	Reserves are involved in the organization of international scientific symposia on scientific study of the basin and surrounding areas	The 11th symposium was held in	Development and application of scientific methods

	(every two years, alternately in Russia and the Mongolian side)	2012. Kyzyl, Russia	of conservation, development of a database.
6	A periodic report of the Biosphere Reserves was prepared and delivered to the MAB UNESCO (every 10 years).	2007	Confirmation of the status of the Biosphere Reserves.
7	A periodic report on compliance criteria of the Object of World Natural Heritage of UNESCO was prepared (every 5-6 years).	2011. - Mongolia, 2013. - Russia.	Confirmation of the status of the Object of World Natural Heritage
8	An international scientific-practical conference 'Creation of Transboundary Biosphere Reserves - Experience, Problems, Lessons'	August 6-11, 2007. Cross-border lake Tore-Hol. Russia	Studying the experience of working MAF on the example of the Russian-Finnish MAF Friendship
9	Russian Reserve joined the founders and participated in the work of the Association of Reserves and the Altai-Sayan Ecoregion, Russia.	Since 1997.	The development of inter-regional relations and research
10	Legal framework of international relations and cooperation of adjacent reserves in the area of scientific study and monitoring of ecosystems and conservation areas is being developing.	Since 2004.	Development of international relations and research

Table 2

The cooperation of neighbouring nature reserves is realized in the following directions:

1. Research studies

№	Name of events	Location	Date	Members Partners
1	Joint and parallel accounting of Snow Leopard on the transboundary section on the Russian and Mongolian side	Mongolia: Mt. Tsagaan Shuvuut, Turgen, Altan Hohy Монголия:	II and IV quarter	Directorate of the PA Ubsunur basin, FGBU The State Nature Biosphere Reserve 'Ubsunurskaya kotlovina'. Russian, Mongolian branch of WWF
		Russia: Mt. Tsagaan Shibetu	II и IV quarter	
2	The study of cross-border groups of Argali, radiolabeled (radio-collared) infants of argali on the Russian and Mongolian side.	Mongolia: Tsagaan Gol, Asat-Har	II Quarter	
		Russia: mountain Mongun Taiga, ridge of Chikhacheva	III quarter	
3	Joint hydrological and other Herpetological expeditions to cross-border sections of Ubsunur Basin	Neighbouring Territories of basin of the lake Ubsunur.	III quarter	

2. Monitoring of objects of rare species

№	Objects of monitoring	Location	Dates	Members Partners
1	Snow leopard, Altai mountain sheep (argali), ibex, Bustard, Mongolian Marmot, Woodland caribou, Saker Falcon, Pallas, Beaver Asian	Clusters of Reserves	Since 2004	Reserves. Russian, Mongolian branch of WWF
2	International Monitoring Programme of mountain ecosystems GLORIA	Alpine and nival ecosystems, Mongun Taiga, Russia.	Since 2011	The Reserve. C-Pb.GU. Russian Geographical Society.

3. Education and training

№	Name of events	Location	Dates	Members Partners
1	A joint management plan for the adjacent nature reserves.	Ulaangom city Mongolia Kyzyl city Russia	2009 2011	The Management of Protected Areas of Ubsunur Basin FGBU The State Nature Biosphere Reserve 'Ubsunurskaya kotlovina' Russian, Mongolian branch of WWF
2	International Seminars to monitor, understand argali and snow leopard on the cross-border area	Mongolia Uvs aimag, Ulaangom city, Kyzyl, Barnaul, Russia.	2009 2011 2008	

4. Providing protection by the regime of the territory

№	Name of events	Location	Dates	Members Partners
1	Monitor the status of water quality in the trans-boundary rivers and lakes	Mongolia, Russia: Borsho, Tas, Torkham-Gol	May	Directorate of PA Ubsunur basin. The Federal State Nature Biosphere Reserve Ubsunurskaya kotlovina'. Regional centers HMS. Russian, Mongolian branch of the WWF. District administrations, airline forest conservation, and forestry.
	Creation of the Public Council for the management of the natural heritage of UNESCO	Mongun-Taiga district, Russia	2011	
2	Raids on prevention of poaching on cross-border areas	Russia: Mongun-Taiga district Mongolia: Tsagaan- Gol	During the year	
3	Prevention and control of forest and steppe fires in neighbouring areas	Neighboring clusters "Oruku-Shynaa" and "Ubsunur"	During fire-dangerous period	

