PLENARY SESSIONS' SPEAKERS PROFILES AND ABSTRACTS

27th OF MAY

13:15-13.45	History of nature conservation in Estonia - **Hanno Zingel** (Ministry of the Environment, Estonia) & **Kalev Sepp** (Estonian University of Life Sciences, Estonia)
13:45-14.15	A new vision for biodiversity conservation - **Julia Marton-Lefèvre** (The International Union for Conservation of Nature, Switzerland)
14:15-14.45	Integrating social science considerations into conservation programs - **Richard P. Reading** (Denver Zoological Foundation & University of Denver, USA)
14.45-15.15	Biodiversity and sustainability: the keys to our future - **Manfred Niekisch** (Zoo Frankfurt, Germany)
15:15	*Coffee break*
15.45−16.15	Nature management challenges in Europe: the EU biodiversity policy framework - **Robert Flies** (European Commission DG Environment, Belgium)
16.15−16.45	The role of zoos in conservation: shift of paradigm - **Tiit Maran** (Tallinn Zoo & Tallinn University, Estonia) & **Richard P. Reading** (Denver Zoological Foundation & University of Denver, USA)
16.45-17.15	Ecosystem goods and services - conservation through sustainable use - **Tamás Marghescu** (The International Council for Game and Wildlife Conservation, Hungary)
17.15-17.45	The Ramsar Convention – a modern success story for nature conservation - **Tobias Salathe** (Secretariat of Ramsar Convention, Switzerland)

28th OF MAY

09. 00-09.30	Winning the environment. The ecosystem approach and its value for military operations, a way to improve your mission – **Kim Janssen** (Witteveen+Bos, The Netherland)
09.30-10.00	Biodiversity - a driver for business - **Henric Wahlgren** (Kinnarps AB, Sweden)
10.00-10.30	Tourist flow management in natural area: concretes applications of counting data - **Enrico Durbano** (Ecocounter Ltd, France)
16.15-16.40	Natura 2000 - beyond 2010 - **Olli Ojala** (European Commission DG Environment, Belgium)
16.40-17.05	Programme of Work on Protected Areas of the CBD: actual situation and perspectives for the future - **Sarat Babu Gidda** (Secretariat of the Convention on Biological Diversity, Canada)
17.05-17.30	Conservation and protected areas – challenges in a changing a world - **Stig Johansson** (IUCN World Commission for Protected Areas (Pan-Europe), Metsähallitus, Finland)

HANNO ZINGEL was born in 22.08.1970, education: 1988 -1992 (Tartu University, biology - taxonomy). Has worked as nature conservation officer since 1996. Between 2000 - 2004 he worked as the Director General of Nature Conservation Department of Ministry of the Environment, he was among other issues responsible for the preparation of Natura 2000 network in Estonia. Today he works as the advisor of the Ministry of the Environment.

KALEV SEPP is a Professor of Landscape Management and Nature Conservation at the Estonian University of Life Sciences (EMU). He lectures on nature conservation, landscape ecology and management. He is a head of studies on environmental science at the Estonian University of Life Sciences, head of the Scientific Council of the Institute of Agricultural and Environmental Sciences. He is a Vice-President of the The International Union for Conservation of Nature (IUCN), an elected Councillor of IUCN (2004−2012). He is a member of the EU FP7 Programme Committee for Environment (including climate change). His research covers: evaluating the human impact on agricultural landscapes, methodological approaches for landscape and biodiversity monitoring, applying the concept of ecological networks in spatial planning and using a concept landscape functions in environmental management (agri-environmental program, nature management), relationship between landscape structure and species composition.

HISTORY OF NATURE CONSERVATION IN ESTONIA

Hanno Zingel [1], Kalev Sepp [2]

[1] Ministry of the Environment, [2] Estonian University of Life Sciences

The historical development of nature conservation ideas can be divided into a number of phases. A simple division identifies five phases in the international development of nature protection in Europe, as in Estonia: (1) the common law phase, (2) the phase of narrow regulations restricting the use of nature resources, (3) the protection of nature monuments and species protection, (4) the establishment of multifunctional protected areas, and (5) the nature protection outside protected areas, cross-sectoral approach to preserving landscape and biological diversity. First, the roots of nature conservation stem from folk religion. Records from the 13th century speak of sacred trees and groves that were worshipped and preserved. The era of narrow restrictions on the use of natural resources followed. According to historical documents, in 1297 the Danish King Erik Menved issued a strict order to prohibit the cutting of coastal woods on four islands near Tallinn. This is the first known Act at the national level to establish nature conservation over a relatively large area in Estonia. The more systematic study of nature and propagation of nature conservation ideas started in the middle of the 19th century. The first protected area in Estonia was established in 1910: a bird sanctuary was created on the Vaika islets of the west coast of Saaremaa. The first Nature Conservation Act was passed in 1935. World War II and the starting Soviet Era disrupted the nature conservation activities. It was not until 11 July 1957 that the third Nature Conservation Act was passed; it was the first Act on nature conservation in the Soviet Union. The first protected area based on international principles – Lahemaa National Park, the first national park in the entire Soviet Union – was established in 1971. In 1981, Lahemaa became the first Estonian protected area to receive a development plan, the predecessor of the modern management plan. One of the key nature conservation decisions in newly independent Estonia was to preserve the continuity of protected areas: areas that had been granted protection in the Soviet era remained under conservation in the Republic of Estonia, regardless of land ownership. The Protection of Natural objects Act enacted in 1994 served as the foundation of this principle. From the mid-1990s, nature conservation in Estonia has been characterized by assumption of the obligations of EU nature conservation and applying the concept of the nature protection outside protected areas, cross-sectoral approach to preserving landscape. Currently, the primary basic piece of legislation governing nature conservation in Estonia is the Nature Conservation Act (2004). As of 2010, Estonia is party to around ten international treaties that directly or indirectly deal with protection of flora and fauna.

JULIA MARTON-LEFÈVRE is the Director General of IUCN. Prior to this, Julia was the Rector of the University for Peace, a graduate-level international university, mandated by the United Nations, providing education, training and research on issues related to peace and conflict. Earlier offices held by Julia include Executive Director of LEAD (Leadership for Environment and Development) International, a programme established by The Rockefeller Foundation to bring together and train mid-career leaders from all parts of the world in improving their leadership skills around the issues of sustainable development and Executive Director of the International Council for Science (ICSU), an important and respected global organization bringing together scientific academies and unions to promote scientific activities for the benefit of humanity. Julia is a member of a number of boards, councils and committees for organizations, such as the China Council for International Cooperation on Environment and Development (CCICED), an advisory body to the Chinese Government, UPEACE, LEAD International, the Bibliotheca Alexandria. She has co-authored numerous books and papers. In 1999 she received the AAAS Award for International Cooperation in Science. In 2008, she was awarded the "Chevalier de l'Ordre national de la Légion d'Honneur" by the French Government and was named Global Ambassador for Hungarian Culture by the Hungarian Minister of Education and Culture. She is a Fellow of the Royal Geographical Society of the United Kingdom and a Fellow of the World Academy of Art and Science.

A NEW VISION FOR BIODIVERSITY CONSERVATION

Julia Marton-Lefèvre
IUCN, International Union for Conservation of Nature

The keynote address explains the historic role of IUCN as an international leader in conservation and describes the findings of the IUCN Red List of Threatened Species and other indices, which show that our wanton use and abuse of nature has damaged two thirds of ecosystems all over the world and caused the current rate of species extinction to be up to 1,000 times the natural rate of loss.

In 2002, at the World Summit on Sustainable Development, nations agreed on biodiversity targets for 2010. This is the International Year of Biodiversity, and these targets, will not be met. Preparations are underway to mark the International Year at a special session at the UN in September, and in October the Parties to the Convention on Biological Diversity will meet in Nagoya to set new targets. IUCN has consulted its Members and has proposed an ambitious mission for 2020 by which 'all the necessary policies and actions to prevent further biodiversity loss' will have been put in place. The vision for 2050 calls for a world in which ' biodiversity is conserved and restored to secure a healthy planet and to deliver essential benefits for sustainable development and the well being of all people and nature.' Twenty specific, measurable, achievable, ambitious, relevant and timely targets are proposed to meet the 2020 mission. There are several factors that will be crucial in making the 2020 mission and ultimately the 2050 vision: adequate financing; a new link between science and policy; assigning an economic value to ecosystem services, and explaining biodiversity clearly to all citizens

RICHARD P. READING is the Director of Conservation Biology at Denver Zoological Foundation (from 1996). In addition, he is the Associate Research Professor at the University of Denver (from 1997), and the Adjoint Senior Research Professor at the University of Colorado, Denver (from 2008). He has studied Marine Biology in Duke University Marine Laboratory and biology in Trinity College. From 1993, he holds a PhD in Wildlife Ecology (Yale University). Under his (co)authorship, 133 Journal Publications & Book Chapters, 8 Books & 2 Special Issues of Journals, 46 Non-technical & Popular Publications, 89 Presentations and Book Reviews have been published. He is a Main Advisor or Field Supervisor for 3 Ph.D and for 4 M.S. students at 5 universities.

INTEGRATING SOCIAL SCIENCE CONSIDERATIONS INTO CONSERVATION PROGRAMS

Richard P. Reading
Denver Zoological Foundation & University of Denver

Social, political, and economic considerations lie at the heart of most conservation problems. Yet, most conservationists receive training in the biological sciences and therefore they try to impose primarily biological solutions on these problems, often with discouraging results. Conservationists face continuing biodiversity loss and discouraging success rates. As they continue to confront the erosion of biodiversity worldwide, conservationists increasingly search for more innovative approaches. Arguably, one of the main reasons for our inability to stem biodiversity loss rests in traditional, narrow

approaches to conservation problems that inadequately address the ultimate socio-political and economic causes. A more explicit policy approach to conservation problems that initially focuses on comprehensive problem definition promises to improve success rates by encouraging practitioners to develop broader, more truly interdisciplinary conservation programs that explicitly include social scientists and work to address the full array of underlying factors causing biodiversity loss. More comprehensive assessment of conservation problems examine biological variables, but simultaneously explore organizational considerations, issues of power and authority, the values and attitudes of key stakeholders, economic factors, and more in an integrated program.

Given time constraints, in this talk I will illustrate the importance of incorporating social science considerations by focusing on one of these crucial areas of exploration: the values and attitudes of key stakeholders. Using examples from black-footed ferret (*Mustela nigripes*) and gray wolf (*Canis lupus*) conservation efforts in the United States and protected areas management in Mongolia, I will demonstrate how inadequate or simplistic attention to values and attitudes of people involved in and affected by these programs reduced effectiveness and delayed progress, often at considerable expense to the program. Conducting social science assessment in isolation from other programmatic components (i.e., multi-disciplinary approaches) similarly impeded a more complete and nuanced understanding of the conservation problems and therefore precluded a more effective, interdisciplinary response. I end with a call for conservationists gain more training in the social sciences and to work more closely with social scientists to develop more comprehensive and interdisciplinary approaches to addressing conservation challenges.

MANFRED NIEKISCH is a biologist and the Director of Frankfurt Zoo. He has been actively involved in the international conservation work since 1980, initially with WWF and later with Oro Verde. In 1998, he became the Professor of International Conservation at the University of Greifswald (Germany). He also teaches at both the University of Hanoi (Vietnam) and the Universidad Internacional de Andalucía (Spain). His honorary positions include among others the President of the Society for Tropical Ecology (gtö), Vice-President of the Frankfurt Zoological Society (FZS), member of the Board of the Senckenberg Natural History Society and Chairman of OroVerde Foundation. He served for the maximum possible two terms as regional Councillor of IUCN. He is also co- editor of the Journal for Nature Conservation. In 2008, he was appointed to the Advisory Council on the Environment (SRU) of the Federal Government of Germany. Geographically, the focus of his scientific and practical conservation work is on the tropical regions.

BIODIVERSITY AND SUSTAINABILITY: THE KEYS TO OUR FUTURE

Prof. Dr. Manfred Niekisch
Zoo Frankfurt

Based on concrete examples from different countries around the world, the driving forces behind the loss of biodiversity and the consequences especially for the poor will be discussed. It becomes directly visible in communities living in subsistence economies that it is the diversity of products that guarantees food security and survival, not the mass production in monocultures. In other words, the monocultures of oil palms, shrimps, soy beans and other products increase poverty and cannot solve the problem of hunger in the world. Furthermore, it cannot be forgotten that genetic and species diversity form the basis for all biological evolution on earth. Ecosystems provide invaluable environmental services and are – as can be seen in a few cases – of direct and highest economic importance. The common concept of "sustainability," represented by a roof sustained by three columns (ecologic, economic, social) or a triangle with the corners, is sending out an incorrect message and therefore has to be revised. Although not always visible at first glance, the conservation of biological diversity and a sound understanding and respective implementation of "sustainability" are indispensable also in highly industrialized countries. It seems that the relevance and importance of biodiversity for all human cultures and economies has not been sufficiently recognized by politicians, the business sector and most civil societies and therefore "target 2010" is far from being achieved.

ROBERT FLIES is the Advisor to the Director (Directorate B – Nature) in the Directorate General for Environment of the European Commission. This is a post he has held since June 2006. He is particularly involved in land use, agriculture and forestry policies, nature and biodiversity – issues that are dealt within the directorate. He was previously (2003- 2006) the head of the Forest Unit in DG Environment. From 1993- 2002 he worked in DG Agriculture in the area of rural development and between 1983- 1992 in DG Research, managing environmental and land use R&D projects. Prior to his position in the EU Commission, he worked in the Luxembourg Forestry administration.

NATURE MANAGEMENT CHALLENGES IN EUROPE: THE EU BIODIVERSITY POLICY FRAMEWORK

Robert Flies
European Commission DG Environment

Let me take the opportunity of the international year of biodiversity 2010 to remember that our forests are a key component of European nature and biodiversity policy.

What do we mean by biodiversity?

Biological diversity or biodiversity encompasses the richness of life and the diverse patterns it forms. Biodiversity does not only have an intrinsic, ethical, cultural, emotional and recreational value, but it provides a series of so-called ecosystem services which form the basis for human livelihoods. Biodiversity rich ecosystems clean and regulate our water, purify our air and maintain our soils. They regulate the climate (through inter alia carbon sequestration as well as storage and release of water), recycle nutrients and provide us with food, raw materials and resources for medicines and other purposes. However, biodiversity loss has accelerated to an unprecedented level, both in Europe and worldwide.

Improved communication on biodiversity is needed

Most people equate the term biodiversity protection to the conservation of species and habitats. There is relatively little awareness of the economic, social and cultural benefits we derive from nature. As a consequence, there is still a perception that biodiversity protection in some way competes with economic well-being and employment. The use of specialist jargon may also reinforce the feeling of disconnection between human society and the natural environment that surrounds us. However, the reality is that biodiversity protection affects every person in the EU. It is concerned with our cities, towns, houses, gardens, parks and green spaces as much as it is with rural areas, coastal zones and protected sites.

A snapshot on EU Biodiversity activities.

In 2006 the Commission adopted a Communication on "Halting Biodiversity Decline by 2010 and beyond" outlining what needs to be done by the European Community and the Member States for biodiversity conservation. Further to strengthening the implementation of the EU's Nature laws (NATURA 2000), the EU biodiversity strategy includes the mainstreaming of biodiversity in other EU policy areas, such as the CAP, Regional and Maritime Policies, Trade, Development Cooperation and External Relations, Climate Change and Research.

The cornerstones of EU policy to protect biodiversity in Europe: the Birds Directive and the Habitats Directive embedded in the NATURA 2000 network.

EU nature conservation is based on 2 main pieces of legislation, the Birds and the Habitats Directives. Both directives provide the basis for the NATURA 2000 network.

NATURA 2000 is the centrepiece of EU nature & biodiversity policy and is the most extensive and comprehensive ecological network in the world. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is not simply a network of parks and nature reserves. NATURA sites very often include towns, villages, farms and businesses with the idea that man and nature work together. That means that economic activities and developments continue to take place as long as these activities do not undermine the ecological value of the site. The terrestrial part of NATURA 2000 is now largely complete and comprises around 25.000 sites in 27 Member States, covering over 840.000 km² or 17% of the EU territory.