5. Educational Tourism and work with children.

№	Name of events	Location	Dates	Members
1	Design of the creation of cross-border network of camp sites and trails in the protected zones of protected areas.	Border areas with the Russian and Mongolian sides.	By protocol decision of Sides from 21 December 2009	V.Kanzay Parties, M. Anhbayar Russian, Mongolian branch of

2	Development of a pilot project for children's environmental tour changes called ‘A Wonderful World of Ubsunur Basin’	Kyzyl, Russia. Ulaangom, Mongolia. (15 pers.).	II - III quarter Since 2010.	WWF, UNDP / GEF

6. Advertising and publishing activities and exchange of experience

№	Name of events	Location	Dates	Members
1	Exchange of promotional products (postcards, booklets, calendars, badges)	During the joint activities	During the year	V.Kanzay M. Anhbayar
2	Issue of joint publications, methods to integrate species, phenological observations, etc.	Kyzyl, Russia. Ulaangom, Mongolia.	According to HMRC approved plans	
3.	Joint visits of delegations of protected areas. The publication of scientific papers.	Kyzyl, Ulaangom	According to the plan of joint activities.	V.Kanzay, M. Anhbayar
4.	Edition of presentation version of the joint management plan in Russian, Mongolian and English languages.	Ulaanbaatar	III quarter 2011.	M. Anhbayar Mongolian branch of WWF, UNDP
5.	Creation of a joint website of the Transboundary Biosphere Reserve ‘Ubsunurskaya Kotlovina’	Kyzyl, Ulaangom	2013.	V.Kanzay, M. Anhbayar

Further plans of joint activities among neighbouring reserves are established in accordance with the achieved joint operating time, and meet the provisions of the joint management plan.

The algorithm of further actions:

- Coordination and approval for the composition of Mongolian-Russian Joint Commission on an equal footing and conditions in implementing the agreement, and address issues related to its implementation, with the relevant ministries of Russia and Mongolia.

- Implementation of the first organizational meeting of the Joint Russian-Mongolian Commission on Transboundary Biosphere Reserves will elect co-chairs and directors of reserves, and approve the work plan for 2013 and the near future.

- At the same time, an application (the rationale, criteria, results, etc.) is developed by scientific departments of adjacent Biosphere Reserves. It was stated by the Joint Russian-Mongolian Commission on Transboundary Biosphere Reserves and submitted to the Commission MAB (Man and the Biosphere) of UNESCO, together with the relevant decisions of the governments of Russia and Mongolia for re-registration of adjacent Biosphere Reserves in the trans-boundary Biosphere Reserve 'Ubsunurskaya Kotlovina'.

However, there are questions that require further decisions. According to the Russian reserves, along with the natural reserves and security (buffer) zones, it is necessary to create zones of cooperation, which requires conducting the explanatory works with the local communities and the creation of a legal framework. In this area, there is time between the experience of joint activities within the framework of a Public Council for the management of natural heritage, which includes the reserve staff and representatives of the local governments and the public of Mongun-Taiga region of the Republic of Tuva, which was set up in 2011.

As for this question, a lot of support lies on the institutions of co-management under intergovernmental agreements between the two sides in 1994 and 2012, which will

allow a higher level of discussion and address issues of cross-border cooperation of protected areas in Russia and Mongolia.

A list of candidates for the Joint Russian-Mongolian Commission of Transboundary Biosphere Reserve 'Ubsunurskaya Kotlovina' was pre-agreed:

From the Russian side:

1. A.M. Adygbay – a Co-Chairman, the Head of the Management of RPN in the Republic of Tuva (Government Decree of Russian Federation 16 October.2012. No. 934-p);

2. Kara Sal V.D. – a Minister of Natural Resources and Environment of the Republic of Tuva (Approval of a Vice-Chairman of the Government of the Republic of Tuva from 12 August. 2011.No. 01-7-4663/11-0)

3. Kanzay V.I. – a Director of the State Organization of the State Nature Biosphere Reserve 'Ubsunurskaya kotlovina'.

4. A.N. Kuksin – the 1st Deputy Director for Science of the reserve.

5. Kurbatskaya S.S. Ph.D – a Professor and the Director of Ubsunursky International Biosphere Research Centre of the Russian Academy of Sciences and the Government of the Republic of Tuva.

From the Mongolian side:

1. T. Erdenechimeg – a Co-Chairman of the Russian-Mongolian Joint Commission for the Management of the Transboundary Reserve 'Uvs Nuur Basin' from the Mongolian side, the Head of the Office of Protected Areas of the Ministry of Natural Resources and Environment of Mongolia (Order of the Ministry of 21 January 2013, No. A-19).

2. B. Dashdavaa – a main specialist of the Department of Protected Areas of the Ministry of Natural Resources and Environment of Mongolia.

3. A. Namhay Ph.D – an advisor to the Minister of Natural Resources and Environment of Mongolia, a member of the commission.

4. B. Batbold – a State Secretary of the Ministry of Natural Resources and Environment of Mongolia, a member of the commission.

5. M. Anhbayar – a Director of the Directorate of Protected Areas of Ubsunur Basin, a member of the commission.

6. B. Buyantsog – a Director of the Directorate of Protected Areas 'Khan Huhy', a member of the commission.

Creation of a cross-border Biosphere Reserve 'Ubsunurskaya Kotlovina' meets the goals and objectives of the reserves of Russia and Mongolia, the provisions of the conventions ratified by both parties in the field of preservation of landscape and biological diversity for the ecosystem of the Lake Ubsunur, promotes bilateral cooperation in the field of environmental protection and rational use of natural resources, development of eco-tourism, environmental education and the education of the citizens in both Mongolia and Russia, as well as the realization of long-term environmental monitoring and research of natural complexes and objects.

The conclusion of the agreement was a logical step in the development of international cooperation between two reserves that have worked closely together for several years on the plans of joint activities approved annually.

Literature:

1. Agreement between the Government of the Russian Federation and the Government of Mongolia on the establishment of the trans-boundary protected area 'Ubsunur Basin' from 31 May 2012.
2. Proceedings of the international scientific-practical conference 'Creation of Transboundary Biosphere Reserves - the Experience, the Problems, the Lessons'. 6-11 August 2007. Kyzyl.
3. Proceedings of the Seville Strategy and the Madrid Plan of Action.
4. Agreement on Cooperation of the Russian-Mongolian adjacent nature reserves of the Ubsunur Basin from 2004.
5. A joint mid-term management plan of trans-boundary reserves of the Ubsunur Basin for 2010 to 2014.

7.3 Transboundary BR 'Altai': First Steps in Kazakhstan, Vitaliy Maltsev, Kazakhstan

Kazakhstan National Committee for the UNESCO programme 'Man and Biosphere'