How to diminish our knowledge gap

Insufficient resources are invested in surveying and monitoring biodiversity. Some Member States do not know the conservation status of over 50% of the threatened species within their territory. Would a similar state of ignorance be imaginable in relation to GDP or unemployment figures? At the level of the EU, we do a lot of efforts to enhance and

coordinate tools to establish a comprehensive and authoritative picture of the status and trends in our biodiversity.
The EU RTD programmes and projects promote research activities to make available reliable indicators of ecosystem resilience and vital and to develop fundamental scientific knowledge to link ecosystem properties to changes in the goods and services provided by nature. In addition, the link between biodiversity, ecosystem services and climate needs to be better understood, in particular with regards to positive and negative feedbacks in the climate system.

Biodiversity Protection as a Driver for Economic and Social Change
The interaction between Europeans and their environment has shaped our landscape, history, culture and identity. The diversity of Europe's natural environment has played a significant role in shaping our cultural and social diversity and in defining the sense of what it means to be European. In some parts of Europe we have managed to conserve the connection between man and the environment but in other places, particularly in large cities, this connection has been broken. In poorer, inner-city areas the absence of any connection with nature is a contributory factor to alienation and marginalisation.
In some parts of Europe, re-connection with nature has been a lever for economic, social and cultural change. In the Emscher valley in Germany for example, the re-vitalization of a practically dead and lifeless river covered-over for decades with concrete and steel has become the centre-point for economic and social renewal through a major, multi-billion Euro project.

Biodiversity represents the natural wealth of the earth but is usually not considered as a market good and doesn't have any evident price: the economic benefits as well as costs of biodiversity loss and ecosystem degradation receive now more attention.
The Commission devotes a lot of efforts in the further development of ecosystem assessments by having launched a study on *The Economics of Biodiversity and Ecosystem Services (TEEB)* led by a top Economist of the Deutsche Bank, Pavan Sukhdev. The basic thrust of TEEB is to demonstrate that ecosystems are worth more to human society in their present state than they would be if they were converted for other uses. The results from phase I of this study have been presented in 2009 at the CBD COP9 meeting and the report can be provided by DG Environment.

European companies are realising that adopting measures that promote biodiversity can bring additional financial benefits to their business.
Biodiversity is of strategic importance for business by providing the raw materials and natural assets for many enterprises. Corporate actions on biodiversity can help companies to distinguish themselves from competitors, while also involving retailers, investors, employees, local communities and others. The question of public image is increasingly crucial for businesses if they are to compete successfully for customers.
DG Environment is in the process to launch a new European Business & Biodiversity initiative with the aim to introduce biodiversity considerations into corporate governance through voluntary initiatives. DG ENV is establishing in this respect a technical support facility for interested businesses on developing partnerships for biodiversity protection at the European level.

Climate change has major implications for biodiversity and resilience of forest ecosystems: on March 1st, 2010 the Commission adopted a green paper on preparing forests to climate change.
Many forests throughout Europe will increasingly be challenged by climate change. Preparing to meet these challenges now is the best way to ensure that forests can continue to deliver all their functions. The purpose of this Green Paper is to encourage an EU-wide public debate on options for the EU approach to forest protection and information. The European Institutions and all those interested organisations or private individuals are invited to submit their comments on the questions set out by the Green Paper as well as on any other issues they wish to raise. A web-based public consultation will be open until July 31st, 2010.

The International Dimension
At a global level, the EU has taken a leading role in the Convention on Biological Diversity (CBD) and other conventions and protocols concerned with biodiversity protection. The EU has taken active steps to implement the Convention on International Trade in Endangered Species (CITES) and is advocating an operational international mechanism on Reduced Emissions from Deforestation and Forest Degradation (REDD) designed to protect forests across the globe. Biodiversity protection is also part of the EU's external policy and development policy. Nevertheless, as a result largely of its steadily increasing consumption patterns, the EU's biodiversity footprint in third countries is very large.

Most European citizen are interested in conserving their natural resources. The best way to manage our natural resources

for biodiversity conservation is to involve the people who use them and know the best. Close cooperation, an atmosphere of trust, and involvement of different stakeholders are key principles in Europe to preserve biodiversity and protect the economic vitality of our natural environment.

TIIT MARAN graduated from Tartu University (Estonia) as dipl. biol. on environmental science and ecology in 1983, and later took the MSci degree in zoology and Phd in ecology. Hei s currently working in Tallinn Zoo as the Head of Species Conservation Research Lab and Scientific Secretary in Tallinn Zoo. He also has a part-time position of associate professor on conservation biology in Tallinn University. The European mink conservation has always been a central issue in his work, involving practical conservation management, research and policy. Other commitments include: the coordinator of the European mink EEP, the Director of the Lutreola Foundation, a member of Estonian Scientific Authority on CITES.

THE ROLE OF ZOOS IN CONSERVATION: SHIFT OF PARADIGM

Tiit Maran[1], Richard P. Reading[2]

[1]Tallinn Zoo & Tallinn University, [2]Denver Zoological Foundation & University of Denver

Zoos are in the process of gradually transforming themselves from amusement parks and unsustainable wildlife consumers to environment education and conservation centers. This transformation remains underway, with some zoos moving further along the transformation than others, yet overall the zoo community plays an active and increasing role in conservation, both locally and internationally.

According to global and regional zoo strategies, modern zoos have four main functions: education, wildlife conservation, research, and entertainment. All these functions can be, and often are, integrated for better protection or restoration of wildlife. During the late-twentieth century, zoos primarily focused on *ex situ* activities as a means of maintaining an "Arc" to hold animals into the future when, hopefully, the environment can be restored and species reintroduced. That approach gradually shifted to a new focus on environmental education and *in situ* conservation actions.

Regional and global zoo organizations offer an increasing opportunity to use more effectively human and financial resources for conservation, but also to influence global, regional, and national wildlife conservation policies.
Joint programs with universities are opening new perspectives and opportunities for conservation research both *ex situ* and *in situ*.

In our talk we will review the gradual shift in zoos' paradigm, their current contribution to the conservation of wildlife, and increasing focus on research and environmental education. We end our talk with two case studies: conservation in Tallinn Zoo (Estonia) and Denver Zoo (USA).

TAMÁS MARGHESCU is a dual citizen of Germany and Hungary. He holds a Masters of Science from the Forestry Science Faculty of the Albert-Ludwigs University in Freiburg. He started his career in the Bavarian Forestry Service in Germany and was then chosen an associate professional officer to work in the Operations' Division of the Forestry Department in the Headquarters of the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy. Later he worked also as the Chief Technical Adviser in Thailand. With the political change in Hungary, the German Government provided assistance to Hungary, by sending Tamas as a high-level expert adviser to Hungary. He worked there for 6 years (until 2002) as the Special Adviser to the Hungarian Minister of Environment, the period being very exciting as far as politics, economics, social transition and European integration were concerned. In 2002, Tamás was appointed the Regional Director for Pan-Europe (57 countries) of the International Union for Conservation of Nature (IUCN). In January 2010, Tamás was appointed the Director General of the International Council for Game and Wildlife Conservation (CIC). He has a reputation of being highly creative with a strong sense of 'what can be done'. His solutions are often unconventional and refreshing, representing "out of the box" thinking.

ECOSYSTEM GOODS AND SERVICES – CONSERVATION THROUGH SUSTAINABLE USE

Tamás Marghescu

The International Council for Game and Wildlife Conservation

A lot is being debated nowadays on the valuation of ecosystem goods and services. We are indeed at the brink of a new world economy, the old order currently just collapsing in front of our eyes. This is probably the long-awaited chance of nature conservation to finally get a grip on stopping the loss of nature and its goods and services. Nature will need to get a price and needs to be dealt with as an asset of the economy.

At the same time, we see that an ever growing world population needs to be fed from land, which needs to provide alternative, renewable energy and which is in part set aside for conservation purposes as protected areas. The concurrence of food, energy and the many other ecosystem goods and services, including conservation for the same piece of land can be solved only, if more and more areas of land are not segregated for one type of use or the other and if different uses are integrated to achieve a sustainable, multi-functional type of land use. The problem lies noti n the sustainable use of natural resources but in the solution.

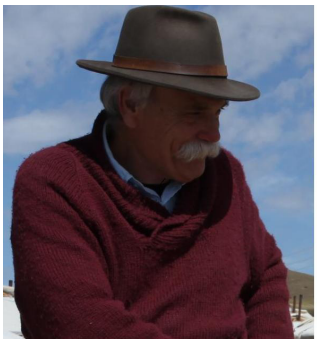
TOBIAS SALATHE was trained as an ecologist at Basle University in Switzerland. Before joining the Ramsar Convention Secretariat in 1999, where he coordinates the work of the European countries, He has worked as a conservation consultant, coordinator of the Migratory Birds Conservation Programme of BirdLife International, an external expert for the Nature Conservation and Life Unit of DG Environment of the European Commission, and for the Mediterranean Wetland Research and Conservation Programme of the Tour du Valat Foundation..

THE RAMSAR CONVENTION – A MODERN SUCCESS STORY FOR NATURE CONSERVATION

Tobias Salathe

Secretariat of Ramsar Convention

On 2 February 1971, eighteen countries signed the first modern global environmental treaty in the town of Ramsar. 40 years later it is still the only MEA dealing with particular ecosystems, subsumed under the newly created term of "wetlands." Today, it is becoming widely recognized how centrally important these water-related ecosystems are for biodiversity conservation, preservation of cultural heritage, and to mitigate climate change impacts. The network of close to 2000 globally designated sites under the Convention constitutes the world's largest network of protected areas. The guidance and tools elaborated by the Ramsar Convention provide a unique link to bridge the remaining gap between water resources management and a sustainable ecosystems approach for human wellbeing.



PIET WIT has an educational background in agriculture and range ecology. Piet Wit has built up extensive expertise in natural resource and biodiversity management over nearly fourty years. He has a long-term experience in the Netherlands, notably in research and education, and he has worked in most West-African countries in the Sahelian region, in eastern, central and southern Africa and throughout Asia. His experience includes long-term missions in Nigeria, Cameroon and Mongolia on biodiversity conservation and management projects, including participatory management of protected areas and their buffer zones, integrated water management and integrated rural development. Piet Wit has a strong background also in training and education management. He is especially involved in bringing together theory and practice, integrating the realities of the field into policy-making and vice versa, identifying and exploiting opportunities, and building synergy between different sectors and actors.

KIM JANSSEN has a background in both sustainable (eco)tourism management (BSc) and environmental sciences (MSc). Her interests are widespread within these fields as she has on one hand been contributing to community-based ecotourism projects in Ecuador and Chile, while on the other hand she has worked on ecosystem restoration research in South Africa. Core in Ms. Janssen's work experiences is stakeholder consultation towards optimising integrated environmental management processes. Ms. Janssen has been contributing to the development of a publication on 'rapid ecological appraisal' for the civil military. Currently, she works for the Dutch Witteveen and Bos consultancy firm, where she is involved in several nature-water projects.

WINNING THE ENVIRONMENT. THE ECOSYSTEM APPROACH AND ITS VALUE FOR MILITARY OPERATIONS, A WAY TO IMPROVE YOUR MISSION.

Piet Wit[1], Kim Janssen[2]

[1]IUCN Commission on Ecosystem Management, [2]Witteveen+Bos

Principle 12 of the Ecosystem Approach, as endorsed by the CBD, states that "the ecosystem approach should involve all relevant sectors of society and scientific disciplines." IUCN's Commission on Ecosystem Management (CEM) is planning to publish a booklet with cases on the application of the ecosystem approach for different sectors, to illustrate its value for each of these sectors and to promote its application. After a short introduction of CEM, the present presentation develops the application of the ecosystem approach by the military sector, in particular in relation to peace-support operations and reconstruction programmes. It describes a simple model of 4 steps. The first step deals with the physical system ("the ecosystem"), the second step with the use of the ecosystem and the third step with its management (institutions and regulations). The fourth step guides the military in taking decisions what (not) to do given the information from steps 1, 2 and 3. The results will be published in an instruction booklet by the CCOE (Cimic Centre of Excellence, Enschede, The Netherlands), an army think-tank sponsored by the nations of the Denmark, Germany, Latvia, The Netherlands, Poland and Slovenia.

HENRIC WAHLGREN is a Sustainability Manager at Kinnarps AB, Sweden. He has an MSc degree in Environmental Science (2007, Linköping University). His work at Kinnarps AB includes the investigation of materials, processes and keeping track of new development; but also collecting and analysing data and communication through company reports; aiding the marketing department with communicating sustainability, sales teams and the purchasing department with selling and procuring and the product development with finding more sustainable solutions. He is also engaged in internal training and public lectures (for example, at Jönköping University and at the International Business School he gives lectures on CSR and sustainability), internal auditing, and in the development of company strategies, policies, targets, action plans and implementation. From 2010, he is a member of the IUCN Commission on Ecosystem Management (CEM).

BIO-DIVERSITY – A DRIVER FOR BUSINESS

Henric Wahlgren

Kinnarps AB

Never before has a single species been responsible for the fate of our planet. We, humans, are now re-shaping not only the look of earth, but also its natural systems in our strives to further improve our lives.

Scientist all over the world have more or less agreed that the effects on our climate, biological and natural systems together with the extinction of species and land and water degradation, are the result of our way of life. We are experiencing an immediate crisis.

Very recently, we have also experienced a financial crisis. The crisis that was so big that it actually caused 2009 to become the first year since the nineteen eighties when "over-shoot day" did not happen earlier than the year before.

The free services that nature provides us and our companies with are rapidly declining, from clean water to pollinating insects. All around the world we can see the problems, difficulties and challenges caused by our un-economic use of natural resources.

Humanity is using 30% more resources than is available per year. If our planet was a company, not many would invest in it in the long term. If not today, then tomorrow at the latest, corporations need to realise that biodiversity and the protection of natural life are fundamental drivers for continuing growth and development. It is time for economists to address the word *economics* in its original term: the use of scarce resources.

ENRICO DURBANO – Ecocounter Ltd, France. COMPETENCES: Project management, identifying and selecting the premium sites, supervising the installation of equipment, seeking out and identifying technical problems, building national network to manage touristic flows in natural areas, communication, training MORE IMPORTANT COUNTING PROJECTS: 2004-2005: Taking part in setting up an observation post to monitor the frequentation of the Alpes Maritimes Natural Park (Italy) 2008-2009: Setting up a network of pedestrian and car counters for the Alpes Maritimes General Council (France) 009-2010: Management of an observation post in the Pyrenees National Park (France) TRAINING AND LANGUAGES: Training: Università di Torino, Laurea in Scienze Forestali ed Ambientali. English equivalent: Forest and Waterways Engineer. Languages: English, Spanish, Italian, French.

TOURIST FLOW MANAGEMENT IN NATURAL AREA: CONCRETES APPLICATIONS OF COUNTING DATA

Enrico Durbano
Ecocounter Ltd

Eco-counter is the world leader monitoring tourism flows in natural areas. Partnerships with clients have allowed creating innovative solutions to help natural sites managers.

With a global network of specialists in 30 countries, the company has developed a great understanding of the different problem related to managing tourism in protected areas.
Over 10 years ago, the first automatic counters were installed: they were solving a need to understand how many people were using a specific facility. This information was helping the day-to-day management: questions like where the work on the facility or quantify access in restricted areas should be solved.

Since then, leisure has considerably changed: natural areas become more and more popular. They now serve a dual role: protection and recreation. This can often cause conflicts.

Considering the evolution, natural areas managers need to have a better understanding of the visitors. Dashboards need to combine different types of information: how to combine data on visitors and environmental indicators? How to share data between different stakeholders? How to improve mobility in protected areas?

All the new needs are pushing manufacturers to improve technology: real-time access to the data, classification of the different types of users and direction of travel, improved software to analyze and share data.

In many European countries, counting data is used for very specific projects (environmental indicators, fauna protection, mobility) or large scale projects where many factors need to be considered (national, regional and local information). This presentation will overview different projects to show a case studies where counts data is being used.

OLLI OJALA works as policy officer in the Natura 2000 unit of the European Commissions Directorate General Environment. He has a Masters degree in Biology, major in botany, from University of Helsinki, Finland. In 2001 he started working in the Regional Environment Centre of Uusimaa in Finland. Since 2009, he has been seconded as a national expert to the European Commission. Over the years he has dealt with various aspects of nature conservation e.g. nature inventories, species and biotope protection, habitat restoration, management of Natura 2000 sites and most recently policy development.

NATURA 2000 – BEYOND 2010

Olli Lauri Pellervo Ojala
European Commission DG Environment

Natura 2000 is based on EU Habitats and Birds Directives and it forms the largest co-ordinated network of conservation areas in the world. It is the cornerstone of the European Environmental policy and it is one of the key tools to halt the loss of biodiversity in the EU and to maintain the essential ecosystem services – biodiversity and nature provision. Despite the recorded success, a lot remains to be done. The network still needs to be finalised, financed appropriately and managed efficiently. Also, the knowledge base needs to be strengthened and the influence of the network on the public needs to be enhanced.