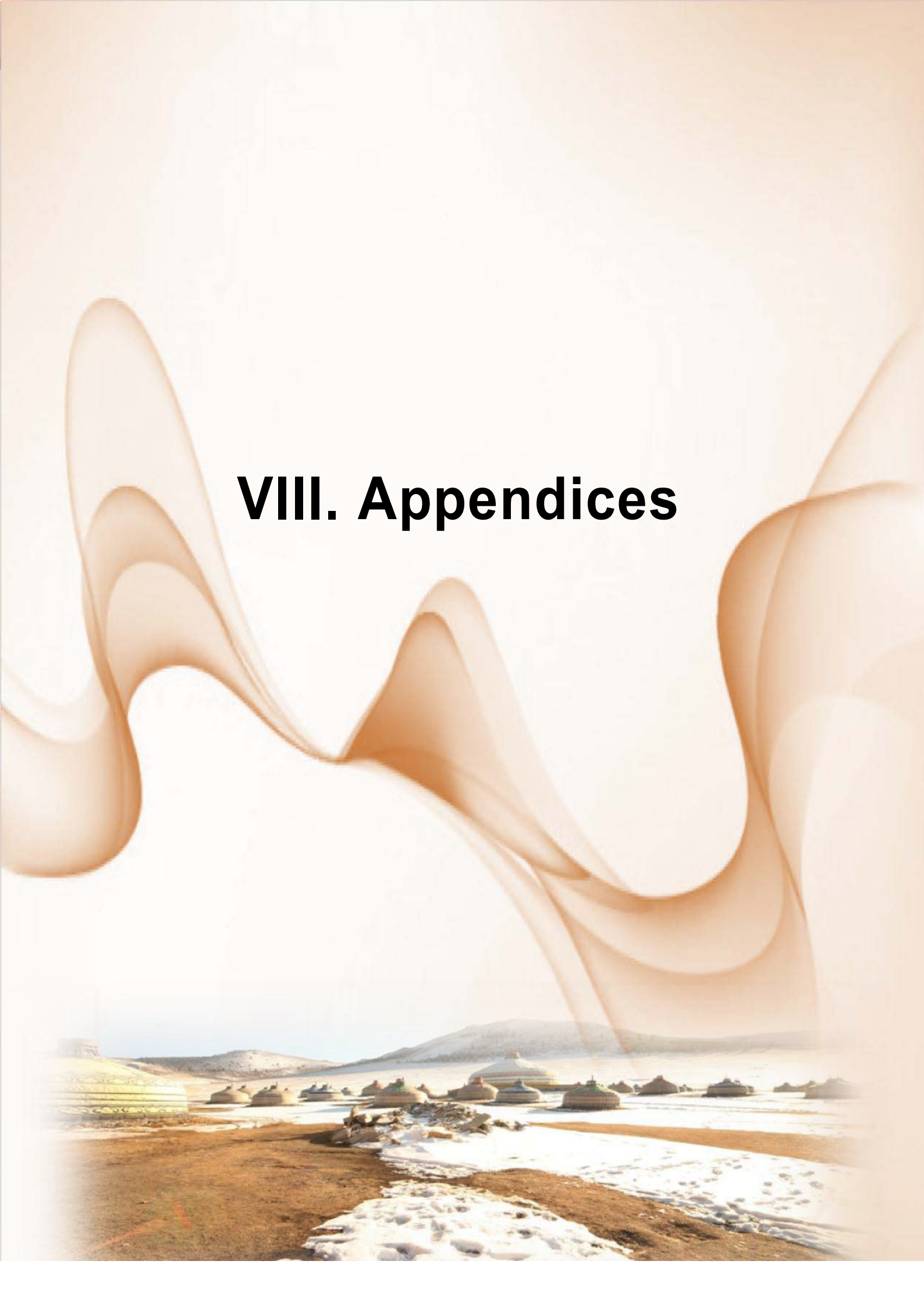
According to the decision of the presidents of Kazakhstan and Russia (two neighbouring countries), the process of establishing the trans-boundary protected area in Altai began by signing an agreement between two governmental nature protection agencies of both countries in 2011. The joint two-sides commission begun its activities at the end of 2012. The base for the trans-boundary reserve is two nationally protected areas – Katunskiy Biosphere Reserve (Russia) and Katon-Karagay National Park (Kazakhstan). At the same time, the national committees of both countries decided to propose establishing a trans-boundary Biosphere Reserve. After consultation between each other and with the MAB Secretariat in Paris in 2011, the national committees planned two stages: 1) to get the status of Biosphere Reserve for Katon-Karagay and 2) work out the joining proposal for the trans-boundary Biosphere Reserve 'Altai' on the base of two national Biosphere Reserves. In this case, the Kazakhstan National MAB Committee as an authority of the National Commission of the Republic of Kazakhstan for UNESCO proposed the nomination of Katon-Karagay Biosphere Reserve to the Secretariat of the MAB in 2013. Within this nomination dossier, the information on functional zonation, ecosystems, biological diversity, socio-economic development and approaches for management were provided. The final decision on the inclusion of Katon-Karagay to the world network of UNESCO Biosphere Reserves will be made in the 25th session of the ICC in June 2014. Kazakhstan National MAB Committee hopes that such decision will be positive. After that, in 2014-2015, both the national committees (Russian and Kazakhstan) will prepare a nomination dossier for the trans-boundary Biosphere Reserve 'Altai'. Below we will give some brief information on the potential of Katon-Karagay BR as a Kazakhstan part of the future trans-boundary Biosphere Reserve.