Co-operation with other policy sectors offers great opportunities and challenges. It is a major tool for climate change adaptation and mitigation, a core element of green infrastructure, especially suitable for policies aiming at the provision of ecosystem services, a model for sustainable development and a key indicator for the post-2010 biodiversity policy.

SARAT BABU GIDDA is an ecologist with more than 20 years of experience in biodiversity conservation and natural resource management. Since 2003, he is has been working as the programme officer in-situ conservation in the Secretariat of the Convention on Biological Diversity (CBD). He is responsible for facilitating implementation of the CBD Programmes of Work on Protected Areas and Mountain Biological Diversity.

Prior to joining the CBD, he was a senior civil servant in the Government of India, in the Ministry of Environment and Forests, associated with the policy formulation and programme implementation for the conservation and management of natural resources and for the implementation of the Convention on Biological Diversity. He was India's focal point to the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity. He was also actively involved in the formulation of India's National Biodiversity Strategy and Action Plan – one of the largest participatory and decentralized environment and planning exercise – and played a significant role in developing India's biodiversity legislation. Sarat was also associated with the development and implementation of biosafety regulations in India, and he functioned as the Member Secretary of Genetic Engineering Approval Committee – India's regulatory body for the transfer and use of Genetically Modified Organisms.

Sarat holds a PhD in Natural Resource Management, a Masters in Ecology and another Masters in Environment Policy from Imperial College, Wye Campus, University of London.

PROGRAMME OF WORK ON PROTECTED AREAS OF THE CBD: ACTUAL SITUATION AND PERSPECTIVES FOR THE FUTURE

Sarat Babu Gidda
Secretariat of the Convention on Biological Diversity

Six years ago, in February 2004, the CBD Parties made the most comprehensive and specific protected area commitments ever made by the international community, by adopting the Programme of Work on Protected Areas (PoWPA). The objectives, structure, and targets of the PoWPA are given in Annexure. The PoWPA enshrines the development of participatory, ecologically representative and effectively managed national and regional systems of protected areas, stretching where necessary across national boundaries, integrating into other land uses and contributing to human well-being. By emphasizing the equitable sharing of costs and benefits, recognizing the various governance types and by giving prominence to management effectiveness and multiple benefits, the PoWPA is the most comprehensive global plan of action for effective implementation of protected areas (from designation to ongoing and effective management) and can be considered as a defining framework or "blueprint" for protected areas for the next decades (Stolton *et a*l 2008; Chape *et al* 2008). It is not an exaggeration to claim that the CBD Programme of Work on Protected Areas is the Convention's most successful initiative, as since CBD came into force in 1993, the world's protected areas have increased by nearly 100% in absolute numbers and by about 60% in total area.

Objectives, structure and targets of PoWPA

The overall objective of the PoWPA is to establish and maintain, by 2010, for terrestrial areas and by 2012 for marine areas, "comprehensive, effectively managed and ecologically representative systems of protected areas" that, collectively, will significantly reduce the rate of loss of global biodiversity.

Contents of the programme of work

The programme of work on protected areas consists of four interlinked elements mutually reinforcing and cross-cutting in their implementation. In essence, programme element 1 deals with what and where protected area systems need to conserve. Programme elements 2 and 3 address the enabling activities that will ensure the successful implementation of the other programme elements, including issues such as the policy environment, governance, participation and capacity-building. Programme element 4 covers the steps needed for assessing and monitoring the effectiveness of actions taken

under programme elements 1 to 3. Each programme element consists of specific goals, outcome-oriented targets and related activities. The programme of work contains 16 goals with corresponding targets that set specific dates by which respective goals have to be completed. In many cases, the programme of work identifies indicators needed for measuring progress towards the goals. A list of activities, 92 in total, follows each paired goal and target.

Programme elements

Programme element 1 "Direct actions for planning, selecting, establishing, strengthening and managing protected area systems and sites" is in many ways the essence of the programme of work. The goals, targets and activities of this programme element, taken together, define the objectives, nature and extent of the national protected area systems that will ultimately constitute an effective and ecologically representative global network of national and regional protected area systems. Programme element 1 includes establishing and strengthening national and regional systems of protected areas; integrating protected areas into the larger landscape and seascape, and into various sectors of planning; strengthening collaboration between countries for transboundary protected areas conservation; improving site-based planning and management; and preventing the negative impacts of key threats on protected areas.

Programme element 2 is on "governance, participation, equity and benefit-sharing." Simply stated, achieving the ultimate goal of the programme of work – establishing comprehensive, ecologically representative and effective protected area systems – requires serious and systematic attention to socioeconomic and institutional matters, not just to biological factors and criteria. This programme element includes promoting equity and benefit-sharing through increasing the benefits of protected areas for indigenous and local communities, and enhancing the involvement of indigenous and local communities and relevant stakeholders. The central importance for protected areas of governance, participation, equity and benefit-sharing is underscored by devoting one of the four elements of the programme of work to this set of enabling activities.

Programme element 3 "Enabling activities" is about creating an environment that would ensure successful implementation of the other programme elements. It includes providing policies and institutional mechanisms; building capacity for the planning, designating, establishing and managing protected areas; applying appropriate technologies; ensuring financial sustainability; and strengthening communication, education and public awareness. Programme element 3 provides an umbrella for a number of crucial areas where action is needed to establish the conditions and generate the resources, capacities and public support to plan, establish and effectively manage comprehensive, ecologically representative systems of protected areas. Achieving the goals and targets under this programme activity clearly requires action by policy- and decision-makers of many sectors other besides protected areas. Policies, laws and resulting economic incentives in the broader economy are the responsibility of a wide range of government agencies and legislative bodies. In many cases, they can only be changed with strong leadership from senior political leaders.

Programme element 4 "Standards, assessment and monitoring" includes developing and adopting minimum standards and best practices; evaluating and improving the effectiveness of protected area management; assessing and monitoring protected area status and trends; and ensuring that scientific knowledge contributes to protected area establishment and effectiveness. Programme element 4 addresses the need for Parties to put in place systems to assess and monitor the effectiveness of their protected area systems. To do so requires a set of standards and criteria, against which to measure the effectiveness of management, a system for evaluating the effectiveness of management interventions, and ongoing monitoring of status and trends of both protected areas themselves and the biodiversity that they contain. In addition, it is widely recognized that scientific knowledge of biodiversity needs to be improved and more widely disseminated to those responsible for protected areas management. Implementing the goals under programme element 4 is therefore essential for determining whether the actions taken under programme elements 1 to 3 have their intended impacts, and for allowing for changes in management strategies and actions where that is not the case.

Targets

The programme of work on protected areas contains specific time-bound targets primarily organized around national-level actions. The overall target date for implementation of the programme of work is 2010 for terrestrial and 2012 for marine areas. The Conference of the Parties adopted intermediate targets for many activities with time-bound deadlines of either 2008, 2010/2012 or 2015, in recognition of the fact that many of the goals and targets will require a phased, step-by-step approach.

Among the seven goals of the programme of work on protected areas for which Parties agreed to achieve by 2008, progress at global level was fair in preventing and mitigating the negative impacts of key threats (goal 1.5), in reviewing and revising appropriate policies (goal 3.1), in strengthening communication and public awareness (goal 3.5), and in developing minimum standards (goal 4.1), and the targets were partially achieved. However, in promoting equity and benefit sharing

(goal 2.1), in enhancing involvement of indigenous and local communities (goal 2.2) and in ensuring financial sustainability (goal 3.4), the progress was limited and way behind in achieving the targets. For the six goals with target date of 2010, progress was fair in establishing and strengthening national and regional protected area systems (goals 1.1), in establishing regional networks and transboundary protected areas (goal 1.3), in developing comprehensive capacity building (goal 3.2), in developing and applying appropriate technologies (goal 3.3), in evaluating protected area management effectiveness (goal 4.2), and in the effective monitoring of protected area coverage, status and trends (goal 4.3), and the targets could be partially achieved. Progress in site based protected area planning and management (goal 1.4) with target date of 2012 was fair and the target will likely be partially achieved. In integrating protected areas into broader land- and sea-scapes (goal 1.2), with target date of 2015, some progress is obvious and the target may likely be achieved provided more efforts are put in place in the next five years. Goal 4.4 on ensuring scientific knowledge in establishment and management of protected areas, showed good progress to date Among Africa, Asia, Latin America and Central and Easter Europe regions. Latin America and CEE regions showed relatively better overall progress than Asia and Africa regions.

PoWPA Beyond 2010 – Perspectives for the Future

Despite considerable progress, there are still some areas that are lagging behind.

- The social costs and benefits, the effective participation of indigenous and local communities and the diversification of various governance types need more commitment and resolute actions.
- The evaluation and improvement of management effectiveness, and the development and implementation of sustainable finance plans with diversified portfolios of traditional and innovative financial mechanisms need enhanced measures.
- Marine Protected Areas: although the terrestrial protected areas coverage exceeds 12% of the world's terrestrial surface, marine protected areas (MPAs) cover only 5.9% of the world's territorial waters, growing in a mean annual growth rate 4.6% per annum.
- Climate change considerations for both mitigation and adaptation responses need to be incorporated.

These issues will be considered by the SBSTTA at its 14th meeting in May, while undertaking the in- depth review of the programme of the work prior to COP 10.

STIG JOHANSSON is the current vice-chair in the IUCN World Commission for Protected Areas responsible for Pan-Europe. He works as the Regional Director for Southern Finland at Metsähallitus, Natural Heritage Services. The Natural Heritage Services manage the protected areas network in Finland, and his region covers 25 national parks and about 1500 other protected areas. Dr. Johansson has a long experience from conservation and natural resources management in Europe as well as from tropical conditions. He has worked more than 10 years in the tropics, mainly in Kenya, Tanzania and Namibia. He is a member of the Island Committee – a statutory advisory committee appointed by the government of Finland. He is also representing Finland as a member and was the previous chairman of the permanent working group for Terrestrial Ecosystems at the Nordic Council of Ministers.

CONSERVATION AND PROTECTED AREAS – CHALLENGES IN A CHANGING WORLD

Stig Johansson

IUCN World Commission for Protected Areas (Pan-Europe)

Since the national parks were first established in Europe 100 years ago, their number has increased rapidly. Today, 12.2% of the terrestrial world is located within protected areas; however, much remains to do in marine protection. The establishment of the Natura 2000 network covers 17% of the European Union. The aim has been to conserve our European natural heritage, yet we have failed to halt the loss of biodiversity by 2010. There is a growing pressure on natural resources. Both in Europe and around the world, economic and social changes lead to polarization of land use, leaving biodiversity within protected areas, while increasing intensification results in accelerating loss in the surrounding landscapes. Moreover, climate change will demand a completely different future outlook. The paradigm of protected area management has been dominated

by a site focus. Our thinking must shift from sites to systems, from mere representation to include ecosystem services, and we need management of this green infrastructure from a broader angle. The target to stop the loss of biodiversity must be re-integrated with the efforts to combat climate change. Preserving our natural capital must be raised to an overarching political goal. Biodiversity and protected areas must be integrated into those indicators, which will have to complement GDP as our only measure of progress. Climate change will require a focus on natures' resilience, and the potential of species and habitats to adapt to change. While species, habitats and representation are still the basic elements of conservation, we need to view protected areas in the future more from the perspectives of the ecological, social and economic functions and services that they deliver to our societies.

PARALLEL SESSIONS' ABSTRACTS

28th OF MAY

Parallel symposia: Success stories of nature conservation & Nature conservation beyond 2010

11.00-11.15	Takhi reintroduction in Mongolia – René Henkens
11.15-11.30	Success Story: Combining tourism and wilderness in Soomaa through PAN Parks - Murel Merivee, Zoltán Kun, Agu Leivits, Aivar Ruukel, Tõnis Korts
11.30-11.45	Success Story: Cooperative management of the North Livonian Transboundary Ramsar Site-Agu Leivits, Andris Urtāns, Anneli Roosalu, Murel Merivee, Valērijs Seilis
11.45-12.00	Selected trends in bird monitoring and in communication - Urmas Sellis
12.00-12.15	Successful habitat restoration for threatened amphibians in Estonia - Riinu Rannap
12.15-12.30	Conservation and wise use of Estonian wetlands - Kai Kimmel
12.30-12.45	Restoring fen and moor in Aamose, DK after peat digging and drainage - Claus Helweg Ovesen
12.45-13.00	DNA barcoding and nature conservation – mutually beneficial future - Urmas Kõljalg

Parallel symposia: Nature conservation policy & Ecosystem approach in management

11.00-11.15	Nature conservancy, without the local inhabitants, is this possible? - Mark Soosaar
11.15-11.30	Determinants of orientation to nature protection: some inferences from Estonian society - Kati Orru
11.30-11.45	About local nature conservation trustees, public servants and trust in nature conservation - Kristel Vilbaste, Mikk Sarv
11.45-12.00	Fundamentals of species conservation in Estonia - Eike Vunk
12.00-12.15	Recent trends in nature conservation - Kaja Peterson
12.15-12.30	Ecosystem approach to creating competitive space as a basic element of modern spatial planning - Alicja Suder
12.30-12.45	Ecosystem approach in soil protection and land management - Raimo Kõlli, Arno Kanal
12.45-13.00	EU Biodiversity Policy Post-2010 - exploring the possibilities for safeguarding broader ecosystems - Kettunen, M., Baldock, D., ten Brink, P., Lutchman, I. & Tucker, G., Baumueller, A. & Arroyo, A.

Parallel symposia: Ecosystem goods and services

14.15-14.30	Recognising the value of protected areas (in the Economics of Ecosystems and Biodiversity report for policy-makers - Kettunen, M., Berghöfer, A., Brunner, A., Conner, N., Dudley, N., Ervin, J., Gidda, S. B., Mulongoy, K. J., Pabon, L., Vakrou, A.
14.30-14.45	Transactional environmental supporting system and development of pro-biodiversity business - Zenon Tederko
14.45-15.00	Old manor parks – from cultural heritage to refugia of biodiversity - Jaan Liira, Kertu Lõhmus, Epp Tuisk, Kai Vellak, Inga Jüriado, Ave Suija
15.00-15.15	Red wood ant settlements as outside study objects and the management of ant-friendly tourism - Anne Martin, Ants-Johannes Martin
15.15-15.30	Large carnivore damage prevention and conservation: livestock guarding dogs in Finland and Estonia - Teet Otstavel
15.30-15.45	Paying for environmental protection and attitude towards nature protection in Estonia in international comparison - Üllas Ehrlich, Sirje Pädam

Parallel symposia: Biodiversity and management

14.15-14.30	Carrying capacities of nature parks - Jesper Brandt
14.30-14.45	Invertebrate diversity research and conservation in Estonia: our overlooked majority - Tõnu Talvi
14.45-15.00	The dendroflora of Estonian nature protected parks - Nele Nutt, Sulev Nurme, Mart Hiob
15.00-15.15	How are Estonian woodland key habitats managed - what has remained and how are they protected? - Kaupo Kohv, Anneli Palo
15.15-15.30	How are habitat and landscape factors influencing the diversity and abundance of bumblebees? - Isabel Diaz Forero, Ave Liivamägi, Valdo Kuusemets, Jaan Luik
15.30-15.45	Distribution and habitat ecology of the threatened Florest lichen Lobaria pulmonaria in Estonia - Inga Jüriado, Jaan Liira

TAKHI REINTRODUCTION IN MONGOLIA

Piet Wit[1], René Henkens[2]
[1]IUCN Commission on Ecosystem Management, [2] Alterra & Wageningen UR

In 1968, the last Przewalski Horse (*Equus ferus ssp. przewalski)i* was observed in the wild in South-Western Mongolia. Surviving *Takhi* (as the animal is called in Mongolia), descending from only 13 ancestors, has been taken in captivity about a century ago. The Foundation Reserves for the Przewalski Horse (FRPH) together with its Mongolian counterpart MACNE designed and executed a reintroduction programme in the *Hustai* National Park in Central Mongolia, based on an ecosystem approach "*avant la lettre."* At present, over 250 *Takhi* roam the mountain steppe of *Hustai* National Park. Over 90% of these are born in the wild. As a result of this, Przewalski's Horse is one of the few species that have been upgraded a category in the Red Data Book of Species (IUCN): from "extinct in the wild" to "critically endangered." The presentation elaborates on the principles of ecosystem management as endorsed by the CBD, in relation to the management of *Hustai* National Park and its *Takhi* population.

SUCCESS STORY: COMBINING TOURISM AND WILDERNESS IN SOOMAA THROUGH PAN PARKS

Murel Merivee[1], Zoltán Kun[2], Agu Leivits[1], Aivar Ruukel[3], Tõnis Korts[4]
[1]Environmental Board, [2]PAN Parks Foundation, [3]Estonian University of Life Sciences, [4]Viljandi County Government

PAN Parks, the only European-wide organisation focusing on the protection of wilderness areas, occupies a unique position from a conservation perspective in its attempt to redefine and develop a concept of wilderness conservation in Europe, one of the most highly developed areas in the world. PAN Parks applies a truly integrated approach combining wilderness protection and sustainable tourism development aiming at turning tourism from a threat to an opportunity for conservation.

PAN Parks provides effective third-party verification system under WCPA (World Commission on Protected Areas) Framework for Management Effectiveness. PAN Parks sets an important benchmark for high standards in protected area management. The certification is based on verification carried out by independent experts, in accord with PAN Parks quality standards. There are five PAN Parks principles, covering relevant wilderness protection from social, economic and cultural aspects. Principles allow for objective verification and transparency. The verification procedure includes three main elements: verification of the protected area, its Sustainable Tourism Strategy and the local business partners.

The sustainable tourism development process helps to ensure that tourism provides real benefits for the rural communities in and around the protected areas, and at the same time reduces the pressure caused by tourism on the park. However, without the genuine support of local communities, the task of nature conservation is pointless. The sustainable tourism development strategy of PAN Parks is developed through a collaborative process between park managers and all relevant local stakeholders The sustainable tourism development strategy is a cornerstone, ensuring that tourism supports nature conservation, and guaranteeing that tourism is not introduced in sensitive areas.

Local tourism related businesses can also undergo a certification process ensuring that the business is working in harmony with the park management; this helps those involved in making real improvements and gives them a business advantage. This also helps to involve local communities and businesses, raising their awareness of the real value wilderness has. This integrated approach is the key to effective management of protected areas and is becoming rapidly recognised as being the model of best practice. In Romania, as a result of the success of verification process in Retezat NP, the national management authority has adopted the PAN Parks Sustainable Tourism Development model as the standard for all national parks.

Soomaa NP of Estonia followed the PAN Parks process for 3 years. The basis of the interest was twofold: a) the belief of the nature conservation agency in the possibility to combine tourism with the effective conservation measure and b) the interest of a few local businesses which saw the potential in the marketing of PAN Parks. Environmental Board, as the protected area administrator, applied to the PAN Parks Certificate in 2009. Soomaa was the first park where the certification of the 5 principles happened through the same verification mission. The successful process was made possible both by the good cooperation between local community as well as by the original establishment of Soomaa NP, which already in 1993 had provided a regime and management approach for the protected values that were suitable for the network.

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http://www.panparks.org/learn/pan_parks_concept/integrated_approach
http://www.soomaa.ee

SUCCESS STORY: COOPERATIVE MANAGEMENT OF THE NORTH LIVONIAN TRANSBOUNDARY RAMSAR SITE

Agu Leivits[1], Andris Urtāns[2], Anneli Roosalu[1], Murel Merivee[1], Valērijs Seilis[2]
[1]*Environmental Board,* [2]*Latvian Nature Conservation Agency*

Cooperation between the Baltic States nature conservation agencies is guided by a number of trilateral or bilateral agreements, some of them signed already more than 15 years ago. However, in practice, the transboundary cooperation takes place in the frame of individual projects or even private initiatives of scientists involved in joint research.
The area along the coast of the Bay of Riga and on the both side of the Latvian-Estonian border is called North Livonia. On the both side of the border there are several protected wetland areas that, though split by national borders, form inseparable ecological units. As result of active transboundary cooperation on the base of thee Ramsar areas (Nigula, Northern Bog, Sookuninga), a North Livonian Transboundary Ramsar site was legally announced here in 2008.

Mutual understanding of co-operation between managers of joint transborder wetland system became accepted by both sides step by step and nowadays has resulted in joint projects. The co-operation between the border nature reserves North-Vidzeme Biosphere Reserve (established 1990) and Nigula Nature Reserve (established 1957) has lasted for some time and was strengthened by the agreement for joint nature conservation management (2000) between the governments of Estonia and Latvia.

One of the more prominent transboundary projects in region has been the "*Integrated Wetland and Forest Management in the Transborder Area of North-Livonia (Estonia-Latvia).*" The project was implemented to develop joint Transboundary Master Plan for future cooperation. Aforementioned project was followed by the INTERREG IIIA project WETLIVONIA "*Tuned management and monitoring of the transboundary protected areas in North-Livonia as a support for local development,*" which made it possible to initiate many actions planned in the transboundary Master Plan. Activities like planning local infrastructure in PA-s and river habitat restoration, as well as planning and setting up a cross-border monitoring system for the management of transboundary Ramsar areas, including creating facilities for Transboundary Research and Monitoring Centre for future studies in North-Livonia, not only improved the protected area management and cooperation between transboundary sites, but also supported local rural communities.

During the last years, both the Estonian and Latvian nature conservation system has undergone several large scale reforms – instead of single protected areas administration, there is Environmental Board in Estonia and instead of North-Vidzeme Biosphere Reserve Administration, there's Nature Conservation Agency In Latvia. Due to the administrational changes, the

transboundary cooperation is kept alive through different small scale events and initiatives that also support the work done in regional nature conservation agencies.

Political, financial and methodological constraints significantly limit effective transboundary cooperation. However, the stakeholders admitted that regular meetings and information/experience exchange are very useful and needed to meet the common obligations set by the needs from protected area management. Transboundary cooperation is a good tool for changing traditional wetland management approach of protected areas from command & control management to integrated community based adaptive ecosystem management, which is more acceptable by local communities.

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SELECTED TRENDS IN BIRD MONITORING AND IN COMMUNICATION

Urmas Sellis
Eagle Club

Monitoring of an individual bird via ringing (banding) has been widely known and used by ornithologists and bird watchers around the world for as many as 130 years already. But common rings are difficult to read on alive bird, therefore during the last decades, colour rings with readable individual codes have been used - that gives more possibility to recover the bird for several times through its lifespan.

In Estonia, several species, incl. eagles and black stork, are ringed in that way within international colour ringing schemes. Therefore, we know the population dynamics, dispersion and migration routes quite well.

For more data about an individual bird, it is possible to use transmitters - either radio, satellite or GPS tags. Most effective are the last ones, though it depends on the monitoring topic. Estonian Eagle Cub has used different tags for the sixth year at the moment and there are data about 32 different birds, followed by us. Almost all the data covering outside the breeding time are represented on the online migration map available at: http://birdmap.5dvision.ee/en

The most complete (in some sense) bird monitoring is possible by using real-time web cameras (looduskalender.ee). We have used web cameras since 2007 to make available all the nest life of certain bird pairs for almost everyone and to save the all the material for future investigations.

Transmitters and webcams about eagles and black storks have had an extremely high media coverage and interest around the world. There is even the so-called society of 'storkaholics', watching the nest life during all their free time and communicating about the topic. The same stream from an Estonian remote forest is running in schools, at homes, by dentists and in Brussels offices...

The people who have watched wild life through a webcam for some hours care much more about nature in the future! And the small country on the Eastern Baltic shore (called Estonia) will be much more known in a positive light...

Estonian EagleClub is very thankful to the following organisations for their help: Environmental Investment Centre, Ministry of Environment, Environmental Board, European Commission, University of Tartu (FIBIR), Estonian University for Life Sciences, State Forest Management Centre, Estonian Ornithological Society, Looduskalender, etc

SUCCESSFUL HABITAT RESTORATION FOR THREATENED AMPHIBIANS IN ESTONIA

Riinu Rannap
Tartu University

A large-scale restoration of high-quality habitats is considered essential for the recovery of threatened amphibians, but only a few successful cases have been documented so far. Here I describe a landscape-scale restoration project targeted at two

declining species – the crested newt (Triturus cristatus) and the common spadefoot toad (Pelobates fuscus) – in six protected areas in southern Estonia (2005-2007). In a close co-work of managers and scientists, 230 ponds were restored or created in 27 clusters to (i) increase the density and number of breeding sites; (ii) provide adjacent ponds with differing depths, hydroperiods and littoral zones; (iii) restore an array of wetlands connected to appropriate terrestrial habitat. In only three years, the number of ponds occupied by the common spadefoot toad increased 6.5 times and by the crested newt 2.3 times. By 2008, successful breeding of the crested newt was recorded in 23 of the 25 clusters designed for this species (92%), and of the common spadefoot toad in 17 of 21 clusters (81%). Hence, populations of threatened pond-breeding amphibians can rapidly recover if their habitats are restored at the landscape scale, following the scientific knowledge on their habitat requirements and population connectivity.

CONSERVATION AND WISE USE OF ESTONIAN WETLANDS

Kai Kimmel
Environmental Board

The values of wetlands and the role wetland ecosystems play in maintaining biodiversity and environmental quality are widely accepted (Masing et al., 1990). The need for the conservation of wetlands is increasingly coupled with the recognition that wetlands provide services that are important welfare constituents. Nevertheless, the degradation and loss of wetlands were identified by the Millennium Ecosystem Assessment as being more rapid than that of other ecosystems. The promotion of the conservation and wise use of wetlands are therefore very relevant.

In Estonia, the area of wetlands has also diminished remarkably due to different utilization for economic needs. Comparatively large areas of natural wetlands have, however, been preserved and contribute significantly to environmental and biological diversity. Substantial progress has been achieved in the area of wetland conservation and a significant proportion of valuable wetlands (a total of 33 wetland habitat types covering more than 300,000 ha) are legally protected (Kimmel et al., 2010). All Special Protection Areas and 80% of Special Conservation Areas in the Natura 2000 network represent a lesser or greater amount of wetland habitats. Several wetland types, particularly mires (especially ombrotrophic bogs) and semi-natural wetlands (coastal and floodplain meadows), have been preserved in Estonia in considerably large numbers and in total area, providing habitats for a number of species threatened globally or on a European scale.

The Ramsar convention is promoting the wise use of all wetlands as a means of maintaining their "ecological character" – the ecosystem components and processes that comprise the wetland and underpin the delivery of ecosystem services (De Groot et al., 2006). The brief analysis indicates that Estonian wetlands provide the array of provisioning, regulating, cultural and supporting ecosystem services. Despite the compensation network, where legally protected areas are supplemented by areas included in the green network, ensuring this way the maintenance of the provision of the main wetland ecosystem services, there are still crucial challenges of wetland wise use in Estonia: 1. Management of drained wetland areas that have become the sources of greenhouse gases; 2. Achievement of the sustainable use of peat resources and ensuring of the restoration of cut-away peatlands; 3. Maintenance of the traditional management of valuable semi-natural wetlands. To this day, wetlands have often been treated from different viewpoints, depending on the interests of different disciplines or sectors. There is a challenge to integrate the ecosystem services framework, providing better possibilities to assess trade-offs among alternative scenarios of resource use, into wetland management planning. The valuation process, involving stake-holders and monetary valuation, could help raise awareness and encourage cross-sectoral co-operation.

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RESTORING FEN AND MOOR IN AAMOSE, DENMARK AFTER PEAT DIGGING AND DRAINAGE

Claus Helweg Ovesen
Biologist, senior advisor of Roskilde University

During the second world war and a decade after, until the middle of the 1950s, peat was an important source of energy in Denmark and peat digging became a large industry, using the most important native resource. In the Aamose area in NW Zealand (about 25 km2), about 2 meters of peat were removed from most of the area. By digging peat, is was discovered, that the area contained very important reamains from the hunters stone age 8-10.000 years ago and also from the later peasant stone age. Wood and bone were a.o. preserved in the wet peat. The Aamose was invented thoroughly by archaeologists in the 1960-80s, and the National Museum bought 50 ha of the area for both investigation and the habitation of research-workers and students.

Later, in the wet summers in the 1950s, a strong wish to increase agricultural production in fen and moore raised, and the Danish socalled Heath Society created a project covering most of the area. The main element was strechting and deepening the main river, running through the area, and also some important minor rivers, running to the main one. As a result, the water level lowered about 3 meters. Large areas were plouged, but today much has gone out of annual cultivation.

Since the 1990s, the work has been going on to preserve the still existing areas of fen
and former raised bog, and in 1995, 230 ha were made a nature reserve and the water level raised 2-2½ m. In addition, the work is going on to rewet much larger areas (2200 ha) and manage raised bog against regrowth with trees and keep fen areas free of neetles and other less wanted plant species through graizing and hay harvesting.

In the presentation I will introduce the results so far and plans for the future, a short overview of other Danish restoration projects will also be given.

DNA BARCODING AND NATURE CONSERVATION – MUTUALLY BENEFICIAL FUTURE

Urmas Kõljalg
Institute of Ecology and Earth Sciences, University of Tartu

The present and future of DNA based taxon identification technologies in nature conservation will be discussed. If the rapid and reliable identification of native, alien or protected taxa is necessary from the air, water, soil, remains of specimen, etc., the DNA based identification is the most accurate. Also, the identification of population or the level of cryptic species are mostly achieved by molecular methods. However, the bottlenecks of the DNA based taxon identification are a small number of web based DNA keys and the lack of cheap DNA sequencing technologies. Fortunately, both fields are developing fast and the problems will disappear probably in next few years.
First, there are many international and national initiatives which develop DNA based identification tools (CBOL, UNITE, INSD, etc.). There is Estonian national initiative to develop and implement DNA identification tools for the protected species. Web based solutions for the DNA based taxon identifications of both Estonian native and alien taxa will be demonstrated as well.
Secondly, there are many emerging DNA sequencing technologies which will make DNA extraction and sequencing faster and hopefully also cheaper. Already today, some machine-based taxon observations are made by new technologies, such as massively parallel pyrosequencing (454 Roche platform). The use of DNA as a taxon identification agent will probably promote the development of DNA based technologies which can be easily utilised directly in the field.
The morphology-based identification will not loose its importance due to the emerging DNA methods. On the contrary, the value of morphology-based knowledge will even grow, because we need reference specimens of local taxa deposited in scientific collections. These specimens will serve as a backbone of the DNA keys and can always be revisited in order to check identification or for another DNA extraction. Such reference specimens must be collected and deposited continuously, as we need information on population level changes as well. For example, as a result of global warming, the current population might be easily replaced by the southern population of the same species. Such changes can be recorded only if we have specimens deposited in the collections over the years.
The nature conservation should be ready to implement emerging DNA technologies already today. Because in many cases it is only DNA which can tell us whether fish or other meat sold on market comes from protected species, whether the plant tissue from destroyed site belongs to the threatened species and et cetera.

NATURE CONSERVANCY WITHOUT THE LOCAL INHABITANTS, IS THIS POSSIBLE?

Mark Soosaar
Permanent resident of Manija Island, MP of Estonian Parliament

The belief into totally objective and humanless steering of different processes is increasing. Fast trains without drivers and cameras without policemen are everyday reality. Is it possible to preserve nature and to expand biological diversity without human attendance, too? Hundreds of webcameras are monitoring life in the rare species' nests, the images of restricted places are distributed all over the world. It seems that without men's penetration into virgin nature, the Creator himself could manage with the balance of the living world.

But real life is opposite. Let's see, what is happening on the Estonian coastline and in our most sensitive areas – in small islands. Let's go to Kihnu archipelago which is a natural space for the unique Kihnu folk culture, recognized by UNESCO as a masterpiece of humanity.

Kihnu archipelago consists of two inhabited islands (Kihnu and Manija, altogether with 550 permanent residents) and about 20 unhabited small islets which for centuries were kingdoms for many waterbirds. A lot of Kihnu men were living on islets during the whole summer, besides fishing they acted as „Kings of Birds", regulating subconciously and according to ancient traditions the number of nesting birds. Today, the visiting of islets is banned for everyone from April 1st to July 31st, most of the islets are occupied by cormorants and the biological diversity have dropped dramatically down. Biological diversity has gone down in inhabited Kihnu and Manija Islands, too. Reduction has taken place in both, in fauna and flora. European money arrived with the Ministry of Environment, the local people are taught by highly educated administrators, there are very strict rules for farming, fishing and hunting are set up but diversity in nature doesn't rise up.

Why?