Katon-Karagay Biosphere Reserve is situated in the upper part of Bukhtarma, Belaya Berel and Chyornaya Berel rivers, including the Southern slopes of Listvyaga and Katunskiy ridges (with Eastern top of Belukha Mountain), and the ridges of Bukhtarma River's left bank: Sarymsakty, Tarbagatay (Southern Altai part) and Southern Altai. The Northern part includes a part of Katunskiy ridge and has altitudes from 2,000 to 4,506 m (Belukha Mountain). The Southern part's altitude is from 850 m (Bukhtarma River valley) to 3,487 m (Southern Altai ridge). Altitudes near Belukha town reach 2,500-3,000 m. Relief is of alpine type with very expressed valleys, steep rocky slopes, and moraines. The same relief character is observed in the Eastern part of Southern Altai ridge. The rest of reserve's territory, including Sarymsakty, Tarbagatay and Listvyaga ridges, has a mainly flat character of mountain relief. The territory of the Biosphere Reserve has very expressed vertical zoning. Katon-Karagay's territory lies in the limits of the following borders: North and East – borders with Russia (Republic of Altai); South-east – borders with THE People's Republic of China; West – to Belkaragay and Soldatovo villages; South – Northern slopes of Southern Altai ridges. The potential of the region is connected, first of all, to the development of ecologic-recreational tourism, as well as with cattle breeding and plant growing. On a regional scale the experience of ecologic-recreational tourism development in the territory of the Biosphere Reserve may be successfully used in other parts of Kazakhstan, as well as in adjacent Altai territories of Russia, China and Mongolia. At the present time, tourist services are dynamically developing on the territory of the Biosphere Reserve (settlements in the collaboration zone). This is mainly caused by development of small- and medium-sized businesses of additional services for the tourists from local people (organization of guest houses, small hotels and tourist bases, horse riding, etc.), selling local produce grown at home, and local souvenirs. The most common tourism types include education, recreational, ornithological (birdwatchers), botanical, photographic, scientific and ethnographic tourism. Th total area of Katon-Karagay Biosphere Reserve's territory is 1,231,940 ha. The main core zone occupies 126,432 ha, the buffer zone 655,508 ha, and the development zone about 450,000 ha.

For organization of partner relations, a special Coordinational Council of Katon-Karagay Biosphere Reserve was created. Its participants include representatives of

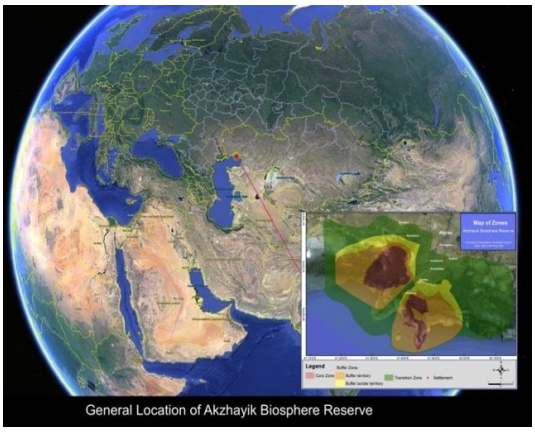
state nature reserves, nature users, local authorities and public organizations. Local communities are involved in the Biosphere Reserve's management through the Coordinational Council of Katon-Karagay Biosphere Reserve (since 2012) and consist of state agencies (territorial management of forestry and hunting), nature reserves, Akimats, local NGOs and land users. This management body is also important for collaboration and to overcome the contradictions between all stakeholders, as well as for development of scientifically-based sustainable nature use. There is a current monitoring of the condition and conservation of natural complexes on the territory of the Biosphere Reserve, and monitoring of rare and threatened species to clarify the condition of the populations, and the ecological peculiarities of rare plant and animal species, providing a basis for evaluation of the species' conservation and restoration prospects. The goal of the monitoring is to obtain regular objective data about the condition of plants and animals on the territory of the Biosphere Reserve, as well as on the condition of their habitat. Based on monitoring data, it is necessary to conduct current evaluation of the condition of populations and ecosystems, the Biosphere Reserve's functional effectiveness, and development of measures for critical and unfavourable situation prevention. In the limits of monitoring there is ongoing research for the *Nature Chronicles*, as well as counts of mammal, bird and invertebrate animal populations. According to the Management Plan, at the present time there is an ongoing inventarization and research of the objects of the state nature reserve fund, as well as research of natural processes and ecological monitoring. These scientific works include observations of phenomena and processes for the *Nature Chronicles* programme, flora and vegetation inventarization, research of rare and endangered vertebrate and invertebrate animals, biodiversity condition monitoring, and specifying indicators of species population conditions.