What was done wrong? Let's discuss this together at the second day of the conference, May 28th at 11.00……

DETERMINANTS OF ORIENTATION TO NATURE PROTECTION: SOME INFERENCES FROM ESTONIAN SOCIETY

Kati Orru
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King's College London, Risk and Hazard Research Group at Department of Geography

The human being is the key to successful nature conservation, but also the beneficiary of the anthropocentric preservation endeavours. Preventing, mitigating and adapting to changes in the natural environment require a comprehensive understanding of the role of human in the integrated ecological system governance. This paper aims at defining the key societal determinants of human perception of the need for nature protection and the related individual behaviour. This paper presents theoretical propositions that could predict the Estonians orientation to nature protection.

We can distinguish three main categories of drivers that influence the public salience of nature protection and related behaviour in Estonia (Figure 1).

First, we need to consider the normative circumstances that have encouraged attitudes to nature. Deeply rooted societal norms, but also destabilising historical experiences have lead to devaluation of individual well-being, let alone the natural surroundings framing our daily activities. Furthermore, as characteristic to the Eastern European transitional societies, we can see the dominance of materialist values that elicit less likely investments in environmental safety. When it comes to acting upon the convictions of nature protection and related political reactions, ingrained traditions of political passivity are characteristic of post-soviet societies.

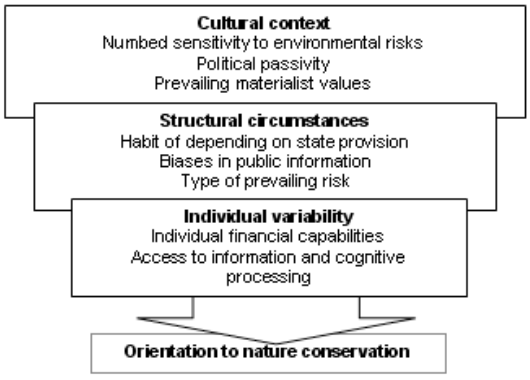

Figure 1. Main triggers of public salience of nature protection.

Second, the structural circumstances constrain or facilitate the alertness

to nature conservation ideas. The available representations of nature, notions of its adaptability to anthropogenic pressures create the societally prevailing sense of nature. For example, depictions of controversial, complex and cumulatively effective water ecosystem balances are less likely understood by public when compared to the portrayal of concrete threats to water ecosystem-dependent communities' livelihoods. The historical legacies of state nature protection programmes diffuse the sense of moral as well as economic responsibility for consuming natural goods.

Third, we must account for the individual variability in the financial capacities for natural resource users' contributions. Finally, the individual processing of nature conservation messages, their anchoring to old beliefs, optimistic biases, appeal to catastrophic events rather than the cumulative day-to-day natural degradation due to human behaviour should be considered as determinants of Estonians alignment to nature conservation ideas.

This paper endeavours to contribute to the understanding of politico-societal and economical determinants of the success of nature protection.

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ABOUT LOCAL NATURE CONSERVATION TRUSTEES, PUBLIC SERVANTS AND TRUST IN NATURE CONSERVATION

Kristel Vilbaste[1], Mikk Sarv[2]
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Do not spit into the old pit, ready for a new pole!

In 1936, when the national system for nature conservation was first established, Estonia had only one nature conservation inspector and 588 unpaid trustees. Contemporary situation is vice versa – there are about 2000 nature conservation officials and perhaps no unpaid trustees. Unfortunately, we have no detailed information on the conservation officials.

In 1930s, 70% of the confirmed nature conservation trustees were school teachers, 17% of them were foresters educated in forestry and 13% were local activists.

The nature conservation trustees had to promote nature conservation in local communities in mode that the question of nature conservation should not be official demand, but natural obligation. Just in the same way as it has been through ages, while preserving sacred groves, stones etc.

The trustees were recommended to create nature conservation study circles among pupils and to organize study trips to nature conservation objects, where they had to talk about the importance of nature conservation. They also had to organise the Nature Conservation Days in their communities and to hold speeches about nature conservation. The trustees from forestry were recommended to involve other foresters in searching for possible conservation objects in order to monitor these objects and areas. [2]

We can find officials, dealing with nature conservation in 2010, from different institutions:
1) Ministry of the Environment, Nature Conservation Department
2) Environmental Inspectorate
3) Environmental Board
4) Local Municipalities
5) The State Forest Management Centre

It is impossible to get exact data neither from Ministry of Environment nor elsewhere on the number of nature conservation officials and on the amount of money we spend to keep them active. SEI has lately carried out a survey which shows that most of the time the nature conservation officials are engaged in paper work and work with databases. The officials have been working in the system, in average, less than 5 years. [2] It is necessary to invite experienced nature experts to help with the teaching of young officials. Permanent reforming of the nature conservation system has resulted in permanent changes in the posts.

Most of the nature conservation trustees are nowadays replaced with nature conservation NGO-s, there are more than 1000 of them. Quite often, the same people are members of 10 NGO-s, the network of organisations does not cover all Estonia. The NGO-s ire also dependent on national funding and drowns in meaningless paper work.

The existing nature conservation system makes Estonian natural values vulnerable. Frequently, the nature is conserved only in papers; our legislation gives often the developers rights to damage nature values. For example, Nabala lime stone area has got more than 50 000 signatures for protection, but the law gives a developer right for mining.

The reason for reaching the dead-end in nature conservation lies perhaps also in the system's ambition to regulate and control everything with no regard to real needs, resources, people with knowledge etc.

What we should do:
1) The nature conservation control should be delegated on community level. Environmental Inspectorate has to be reshaped from punishing institution into anticipatory and supporting tool for nature conservation. Often, local people estimate the situation more appropriately than the officials who drive to the place from city. We should think about restoring the system of nature conservation trustees in order to create a motivation system for them and decentralise it.
2) Nature Conservation has to become real. It embraces all our surroundings, not only untouched nature and protected areas. We have to stop talking about natural selection and about our incapacity to preserve nature from the results of human activities.
3) Our state has to reassess our international obligations, as well as assess our financial funds and people for nature conservation.

We should start with the development plan for TRUST.

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FUNDAMENTALS OF SPECIES CONSERVATION IN ESTONIA

Eike Vunk
Environmental Board, Nature Conservation Department

Species conservation by Nature Conservation Act is based on categories. There are 570 protected species in total in Estonia, named by the regulation of the Minister of the Environment. Categories are based on species rareness, distribution, population size, vulnerability etc.

The Act determines different measures to protect the species: damaging the individuals, formation of conservation areas and management plans is prohibited. Today, there is 1048 species protection sites all over Estonia and the number is slowly increasing. 25 species have management plans that give an overview of species' condition, threaths, risks and management actions to preserve or favor species condition. One of the most important measures is monitoring in order to get the data about species status and find out whether the management is really working.

Estonia is becoming to face the same problem as western countries – important species sites are fragmented and the metapopulation does not work. Due to yet developing society, the approach to the nature is antropocentric and causes false issues to dominate over real species conservation issues. Other fundamental problems are the lack of data and experts of species and in some parts weak legal system.

Environmental Department has 21 conservation biologists whose most important tasks include gathering data from the field, amending environmental register, participating in conservation planning and integrating know-how about species in departments' decisions.

RECENT TRENDS IN NATURE CONSERVATION

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Increasing human pressure on the environment increases the counteraction – the quest for designation of more land and sea areas for protection. The accelerating trend of designating more sites of protection has been noticed in the last 50 years in Europe (EEA, 4/2009) and worldwide (Chape *et al.*, 2005). Despite the increasing number, however, the increase of territory of the protected areas does not follow the same pace. The area that could be designated as protected to balance the economic pressures is becoming scarce. Two reasons could be surfaced in the European context. Firstly, over 175 years of history of nature conservation in Europe, the best examples of natural and cultural heritage have been already designated. Secondly, the steep increase of the network of protected areas in the last decade largely corresponds to the mandatory designation of Natura 2000 sites in the EU member states. Due to its wide scope and rigid legal liability, EU-wide Natura 2000 network has also changed the paradigm of nature conservation in Europe. According to the Habitats Directive, certain types of ecosystems (eg old growth forest, coastal meadow or a salmon river) have a value of their own, independent of their area, location or socio-economic implications on the maintenance cost. The large number and area of designated sites under the Natura 2000 network scheme, 26,807 sites (Natura 2000 Barometer Dec 2008) and up to 17% of EU-27 terrestrial land (EEA 4/2009), respectively, has resulted in a situation where the extension of the network has become questionable. The growing unavailability of substitute areas for the adversely affected Natura 2000 sites has been referred by Therivel (2009). Followed by the difficulty to increase the number and area of natural areas in highly urbanised Europe, coupled with the failure to meet the challenge of halting of biodiversity by any politically agreed date in the future, the traditional paradigm of nature conservation has to be changed. Lockwood&Kothari (2006) refer to the need for the shift from the traditional way of management paradigm (ie protected areas are set aside for conservation) to an 'emerging paradigm' which claims that protected areas are to be run in parallel to social and economic objectives. But even more importantly, a holistic or sustainability approach to maintain the life supporting natural systems still left for today's and future generations is needed. This means that nature conservation would become the responsibility of all sectors and authorities, not only of those designated for nature conservation. Nature conservation, if not integrated into all policies and not engaging people, will eventually become isolated and thus left unsupported by the wider society. The progress of ICT has contributed to the advancement of evidence-based decision making (eg planning, permitting) and better involvement of sectors and people. Data on land use and biodiversity combined with data on risks associated with human activities has increasingly become available on the web and used in decision making almost on routine basis, also in Estonia. Recent survey (Peterson, 2010) demonstrated, however, that despite the continuous upgrading of the ICT tools and data quality, the management of protected areas has not improved in the same pace. On the contrary, the distancing of administration (into the web) from the practical management and supervision in the field are creating more problems than actually can be resolved. Thus, progress of ICT tools independently would not compensate the personal communication and engagement with people and communities that directly or indirectly are affected by the nature management.

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ECOSYSTEM APPROACH TO CREATING COMPETITIVE SPACE AS A BASIC ELEMENT OF MODERN SPATIAL PLANNING

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Introduction

Competitive space is defined by economic, human and environmental index and means the creation of attractive places which lure different users and stimulate sustainable development in regions. Little efficiency of competitive space designing in Poland results from the fact that 80% of country area do not have spatial development plans. Aiming at implementing the country strategic targets of biodiversity protection and regional development, it is necessary to set many acts of specialist law, which would in feedback weaken further the significance of coherent spatial planning and competitive space designing.

Methods

The use of statistical data and SWOT analysis, the strengths and weaknesses of the spatial planning process, in reference to the implementation of biodiversity protection targets in Poland, are indicated. The model of integrated competitive space designing, based on geo-complex analysis, is proposed.

Results and discussion

Spatial planning is recognized as an instrument for coherent management of nature resources, economy and regional development. Considering biodiversity protection objectives, a triangle hierarchy of limits exists in the model of the economical use of country surface in Poland: areas with priority of nature protection and prohibition of business activities (National Parks, Nature Reserves), protected areas where business operation is acceptable under specific conditions (Natura 2000, Landscape Parks, Protected Landscape Areas) and the rest. This simple and transparent model introduces many exceptions in law regulations. They constitute potential source of conflict among interests of different groups and as a result reduce the competitiveness of space in the domain of nature values and business activities of the local societies. Another problem is the instability of local forms of nature protection which are not included in spatial plans. Additionally, the obligation of full regeneration of destroyed habitats, even outside the place of damage, require the establishment of the appropriate places during the compilation of spatial plans, and is not therefore very realistic. Starting from the idea that ecosystems management is placed within a given space, depending on its own features, the geo-complex management is more appropriate method for designing of spatial order both on national and regional level.

Conclusions

The simplification of country law regulations in the domain of environment protection, the strenghtening of protection rules within National Parks and Nature Reserves, including local protection forms in spatial planning, the integration of strategic document of regional development, the country spatial development and biodiversity protection as well as space management, based on the geo-complex analysis, are the basic tools for the further creation of competitive space in regions.

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ECOSYSTEM APPROACH IN SOIL PROTECTION AND LAND MANAGEMENT

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Introduction

Preserving soil productivity is a key factor in sustaining the soil resources of the terrestrial ecosystems. The soil cover as a whole and its soils distribution patterns play an essential role in the development of regional land use peculiarities or in the spreading of arable, semi-natural grasslands and forest areas. On forested and semi-natural areas, the leading role in forming and developing ecosystems, as well as their proper functioning, belongs to the soils. The mutual causal relationships between

soil and plant covers are under the influence of local meteorological (climatic) conditions; however, these relationships are in a site specific state.
On arable areas, due to soil management and temporally quickly rotating agroecosystems, the fluxes of organic matter into and out of soil may be quite variable and, besides that, there are big differences between low input and high input management conditions.
The main task of our work is to analyze the functioning regularities of soils in composition of different types of ecosystems, elucidating not only optimized levels of their functioning, but also finding possibilities for step by step improvement of their productivity and environment protection ability (EPA).

Material and Methods
The present work is based on available researches on mutual relationships of plant associations with soil cover in *frigid-udic* & *frigid-aquic* pedoclimatic conditions. In the treatment of the problem, the ecosystem approach was used. In the quantitative characterization of soil functioning, the annual fluxes of organic carbon and phytoproductivity of ecosystems, as well as the soil's EPA were considered.

Results and Discussion
The work presents the main constraints of Estonian soils and in addition, their occurrence is assessed. The soil degradation features and their causes are very variegated, depending on soil properties, local ecological conditions, land use, external influences and societal activity. The measures to prevent soil degradation are as numerous and various as the factors that cause the problem.
The matching of soil cover with suitable plant cover and with crops on arable lands is considered a key problem. Critical activity for sustainable land use. In arable soil management, the tools of conservation agriculture (equilibrated and exactly timed fertilization, establishment of suitable soil crop rotations, taking into account the soil's humus status and biological activity etc.) and those of others should be used.
The EPA of the soil is an integrated capability of the soil cover to sustain or stabilize the functioning of the soil's ecosystem in the discharging of environmentally harmful influxes into the soil. The biological aspect of the EPA of the soil reflects the soil's capability to form productive plant association with sufficient litter inflow into or onto the soil surface, thus facilitating the process of mineralization and humification and thereby sustaining the soil's organisms. The influence of soil cover on the environmental conditions of an area depends very much on soil type peculiarityies. Soils with a low EPA are highly vulnerable to degradation, but those with high EPA are more resistant to negative influences and may be used more intensively for agricultural purposes.

Conclusions
A knowledge-based and expedient activity in the management of ecosystems will give the best results in the soil cover protection. The disharmonies between geodiversity, pedodiversity and biodiversity should be overcome by pedoecologically proved management. Soil cover may be taken as a medium through which it is possible to improve the environmental status of the area. Soil management strategies, which lead to higher inherent soil productivity, generally also enhance the soil's ability to protect environment.

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EU BIODIVERSITY POLICY POST-2010 – EXPLORING THE POSSIBILITIES FOR SAFEGUARDING BROADER ECOSYSTEMS

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Whilst the prevention of the loss of biodiversity remains high on the EU agenda, there is also a growing interest amongst stakeholders in the possibility of post-2010 EU biodiversity policies, being more focused on the protection and sustainable use of overall ecosystems and their ecosystem services (EC 2010, Council of the European Union 2010). The reason for this is that it is increasingly recognised that long-term human wellbeing is dependent on healthy ecosystems and their services. In particular, as pressures from climate change increase, healthy ecosystems are increasingly seen as an essential part of the adaptation to their impacts.

The discussion paper by IEEP and WWF explores what kind of broader, more ecosystem-focused approach to EU biodiversity policy would entail, how it could be best build on existing policies and initiatives, and what the possible implications (e.g. risks and benefits) of adopting such a regime could be. The paper concludes that the adoption of a more ecosystem-based EU policy regime for biodiversity could bring benefits, but it needs to be carefully considered. Such a regime might help to increase public and political support for biodiversity protection and thereby improve the implementation of EU biodiversity policies (e.g. by highlighting significant synergies with other policy areas such as climate change adaptation). However, appropriate planning of such a regime's scope and clear communication of its goals would be needed to ensure that the momentum to support biodiversity conservation is not lost and that an ecosystem-based policy regime does not become narrowly focused on ecosystem services only. Importantly, an increased focus on ecosystem services should not divert resources away from biodiversity conservation or displace development pressures onto them.

A number of existing EU policies could help to deliver a more ecosystem-based post-2010 policy regime. In particular, by safeguarding the variety and distribution of species and habitats (which are ecosystem "building blocks"), the EU Birds and Habitats Directives provide a good starting point for supporting the quality of broader ecosystems, including their functions, resilience and many of their services. Furthermore, the effective implementation of the Water Framework Directive, Marine Strategy Framework Directive and the pending Soil Framework Directives could also make substantial contributions to a more ecosystem-based policy regime. Technical measures such as Environmental Impact Assessment and Strategic Environmental Assessment could also help, by increasing their consideration of potential impacts on ecosystems and their services.

The paper concludes that the most successful post-2010 biodiversity outcomes will be probably best achieved by gradual policy developments, with the priority being the effective implementation of existing instruments. This should firstly focus on the establishment of a strong and comprehensive policy framework for conserving biodiversity and healthy ecosystems (e.g. their services) in the post-2010 era, possibly adopting a few targeted policies/instruments to address obvious gaps in the existing framework. An additional priority should be to increase the knowledge base on the status of European biodiversity and associated ecosystem services. Later on, a further step could be taken to carry out an evaluation of current legislative and other policy instruments that can help to conserve broader ecosystems in the EU. This would help identify remaining gaps and inform further assessments of the feasibility, merits and implications of potential options for more dedicated instruments for safeguarding European ecosystems.

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Marianne Kettunen *is a senior policy analyst at the Institute for European Environmental Policy (IEEP). Marianne is an expert in the EU and international biodiversity policy and her thematic expertise covers, for example, the value of biodiversity and ecosystem services (e.g. the Economics of Ecosystems and Biodiversity initiative (TEEB)), issues related to the costs and benefits of protected areas (e.g. the Natura 2000 Network), funding for biodiversity conservation within the EU and addressing the negative impacts of invasive alien species (IAS).*

RECOGNISING THE VALUE OF PROTECTED AREAS (IN THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY (TEEB) REPORT FOR POLICY-MAKERS)

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Protected areas are a cornerstone of conservation policies and provide multiple benefits for humankind (Balmford & Whitten 2003, Mulongoy & Gidda 2008, Kettunen et al. 2009, Dudley et al. 2010). Well-managed protected areas tend to be particularly important in terms of providing vital ecosystem services, such as water purification and retention, erosion control and reduced flooding and unnatural wild fires. They buffer human communities against different environmental risks and support food and health security by maintaining crop diversity and species with economic and/or subsistence value (Dudley & Stolton 2003, Stolton et al. 2006, Stolton et al. 2008). They also play an important role in ecosystem-based

approaches to climate change adaptation and contribute to mitigation by storing and sequestering carbon. Furthermore, protected areas are often an important part of local cultural heritage and identity, in addition to their recreation, education, health and tourism benefits. Finally, as many rural communities depend on protected areas for subsistence and livelihoods, protected areas contribute directly to global sustainable development and poverty reduction targets (Dudley et al. 2010, Mulongoy & Gidda 2008).

According to current estimates, the loss of biodiversity and ecosystem services at the current rate for the world as a whole is likely to result in annual costs of 50 billion EUR over the period 2000 – 2010, reaching a total cost of 275 billion EUR/in year 2050 (TEEB 2008). The total global loss of welfare due to the cumulative loss of biodiversity and ecosystem services is estimated to be equivalent to 7 per cent of projected global GDP for 2050.

As for protected areas, it has been estimated that worldwide nearly 1.1 billion people – one sixth of the world's population – depend on protected areas for a significant percentage of their livelihoods (UN Millennium Project 2005). Ecosystems within protected areas provide benefits of various natures at all levels: locally, nationally and globally. At the global level, the analysis of the existing information on the value of protected areas indicates that global benefits of protection can far outweigh costs. Furthermore, findings from a diverse range of case studies indicate that the benefits from biodiversity conservation often outweigh benefits from converting wild or extensively used habitats into intensively used agricultural or silvicultural landscapes.

However, benefits from the protection of ecosystems are often broadly disbursed, long term and not captured by markets, while the costs of protection and the earning potential from non-protection choices are often short-term and concentrated. Consequently, whereas the global benefits of biodiversity outweigh global costs, this is often not apparent at national and local levels, because most of the costs of protected areas are met at these levels and these often exceed benefits at these levels. Therefore, policy actions are urgently needed to address the distribution of benefits and costs. Such policies are vital to make protected areas a socially and economically attractive choice and to maximise their contribution to human wellbeing at all scales. The work on the socio-economic value of protected areas has been developed in the context of the Economics of Ecosystems and Biodiversity initiative (TEEB), launched in 2007. TEEB is an independent study that draws together information from all regions of the world in the fields of science, economics and policy to develop a global study on the economics of biodiversity loss. (www.teebweb.org)

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TRANSACTIONAL ENVIRONMENTAL SUPPORTING SYSTEM AND DEVELOPMENT OF PRO-BIODIVERSITY BUSINESS

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Business-biodiversity opportunities exist primarily in the sectors of agriculture, forestry, tourism and a wide range of supply chain activities. Companies in the sectors, having impact mainly on biodiversity, are in most cases micro, small and medium-sized enterprises. The latter constitute over 99% of all economic activity in the EU25.

The DG Environment-funded project Biodiversity Technical Assistance Units (BTAU) on businesses supporting biodiversity was started in December 2006 and is implemented in Bulgaria, Hungary and Poland. It seeks to demonstrate how economic incentives can be re-oriented to drive private investment, production, and services to enhance biodiversity conservation.

Three separate but related functions must be fulfilled to encourage and promote the development of PBBs. Firstly, the development of an appropriate enabling policy environment by the national governments and the European Union is needed; secondly, the provision of technical support for the development of viable investment projects at national, regional and local levels is needed – especially enabling access to know-haw and environmental information; and thirdly, access to innovative, targeted finance facilities, aimed at the realisation of a latent market of PBBs is needed.

While exploring the specific link to economy, biodiversity and habitats, SMEs faced a number of opportunities and constraints. The major challenge is bringing together all the socio-economic and ecological information necessary for making decisions that would satisfy both the sustainable managing of biodiversity and achieving commercial viability.

These challenge, among others, are being addressed by designing an internet-based Transactional Environment Support System (TESS), with European Commission 7thFP funding. The aim is not only to help the rich but disparate environmental research findings from all across Europe with access problems, but also to integrate the economics of sustainable use and state incentives for cost-effective environmental decisions at all levels.

The TESS project is testing the idea that although planners can now anticipate and constrain or alleviate environmental problems from corporate sources, it is the myriad of individual decisions, on what and when to plant or remove, what to consume or discard or how to travel, which summate to change the biosphere and its diversity of life.

Central governments cannot regulate all these decisions without harming the diversity of human interests and land uses that can sustain a diversity of fauna and flora. Instead, as foreseen in CBD, local communities need to be enlightened, empowered, motivated and guided to manage the environment. However, as to date, the SME sector, making a living from biodiversity, has been marginalised by governments.

The market, properly managed by public policy, remains the best mechanism we have for managing scarce resources and improving livelihoods. However, to make it happen, public policies and the decision making system have to be well-based and supported by environmental information gathered on local and often end user level, towards which the TESS aims at.

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Transactional Environmental Support System. EU Seventh Framework Programme, 1 October 2008 – 30 March 2011, www.tess-project.eu. Zenon Tederko, Dr. Pro-Biodiversity Service; Tel.: +48 510275210; Al. Komisji Edukacji Narodowej 46/1; 02-797 Warszawa; Poland; E-mail:zenontederkoaster.pl

OLD MANOR PARKS – FROM CULTURAL HERITAGE TO REFUGIA OF BIODIVERSITY

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Introduction

The historical and cultural importance of old manor parks has been revived lately (Abner et al. 2007, Eesti parkide almanahh 2007, Külvik & Maiste 2009) with a notion that the nature value of parks is still not properly estimated. The majority of

efforts has been paid to dendroflora in parks (last reviews by Abner et al. 2007, Relve 2009, Tamm 1972, 2009). We expect, however, that more densely wooded parts of old manor parks could act as habitats for forest specific species – function as stepping stone habitats for dispersal in the landscape or become a newly formed habitat for stable populations. Thus, parks can obtain a potential to become the refugia for forest biodiversity, considering the fact that most of the contemporary forest land is comprised of secondary stands and intensively managed mono-cultures (Adermann 2008).

Latest studies have shown that small dispersal ability might be the major limitation for forest flora and that the formation of optimal environmental conditions for forest specialists last for about a century (Jacquemyn et al. 2003, Aparicio et al. 2008). In the light of continuingly increasing fragmentation of old-growth forests, this means that these old parks, currently mostly valued as the objects of cultural heritage, can obtain additional value from the aspect of biodiversity conservation.

Methods

We aimed to quantify the effects of habitat conditions, habitat connectivity and anthropogenic disturbance on immigration success of forest species into old manor parks. For that, we selected densely wooded parts of old manor parks as model target habitats, since they have all been established approximately at the same time (mostly in 18th and 19th century; Abner et al. 2007; Eesti parkide almanahh 2007), consisting of mature trees, but the parks had to vary by the structure of surrounding landscape. Within selected forest(-like) park fragments, we made stand, field layer and epiphytic cryprogam flora surveys according to sampling methodology used in forest studies (Kohv & Liira 2005, Liira et al. 2007, Jüriado et al. 2009,) and comparable to statistical forest surveys (Adermann 2008, Liira 2009).

Results

We realized that those selected park fragments resembled the old managed or unmanaged deciduous stands especially by their structure and species composition (Liira & Sepp 2009, Sepp & Liira 2009), containing regular forest plant species and several old-growth indicators, such as *Lobaria pulmonaria* or *Neckera pennata*. The nature quality of these ecosystems was dependent of management intensity and surrounding landscape.

Discussion

We concluded that the presence of the species in these well developed stands of parks seems to follow the patterns of island biogeography (MacArtur & Wilson 1967, Jüriado et al. 2006). However, we also saw that the over-intensive management of these parks can jeopardize the existence of obtained valuable biodiversity.

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RED WOOD ANT SETTLEMENTS AS OUTSIDE STUDY OBJECTS AND THE MANAGEMENT OF ANT-FRIENDLY TOURISM

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Ecotourism and outside study in nature are essential to educate schoolchildren and students, offering recreation possibilities for adults. Red wood ants (Formica s. str.) are the key species in boreal forest communities. Their importance in forest ecosystems, interaction between birds, mammals and other insects has a significant role in the functioning of a forest community. The largest red wood ant settlements have became one of the most popular tourist and outside study objects in Estonia. Unfortunately, the unmanageable tourism and trampling by tourists has become a serious problem in nature reserves in Estonia.

The impact of human trampling load on the red wood ant settlements was observed through the traffic intensity of foragers on ant paths, number of ant paths and vitality of the nest. Trampling load was estimated by the degradation of the herbaceous plant cover. Intensive trampling causes a decrease in the colonies' activity and an increase in the nest damages. A comparison of different trampling load rates showed that the more intensive trampling is, the bigger the damages are, and the best way for ants would be the absence of trampling load. The disturbed ant colonies and supercolonies are more vulnerable to such enemies of red wood ants as birds, mammals and nest parasites.

Future ant tourism should be more dispersed between different red wood ant settlements, and professional guides are needed. The main precondition and the best way to protect ants from trampling load is the existence of natural barriers like ditches between hiking trails and nests, which would prevent people from stepping on ant paths. Although nature tourism is essential to educate people, the settlements of ants should be well exposed and their visiting managed reasonably, if we want to preserve the beauty of intact nature and the phenomenon of the social life for the future generations and save threatened species. The aim of our presentation is to explain the impact of trampling load on red wood ant settlements and how to manage ant-friendly tourism.

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LARGE CARNIVORE DAMAGE PREVENTION AND CONSERVATION: LIVESTOCK GUARDING DOGS IN FINLAND AND ESTONIA

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Introduction
Livestock guarding dogs work by staying with the livestock and driving away intruders, with rarely any need for physical conflict. They have been used for millennia to protect domestic animals from large carnivores. Research was initiated during the late 1970s. In general, LGDs were capable of reducing predation in a variety of management systems. The return of carnivores to their original habitats has caused conflicts of interests between different stakeholder groups. The developing of damage preventive methods and resources, the production and distribution of reliable information can be addressed as the keywords for obtaining consensus. In the long term, the management policy procedures can have both educational and eco-tourist importance and will have to be integrated in the local communities well-being. At its best, the welfare of livestock, LGDs and wolves decreases the citizens' or farmers' concerns on their livelihood and security.
The aim of this study was to explore the special conditions in Finland and Estonia for Livestock guarding dogs and their suitability as working dogs in the area where they traditionally are not used.

Methods
The study included semi-structured interviews, in-site-visits to Finnish and Estonian farms, as well as the analysis on comparing large carnivore damage prevention practices. The themes were the following: 1.The rule frames of large carnivore conservation, 2. Livestock guarding dogs, 3. Human well-being and acceptance by local people, 4. The large carnivore

damage prevention – The use of compensation and economic incentive systems to alleviate and 5. Different large carnivore damage compensation schemes in Finland and Estonia.

Results

In summary, the themes or factors that emerged from this study were: the welfare of guarded animals and LGDs in their guarding job; people at and outside the farms; public opinion on questions related to nature; cost-effectiveness; cultural, socio-economic and stakeholder relations in general. Both discussions and contacts with new LGD owners are together demonstrating the LGDs being a resourceful way to solve problems on farms caused by large carnivores. As Marker et al. (2005a) concludes 'the perceptions of the people involved were just as important as any objective calculation of performance;' therefore, based on these subjective responses, the livestock guarding dogs proved to be successful this far in Finland and in the early development stage in Estonia. However, the institutional framework seemed to be targeted to challenging development expectations in both countries.

In Finland, the damage compensation system has been valid longer; in Estonia, first compensations were paid in 2009. The emphasis is on the preventive measure development. Estonia differs from Finland also because of the large and severe damage on crops caused by wild boar. Damages caused by wild boar are not, however, on the list of compensation.

Discussion

The significance of further comparisons and research to pay greater attention to the possibilities, limitations and the cost-effectiveness schemes of large carnivore management in different demographic structures of predator populations, landscapes and cultural surroundings is urgent. In other words, there is still a need for more comprehensive research of the positive and negative factors dealing with large carnivore damage prevention among different contexts and among different stakeholders confronting the phenomena. Large carnivores are protected by several international agreements and EU regulations. Large carnivores are often perceived as a threat to human safety. An understanding of the values, beliefs and the fears of those who are involved or affected is an important aspect of preventing carnivore damages.

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PAYING FOR ENVIRONMENTAL PROTECTION AND ATTITUDE TOWARDS NATURE PROTECTION IN ESTONIA IN INTERNATIONAL COMPARISON

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Numerous studies indicate that individual wealth is positively correlated with the willingness to pay for specific environmental goods. However, these studies do not relate to environmental protection in general, neither is it possible to use the willingness to pay estimates for specific environmental goods in order to make meaningful cross-country comparisons.

The main drivers for public support for environmental protection in Estonia and cross-nationally will be studied, using survey data from an Estonian Survey of Environmental Attitudes with comparisons to data on environmental attitudes of the International Social Survey Program (ISSP). Support is measured as the willingness of individuals to make financial sacrifices or accept cuts to one's standard of living to protect the environment. An important issue of investigation is to find out how the environmental status influences the demand for environmental protection. It is expected that the marginal utility of an increase in environmental protection will be higher in countries having less or lower quality environmental assets. The Environmental Performance Indicator (EPI) is used as an indicator to assess country specific environmental quality. This index is based on empirical data about the environment in about 150 countries and has been developed by first identifying specific environmental targets and then measuring the distance between the target and current national achievement.

This paper will also relate to the stream of research in environmental sociology that explains cross-national differences in terms of a shift from materialist values to post-materialist values, such as free speech, liberty, and environmental protection, values which generally arise only after individuals have met their more basic materialist needs for food, shelter, and safety. In order to further investigate these issues, it is of interest to study whether there are differences between country groups with a special focus on comparing new EU member countries with other country groups available in the dataset of the International Social Survey Program (ISSP).

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CARRYING CAPACITIES OF NATURE PARKS

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Nature parks in Europe are in a period of transition where the protection-function is being supplemented with a clear usability-function: nature parks should attract people and the attraction value of the nature park is more and more expected not only to add substantially to the economy of the park administration but also to the economic development of the region where the park is situated.

These trends also change the way the concept of carrying capacity is devoted to nature parks. Having the protection function in focus, carrying capacity is mainly a question of localizing the protection hotspots of the park, and relates the presence of (often threatened) species to the local environmental conditions that should be sustained by different protective measures.

The upcoming agenda for the parks shunt the focus of carrying capacity towards the capacity for active users of the park, mainly visitors.