VIII. Appendices

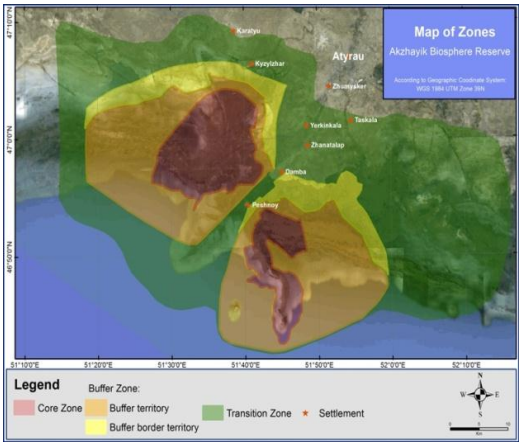


8. APPENDICES
UNESCO MAB Programme in Kazakhstan: Current Achievements

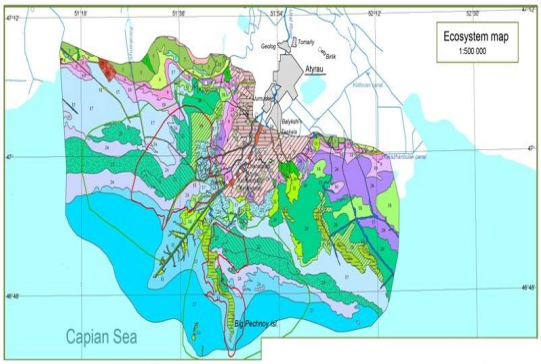
Pic. 1 UNESCO Director General I. Bokova gives Alakol BR certificate to Kazakhstan Minister of Environment Protection N. Kapparov