The general use of carrying capacity in form of ecological sustainability is in fact nothing new for European park areas. Probably the vast majority of European nature parks have in previous times been marginal parts of agricultural systems where the carrying capacity for grazing animal was known through practice and registered for taxation purposes. This cultural history of European Nature parks should be brought the cultural origin of the parks more into the light, but it would also have value from an ecological point of view, permitting the collection of practice-based information on the historical sustainability of different parts of the park systems.

The integration of knowledge on ecological sustainability and visitor pressure has been a focus point for the American nature park system especially since the World War II, due to the increase in visitors (from 10 million to 300 million per year). This has forced through a reformulation of the concept of carrying capacity based on an integrated approach of resource protection and visitor experience considerations that are relevant also for European nature parks, although the general conditions on parks of European cultural landscapes are often more complicated, concerning population density, land use intensity and ownership relations.

The core of the integrated analysis and management of carrying capacity are 1) the establishment of management objectives/ desired conditions and associated indicators and standards, 2) the systematic and continuing monitoring of indicator variables, and 3) the application of management practises to ensure that standards are maintained.

This methodology is being tested on the analysis and management of hotspots in 8 nature parks of the Baltic region, all going through an implementation of the Europarc charter for sustainable tourism, as a part of a Baltic Sea Region Program, Parks &Benefits, part-financed by the European Regional Development Fund.

INVERTEBRATE DIVERSITY RESEARCH AND CONSERVATION IN ESTONIA: OUR OVERLOOKED MAJORITY

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Environmental Board

Relative to the vast taxonomic and ecological diversity of invertebrate animals, their conservation biology has been long time neglected in Estonia. The typical reflection for invertebrates is that they are small but abundant creatures that cannot be exterminated. Although invertebrates make up over 50% of the identified biota in country (but 80% of known species globally), their diversity research, authorized conservation and national Red List assessment is generally ignored when compared with the funding and publicity provided to the widely established vertebrate animal and vascular plant factions. Only some charismatic invertebrate taxa can be distinguished in nature conservation.

Several potential factors can be stressed to threat invertebrate diversity knowledge and conservation. Taxonomic bias in academic research and funding is extensive. It has been recognised that taxonomic predominance within biodiversity research is widespread and skewed towards vascular plants and birds, extending to the detriment of invertebrates during the last

decades. There exists an historic bias in nature conservation traditions in Estonia, supporting natural monuments (ancient trees, erratic boulders etc) and flagship species (several birds, mammals and plants). Public support and acceptance for more fascinating objects is comprehensible. However, it is hard to imagine how we can sustain all the biodiversity continuing our taxonomic impediment. Thirdly, critically insufficient natural history formal training in general and in invertebrate taxonomy particularly severely influence nature conservation targets achievement. Without people able to identify living specimens *in situ*, it is unfeasible to make proper inventories or decisions for conservation purposes. Estonia has a reliable number of amateur naturalists, some of whom are the acknowledged taxonomic experts also on certain invertebrate groups, but such a situation is inadequate. Amateurs follow their own interests, and they do not necessarily train successors. The shortage of professional taxonomists and taxonomic incapacity of conservation practitioners is causing fatal developments in nature conservation.

Resolving these issues is going to be a challenge for different institutions and will require certain collaboration between environmental administrators, conservation biologists and academic taxonomists. Following steps will need to be accomplished before general progress in nature conservation can be made:

- Invertebrates should be integrated into mainstream biodiversity and conservation biology research, practice and legislation;

- A strong improvement of taxonomic training and expertise with shared standards is essential to support conservation activities at all levels;

- Great need for empirical data on diversity, ecology, distribution in most taxa of invertebrates.

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THE DENDROFLORA OF ESTONIAN NATURE PROTECTED PARKS

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Introduction

The majority of nature protected parks of Estonia are manor parks. According to the data of the Ministry of the Environment there are ca 450 manor parks out of the total number of 548 nature protected parks. Approximately half of the nature protected manor parks are also on the list of monuments of national heritage. In other words, the most part of Estonian parks are historical, more than 150 years old. The interest towards dendroflora has been consistent which is proved by frequent dendrological inventories. The most extensive of inventories was carried out by Aino Aaspõllu at the end of 1970s and at the beginning of 1980s.
The purpose of current paper is to examine how large proportion of the tree species currently growing in manor parks is original.

Method

In the current paper, the authors analysed the proportion of distinct tree species on the basis of the inventory of 15 nature protected manor parks. The inventory results are compared to the sale lists of 19th century arboretums. Previous research in the field is taken into account, as well as the list of indigenous tree and bush species and the list of unwanted species in the so-called "black book" of species.

Results and discussion

The major part of the tree species growing in the historical parks are indigenous or planted in the 2nd half of the 19th century. The data about plantation of introduced new species in the 19th century is partially available. The inventories show that the diversity of species has declined in the 20th century due to the disappearance of some introduced new species. The results of the research demonstrate that the majority of the tree species growing in the historical parks today were in use originally. The proportion of indigenous species is more than 2/3. Some of the introduced species are on the list of unwanted species in Estonia but considering their location in the park space we may well assume that prevailing part of them have been planted in original set or have been planted later as substitutes.

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HOW ARE ESTONIAN WOODLAND KEY HABITATS MANAGED - WHAT HAS REMAINED AND HOW ARE THEY PROTECTED?

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Introduction

The concept of woodland key habitat (WKH) was established in Scandinavia in 1990s and was accepted also in Estonia. The main inventory of *WKHs* was conducted between 1999 and 2002. After 2002, the registration of WKHs continued through the forest management planning process. In state forests, the protection of WKHs is based on the directive of the Ministry of Environment and on the international forest stewardship (FSC) standard. The maintenance of WKHs in private forests is voluntary and owners have the possibility to sign a contract with the Estonian state to get compensation for the loss of income. Our goals with this study are: 1) to analyse the role of WKHs in the establishment of the Estonian protected area network; 2) to estimate the effectiveness of international certification schemes in preserving forests with high conservation value; 3) to estimate effectiveness of voluntary protection scheme in private forests.

Methods

The information on WKHs, protected areas and land ownership was provided by the Estonian Environmental Register and Estonian Land Board in Mapinfo format. We analysed the number and area of WKHs within nature conservation areas with different protection regimes and in commercial forests with different ownerships. We registered cuttings in WKHs. To define forest cuttings we visually analysed ortophotos. We used publicly available ortophotos through public WMS service offered by the Estonian Land Board. The ortophotos were made between 2005 and 2009.

Results

In 2010 the number of WKHs in the State Environmental Register was 8558 (22894.5 ha), average area of WKHs was 2.7 ha. The number of WKHs in strict protection zones was 1476 (6297 ha) and 1742 (4959.4 ha) WKHs were situated in zones of protected areas with more loose management regulations. 5340 (11637.2 ha) WKHs were registered in commercial forests. In state commercial forests the number of registered WKHs on different cadastre units was 4276 and in private forests 5469 cadastre units had registered WKHs. In private forests voluntary protection contracts cover 621 ha of WKHs. In State owned commercial forests more than hundred registered WKHs with an area over 300 ha and in private forests more than 200 WKHs with an area over 1000 ha have been at least partly cut after the main inventory.

Discussion & conclusions

The presented figures are underestimating the actual state as three-fourths of the ortophotos were older than 1 year. Based on this data we will discuss if voluntary protection scheme is considerable alternative to conventional nature conservation methods. WKHs have played a significant role in the development of the Estonian protected area network. WKHs and places with high WKHs concentration have been often used to designate new protected areas or to expand existing ones.

The maintenance of valuable forest habitats outside the protected areas through voluntary protection schemes has not been as successful as it was hoped at the end of 20th century. The protection of WKHs in commercial private forests has remained one of the main challenges in Estonia. But also improving the management practices in certified forests is hard task for managers and other interest groups.

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HOW ARE HABITAT AND LANDSCAPE FACTORS INFLUENCING THE DIVERSITY AND ABUNDANCE OF BUMBLEBEES?

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The primary aims of our study were to determine species diversity and abundance of bumblebees in semi-natural grasslands across north-east Estonia, and to evaluate the influence of habitat and landscape factors in the diversity and abundance of bumblebees. The field work was done during the summers of 2008 and 2009 in 22 meadows located in a region called Ida-Virumaa.

At patch scale, we considered variables that described the vegetation in the study areas (i.e. number of species of flowering plants, percent cover of flowering plants and average grass height), and six different indices that were calculated using Fragstats Version 3.3: Area, Perimeter, Shape Index, Perimeter Area Ratio, Fractal Dimension Index and Edge Density. In addition, we considered different variables to describe the composition and configuration of the landscape. In order to analyse the landscape composition, the proportion of different land cover types in the surrounding area of each study site was calculated using ArcGIS 9.3. On the other hand, the configuration of the landscape was analysed throughout eight different indices that were calculated in Fragstats Version 3.3. All landscape variables were estimated at four different scales: 250, 500, 1000 and 2000 meters radius.

In total, we found 24 species of bumblebees, including 5 species of cuckoo bumblebees. The total species found represent approximately 92% of the total species of bumblebees known in Estonia.

In general, we found that there is a strong correlation between the species richness of bumblebees and the number of species of flowering plants. On the other hand, patch area and perimeter do not seem to have an influence on the number of species and individuals of bumblebees in our study sites. At landscape scale, Mean Patch Area of forests appears to have a negative correlation with the number of species of bumblebees at different spatial extents.

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DISTRIBUTION AND HABITAT ECOLOGY OF THE THREATENED FOREST LICHEN *LOBARIA PULMONARIA* IN ESTONIA

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Introduction

Lobaria pulmonaria (L.) Hoffm. is a conspicuous and widely known epiphytic lichen of the northern hemisphere. Due to intensified forest management practices and air pollution populations of *L. pulmonaria* have been heavily fragmented and have declined considerably in Europe (Wolseley & James 2000). *L. pulmonaria* is a widely used as an indicator species of undisturbed old-growth forests ecosystems, but the knowledge about its habitat ecology is still highly fragmented (Jüriado & Liira 2009, Scheidegger & Werth 2009).

Methods

We used data set of 426 records to give an overview of the distribution and stand-scale habitat ecology of *L. pulmonaria* in Estonia. The factors affecting the presence and coverage of *L. pulmonaria* within the stand were estimated in traditionally managed but now abandoned wooded meadows of Estonia.

Results

The number of *L. pulmonaria* localities is the highest in the densely forested regions in north-eastern and south-western Estonia, concentrated mainly in small forest patches defined as 'ecologically highly valuable'. The species grows mostly on deciduous trees, particularly on aspen (*Populus tremula*). *L. pulmonaria* is most common in oligo-mesotrophic boreal, eutrophic boreo-nemoral and in eutrophic paludifying forests, and prefers forests with an average age of trees more than 100 years. In overgrown wooded meadows the probability of presence of *L. pulmonaria* is significantly correlated with the height of the shrubs of one meter radius around the trunk. Moreover, this probability and coverage of *L. pulmonaria* increase with a coverage of bryophytes. The probability of the presence of *L. pulmonaria* decreases with the distance from the nearest colonized trees.

Discussion

In spite of the many localities of *L. pulmonaria* in Estonia, the species is still threatened because (1) the rotation period of tree stands is short, (2) it is abundant in forest types which are rare or under strong economic pressure, (3) and it prefers host trees which have a restricted distribution in Estonia or are not favoured in forest management practice.

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COLLECTION AND CONSERVATION OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN ESTONIA

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Introduction

Plant genetic resources for food and agriculture mean any genetic material of plant origin of actual or potential value for food and agriculture. They include commercial plant varieties (both currently available and those developed in the past) as well as traditional local plant varieties, landraces, wild material and breeding lines. Preservation of plant genetic resources is an essential tool for securing them for further utilisation in the future.

Systematic approach towards the *ex situ* preservation of plant genetic resources for food and agriculture in Estonia was undertaken in the frame of collaborative Nordic-Baltic project in 1994-1999. This conceptual model was initiated by the Nordic Gene Bank. The Nordic-Baltic initiatives created prerequisites for establishment of a well-structured national network of collections of seeds, fruit trees and berries, expansion of *in vitro* preservation and active involvement of botanical gardens into preservation of plant genetic resources in Estonia.

Methods

Preservation activities in Estonia are defined in a National Programme „Collection and Conservation of Plant Genetic Resources for Food and Agriculture 2007-2013“. Overall coordination of the programme is co-ordinated by the Ministry

of Agriculture of Estonia.
Main objectives of the programme are:

- Collection, conservation and sustainable use of plant genetic resources of Estonian origin.
- Characterization, evaluation and documentation of accessions.
- Regional and international cooperation.

The following institutions are involved to the preservation of plant genetic resources for food and agriculture:

- Genebank of Jõgeva Plant Breeding Institute - Long-term seed preservation of cereals, vegetables, forage grasses and legumes.
- Department of Plant Biotechnology EVIKA of Estonian Research Institute of Agriculture - *In vitro* preservation of agricultural and horticultural crops.
- Polli Horticultural Research Centre of Estonian University of Life Sciences - Preservation of fruit trees and berry plants.
- The Botanical Garden of the University of Tartu - Preservation of medicinal and aromatic plant species and ornamentals in *ex situ* field collection. Coordination of activities of private collectors and breeders.
- Institute of Gene Technology of Tallinn University of Technology - Monosomic aneuploid analysis and molecular-genetic techniques in characterization of preserved disease resistant wheat genotypes

Results and discussion
Information on plant genetic resources is maintained in common on-line database SESTO, which is supported by the Nordic Genetic Resource Centre. Participation in the Nordic-Baltic cooperation ensures preservation and utilisation of plant genetic resources on the regional level. Purposeful and beneficial cooperation has been with the Latvian and Lithuanian genebanks. The most important activities for Estonia on the international level have been designated by participation in the European Cooperative Programme for Plant Genetic Resources sand implementation of An European Genebank Integrated System.

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EUROPEAN BIODIVERSITY OBSERVATION NETWORK: A PROJECT TO DESIGN AND TEST A BIODIVERSITY OBSERVING SYSTEM, INTEGRATED IN TIME AND SPACE

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The objective of the EU FP7 project EBONE project is to develop and implement a terrestrial biodiversity observation network that is spatially and topically prioritized and a structure for an institutional framework allowing European and world wide terrestrial monitoring and projections on trends based on reliable data and indicators.

This objective has been elaborated in seven steps:

1. Design a biodiversity observation hierarchy based predominantly on existing capability.
2. Develop techniques for up-scaling between site, networks of sites, habitats and remotely sensed data for detecting and interpreting changes in key indicators and ecosystems.
3. Validate the observation hierarchy by testing the system with field and earth observation (EO) data.
4. Recommend refinements to the observation system.
5. Make recommendations for the implementation of the system in Europe.
6. Propose how data can be integrated in existing structures and data management systems.
7. Develop and test the world wide compatibility of the system in Mediterranean regions outside Europe

ESTONIAN GREEN BELT – PEARL IN THE EUROPEAN GREEN BELT

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For decades, many coastal strips along the former socialist countries were completely or partly closed to public access. Not

only did these strips demark national borders, but even constituted a barrier separating two systems. This former separating line formed the basis for the European Green Belt.
Similar to the terrestrial border strips, these areas preserved vast, almost pristine stretches of coastland. Some of them were successfully designated as nature reserves or national parks after the collapse of the Soviet Union. However, many pearls of nature up to now grace the water line both above and below the water surface largely undiscovered, unrecognised and unprotected.
Many of these treasures of nature are presented in Estonia which agreed in 2006 to include their coastal areas in the North European section of the European Green Belt project. Although a lot of important preparatory work was done witin the European Green Belt project, the real work began in 2009 when the subproject Baltic Green Belt, targeted directly to the Baltic States, was started.

Historically, before World War II, Estonia's coastline was neither heavily populated nor a recreational area for the wealthy elite. The main economic activity along Estonia's lengthy coastline occurred at trading ports (Tallinn, Narva and Pärnu) and the local fishing industry. The Soviet occupation of Estonia in 1944 put an abrupt end to the free access to the sea. Estonia's entire coastline, mainland and islands became de-populated exclusion security zones. Over the next 47 years, Estonia's coastal areas experienced three forms of activity: fishing kolkhoz, mineral extraction and the presence of the Soviet Red Army and Air Force. In 1992 the legacy of these activities was represented a paradoxical combination of natural areas with a well-preserved and intact biodiversity as well as vast areas of land contaminated by toxic waste, industrial and military, and derelict buildings. Estonia's coastal areas have a rich biodiversity in a variety of landscapes, areas of natural beauty, semi-natural habitats and wetlands, which, lying on the East Atlantic Flyway, are hugely important to some 3 million migratory birds on an annual basis (Vollmer *et al.,* 2010).