Pic. 2 General Location of Akzhayik BR



Pic. 3 Zonation of Akzhayik BR

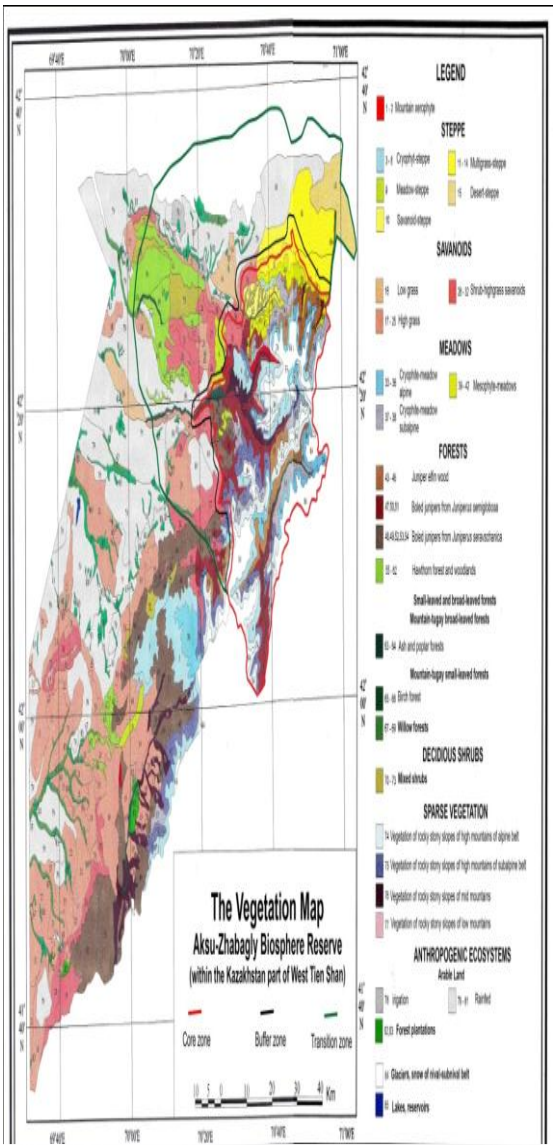


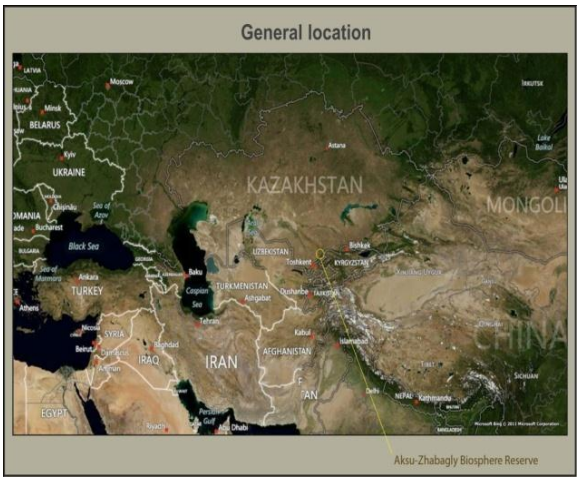
Pic. 4 Ecosystem map of Akjzhaiyk BR

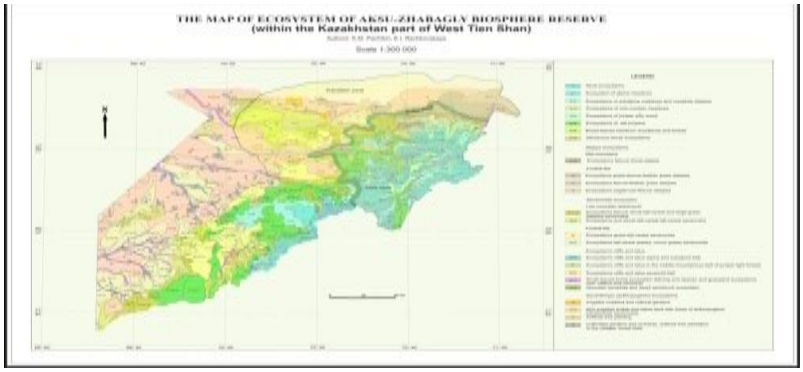
Pic. 5 Tourist post in Akzhayik

Pic. 6 Akzhayik BR: coast of Caspian Sea (photo by V.Kovshar)

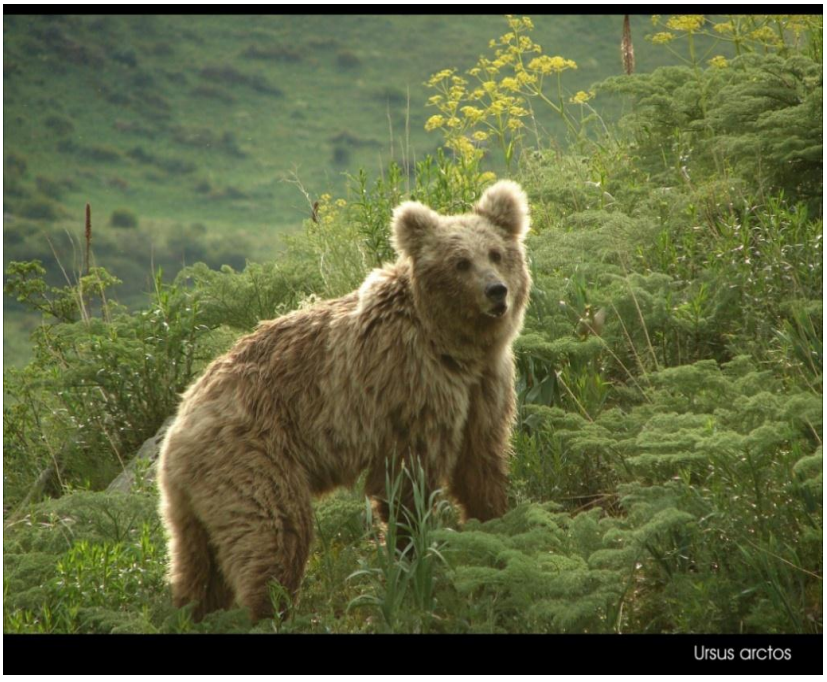
Akzhayik BR: Caspian Seal (*Phocacaspica*) in Shalyga Island(photo by A.Ivasenko)






THE MAP OF ECOSYSTEM OF AKSU-ZHABAGLY BIOSPHERE RESERVE
(within the Kazakhstan part of West Tien Shan)


Aksu-Dzabagly reserve. Kollebaj-Dzhailau


Ursus arctos


"Kokpar" - kazakh
national game

Long-eared Hedgehog ***(Erinaceus auritus)***. Dzabagly village, August.

European Roller ***(Coracias garrulus)***. Turat Ryskuloff village, May.