Despite state-sponsored environmental protection policies and the establishment of numerous nature and landscape reserves during the 1990s, societal and economic developments are beginning to put the coastal areas under severe pressure. In order to avoid inauspicious developments, the coastline must be protected now for the future. It is important not to turn coastal areas into restricted zones again - management has to go hand in hand with nature protection and human activities. To designate the areas according to their value, an inventory must carried out to find the most interesting objects and sights in Estonian coast. The Baltic Green Belt project gives a great opportunity to find out more about the coast, to develop methods for protecting it and to establish a network of stakeholders.

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REGIONAL EXCHANGES AND POLICY MAKING FOR PROTECTING AND VALORISING BIODIVERSITY IN EUROPE (REVERSE)

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Ecosystems have gradually been converted through the expansion of human activities and the introduction/invasion of new species. As a result, species and genetic diversity have declined.
Regional and local authorities can organise land planning and regulate human activities in order to preserve biodiversity (natural area protection, greens corridors, conservation and valorisation of species and varieties,...). REVERSE aims to improve, by means of interregional cooperation, the effectiveness of regional development policies in the area of biodiversity conservation and valorisation, in order to REVERSE biodiversity loss on their territories. Partners will exchange experiences and knowledge on biodiversity conservation and valorisation measures. Less experienced regions will be invited to match more experienced ones on a win-to-win basis. Project's activities will focus on identifying the best good practices in each partner's territory, which will then be presented during site visits and interregional seminars, in the field of land planning and

natural heritage conservation measures, of uses of biodiversity for adapting to climate change, and of sustainable management of biodiversity. Identified good practices will be made available for transfer to other regional and local authorities through a good practice guide, presenting appropriate themes, territories, partners, indicators for biodiversity conservation across Europe.

A NEW WAY OF CONSERVATION THINKING — FOREST BIODIVERSITY PROGRAMME METSO IN FINLAND

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Introduction

The Forest Biodiversity Programme METSO 2008–2016 aims to halt the ongoing decline in the biodiversity of forest habitats and species, and establish stable favourable trends in Southern Finland's forest ecosystems (Finnish Government 2008). The METSO programme is targeted at both private- and state-owned lands. METSO is directed at bringing about a radical shift away from the top-down governing approach of nature conservation to voluntary conservation agreements between the authorities and forest owners. See METSO pilot http://www.metsonpolku.fi/metso/www/en/index.php

This poster describes how the METSO programme has achieved its aims in terms of
(8) improving Finland's network of protected areas
(9) increasing collaboration between forest and environmental organizations
(10) providing advice to forest owners

Methods

In February 2010, we conducted a web survey of those implementing the METSO programme, especially on the local or regional level. The questionnaire was sent to 140 people participating in METSO, and 68 answered it. The respondents were 45 years old on average, and 31% of them were women. In the survey, we explored how the METSO participants perceived the implementation practices of METSO and what kind of impacts they felt the programme had.

Results and discussion

The site selection criteria define the type of ecologically valuable habitats to be protected under the programme, in other words they form "an ecological shopping list". The criteria are based on the ecological structure of forests and on forest habitat types important for biodiversity. Sites are especially favoured where habitats are well preserved in their natural state or could easily be restored, where they host rare or endangered species, and where they are close to protected areas. On a smaller scale, the programme focuses on measures to conserve forests that are rich in biodiversity because they contain features such as decaying wood, burnt or charred wood, and large aspen trees.

Additionally, METSO contributes to the management and restoration of state-owned lands. Metsähallitus (a state-run enterprise that manages the state-owned forests) has restored about 28 300 hectares of state-owned lands. Metsähallitus has also protected 104 new sites on state-owned lands that cover 13 500 hectares, of which about 10 000 hectares are forests that fulfil the selection criteria defined for the programme (Lehtomäki et al. 2009).

Conservation under the METSO programme is based on forest owners' voluntary initiatives. Since METSO began, the nature conservation and forestry authorities are cooperating more intensively than before. They compare forest owners' tenders, choose suitable sites and negotiate conservation agreements. Forest owners have appreciated this voluntary approach launched by METSO (Paloniemi & Varho 2009).

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ECOSYSTEM APPROACH IN MANAGEMENT: *LIFE-BALTCOAST* PROJECT - REHABILITATION OF THE BALTIC COASTAL LAGOON HABITAT COMPLEX

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According to the Natura 2000 habitats directive, the coastal lagoon is a priority habitat type, which is characteristic of the coastal areas of Baltic Sea. Together with a number of natural and semi-natural surrounding habitats, it forms an extremely varied habitat complex with high biodiversity value. During the last decades, the whole coastal lagoon habitat complex has undergone considerable degradation both of quantity and of quality, losing its ecological character. Although the threats to coastal habitat complexes have been different in different countries: drainage, damming, fertilization, eutrofication, mismanagement, overgrowing etc, the result has still been the same – loss of biodiversity. Even if there are some remaining habitats still in good shape in Natura 2000 sites, the ecological network between the habitat complexes is impaired. Though large areas have been taken under management in the recent years due to the help of different agri-environmental schemes paid to the managers, such improvement in quantity hasn't always restored once lost biodiversity. The reason for this is that the management requirements only take into account the habitat type demands, but often look pass the needs of the ecosystem.

Despite several conservation efforts carried out in many countries around Baltic Sea, the conservation status of the coastal lagoon habitat complex is still not favourable and the species characteristic of this habitat complex are in decline. Therefore, an international LIFE-Nature Baltcoast project was launched to contribute significantly to a favourable conservation status of the coastal lagoon habitat complexes, seeing the coastal areas rather a system than a combination of separate habitat types. A number of species, belonging to the coastal lagoon habitat complex, such as wading birds: *Calidris alpine schinzii*, *Philomachus pugnax*, and *Recurvirostra avocetta* (Annex 1 of the Bird Ddirective); the amphibians: *Bufo viridis* and *Bufo calamita* (Annex 4 of the habitat directive), and *Apium repens* (annex 2 of the Habitats Directive), are threatened and/or declining.

The core aim of this project is to ensure the favourable conservation status of selected coastal lagoons and surrounding habitats in Denmark, Germany, Estonia and Lithuania. Swedish project sites will be reference areas for good management. Altogether 34 project areas have been selected, all located in Natura 2000 sites, comprising almost 20,000 ha and stretching over five countries bordering on the Baltic Sea. 35 partners from Germany, Denmark, Sweden, Estonia and Lithuania are involved in the project. During the project period 2005-2011, different activities have been implemented to improve the conservation status of selected project sites. In addition to this, the best management guideline for rehabilitation of coastal lagoon habitat complex for Baltic Sea region will be complied. To prevent extinction of *Calidris alpina schinzii* and *Philomachus pugnax* in Baltic Sea coast of Denmark and in Estonia as well as in whole Baltic Sea region, an international network among wader birds' experts has been created to combine their knowledge and experience.

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http://www.life-baltcoast.eu

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CLIMATE AND BIODIVERSITY IN THE EARTH HISTORY: KEY EVENTS AND NEW FINDINGS

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Traces of interactions of climate and life in the geological record continue to offer surprises that may indicate causative links. Conventionally, early Earth has been considered to be a warm place due to high content of the greenhouse gases in the atmosphere, with CO_2 content about 70 times the current level. However, a study by Rosing et al. (2010) argues that the ancient CO_2 content was no more than 3-4 times higher than today based on the thermodynamic modelling of Fe-minarals found in old sediments and atmospheric constraints. In spite the lower amount of the solar energy reaching the Earth during the early history because the Sun was about 25-30% less luminous, the smaller area of continents and clearer skies due to absence of biogenic cloud condensation nuclei resulting in lower planetary albedo prevented the Earth to turn into a snowball before the first global glaciation near the end of the Archean, about 2.9 billion years (Ga) ago. An earlier study (Rosing & Frei, 2004) had suggested that the oxygen-producing, photosynthesizing microorganisms may have evolved already 3.8 Ga ago.

According to the Snowball Earth hypothesis, during one to three times, the Earth was completely or almost completely covered by a global ice sheet during the Cryogenian period in late Proterozoic, about 850-650 million years ago (Ma). During the following Ediacaran period, 650-542 Ma, the Earth melted, and became a cradle of multicellular life. According to new interpretations, most Ediacaran organisms belong to a stem-group of Metazoa that had part of the regulatory genes generating body plans somewhat similar to some Cambrian Metazoa (Erwin, 2009).
Since 542 Ma, the most relevant episodes that shaped the biotas on the Earth were the Cambrian and Ordovician diversifications, and the Ordovician diversification, and the conquest of land from the Ordovician to the Devonian. The diversification of life was interrupted by several mass extinction events (Bambach, 2006), of which the largest ones occurred in the end of the Ordovician (440-450 Ma), Late Devonian (360-375 Ma), end of the Permian (251 Ma), end of the Triassic (205 Ma) and end of the Cretaceous (65 Ma). It has been suggested that global cooling caused or contributed to the end-Ordovician, late Devonian anf Permian-Triassic extinctions, and, possibly, some others. All these extinction events have been followed by the episodes of biotic recovery usually lasting about 10-15 millions of years. These interactions between climate and living systems, with certain dramatic episodes, have been relevant for shaping the diversity of life in the Earth history, including the life as we know it today.

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THE GREEN NETWORK OF ESTONIA

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At the third Environment for Europe conference of Environment Ministers in Sofia on 25 October 1995, the Pan-European biological and landscape diversity strategy was approved. The long-term goal of the strategy was to protect biological and landscape diversity throughout Europe in the 20 years following the adoption of the strategy. The strategy stipulated the development of the Pan-European ecological network for the protection of ecosystems, habitats, species and their genetic diversity and landscapes of European importance (EEIC, 2008).
Estonia also takes part in this process. By Order 763-k of the Government of the Republic, issued in 1999 and entitled "Initiation of thematic plans for county plans," the plan "Environmental conditions for guiding settlement and land use" was initiated in all of Estonian counties. Two important subtopics of this plan are "Green network" and "Valuable landscapes."

The county thematic plan is the basic material for compiling local governments' general plans. Section 8 of the Estonian Planning Act points out that one of the specific objectives of the general plan is to establish the conditions to ensure the functioning of the Green Network. Recommended methodology was elaborated for counties to implement on compiling the thematic plan (Sepp and Jagomägi, 2002). The Green Network in Estonia is supposed to complement the network of protected areas, combining them with natural areas into unified system.

To study the consistence of different land use classes within the Green Network, comparisons were made with Estonian Base Map (1:50 000) and Estonian Basic Map (1:10 000). Comparisons with different protected areas layers were carried out to find how big the share of protected areas involved into Green Network actually is.

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SHIFTING APPROACHES IN LANDSCAPE PROTECTION: THE IMPLICATION OF NATURA 2000 NETWORK AND THE EUROPEAN LANDSCAPE CONVENTION FOR LANDSCAPE PLANNING IN ESTONIA

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The European Landscape Convention (ELC) seeks to further strengthen the protection, management and planning of Europe's landscapes. The implementation of pan-European Natura 2000 network intends preserving not just species, but also habitats and the whole environment. The planning and implementation of management activities for both could be done simultaneously, targeting objectives of landscape as well habitat protection.

Model landscapes in Vooremaa, Karula national parks and Agusalu nature reserve etc were assessed by merits of implementation of ELC and Natura 2000. Test areas represent different landscape types, habitats and local circumstances. Mapping exercise seeking overlapping and frictions between target layers was based on Natura 2000 layers, nature reserve data, basic map, soil map, landscape units, green network layers and general plans.

As a rule, the borders of nature reserve follow landscape features, in particular in case of linear objects. In some cases, the lineation interrupts landscape units despite similar habitats. The fuzzy borders exist in case of non-linear reserve objects. Also, confronting lineation of landscape and habitat protection areas appears compared to green network and general plans. Environmental Impact Assessment and Strategic Environmental Assessment are key mechanisms which require the incorporation of clear landscape and habitat objectives.
Complex processes in landscapes are not yet systematically linked to habitats due to different spatial, operational and methodological bases. Approaches of landscape management need to be covered by management plans of protection areas in a more comprehensive way. Also, spatial scale and typologies of landscapes and habitats should be harmonized for setting the highest standards in landscape planning and management.

ESTONIAN SOILS MACRO- AND MICRONUTRIENT CONTENT DEPENDENCE FROM THE LOCAL BEDROCK AND TRANSPORTED BY ICE FENNOSCANDIAN MATERIAL

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Introduction

Soil reflects the chemical composition of the parent rock element contents, changes are caused by migration of elements, agricultural soil use and anthropogenic pollution. Soil is an essential part of the environment as the medium for plant growth.

Estonia is located in the southern shore of the Gulf of Finland and everywhere in Estonia the crystalline Precambrian basement, composed by metamorphic and felsic to ultramafic intrusive rock, is covered by Ediacaran and Paleozoic rocks. The sedimentary cover forms parallel layers, which together with basement are inclined to the south at 3m per 1km. The thickness of sedimentary rocks grows from 125m in the north to 600m in the south. The bedrocks are cropping as west-east belts, where older layers are southward covered by younger and younger rocks.
For plant normal growth and development are needed 6 nonmetallic elements (C, O, H, N, P, S), 4 metals (K, Mg, Ca, Na) and Cl as macronutrients to form the living cells. Another more than 20 essential micronutrients (As, Al, B, Br, Cd, Co, Cr; Cu, F, Fe, I, Mn, Mo, Ni, Pb, Se, Si, Sn, Sr, V, Zn etc) are needed for regulation of living processes (Thornton 1983; Nies 2004 etc),

The bedrock geochemistry

Bedrocks in the northern and central Estonia are represented by marl, lime- and dolostone. Limestone contents (w%): CaO–45.7-52.7, SiO_2–1.2-10.1, Al_2O_3–0.4-2.12, MgO–0.8-1.25, K_2O–0.2-0.7, Na_2O–0.03-0.08; microelements (mg/kg): As–0.8-4.8, B–9-21, Ba–14-211, Cd-<1-8.1, Co-<0.03-5.2, Cr–1.5-62, Cu–3-17, F-<100, Fe total–0.45-1.1, MnO–120-460, Mo–0.08, Ni–4-13, Pb–4-127, Sn-<1-1, V–9-12, Zn–4-32, U–0.3-2.6. Marl contents 15-25% of clay parts, in dolostone CaO is partly changed to MgO (14-21%). Cambrian blue clay and Lower Ordovician kerogenic argillite are richer by bioelements (argillite in brackets): SiO_2–59.24 (52.14), TiO_2–0.88 (0.76), Al_2O_3–7.38 (13.15), Fe_2O_3–4.29 (0.85). FeO–2.60 (3.02), MgO–2.58 (1.11), CaO–0.84 (0.22), Na_2O–0.13 (0.10), K_2O–5.84 (7.95), P_2O_5–0.31 (0.13), S–0.13 (2.19), Cl–0.05 (0.02), microelements (mg/kg): As–1.3 (37), B–150 (53), Ba–420 (379), Cd-<1 (<1), Co–20 (12), Cr–78 (80), Cu–25 (105), Mn–320 (158), Mo-<2 (56), Ni–40 (98), Pb–11 (77), Rb–176 (118), Se–<2 (2.3), Sn–3.9 (3.2), Sr–91 (53), Th–10.3 (11.7), U–2.9 (39), V– 109 (507), Zn–76 (47) (Kiipli et al. 2000). The south of Estonia is covered by Middle Devonian sandstone, which is composed from quartz, its composition (%): SiO_2–95.1, Al_2O_3–1.81, Fe_2O_3–0.11, FeO–1.33, K_2O–1.0.
Some microelements exceed 10mg/kg: B (23), Ba(147), Cu(10), Mn (98), V (11) (Kiipli et al,2000).

The sources of the macro- and micronutrients

The geochemical atlas on the humus horizon covers the whole territory and consists of 37 maps, 30 of which show single-element concentrations (Petersell et al. 1997). Comparing the atlas with geological map is easy to define the source of element, is it local or transported from the Fennoscandian Shield. Widely developed in the northern and central Estonia carbonate rocks are enriched here soils with Ca and Mg, partly they are transported by ice into soil parent material on the Sakala ana Otepää heights.
Along the North Estonian Cliff is clearly seen ~ 15km wide zone influenced by kerogenic argillite with high content of Mo, U, P, F, As and V. In Estonia concentration of Mo, Mn, Cr, Cu, P, Sr, Zn is up to 3 times lower than average for continental soils, concentration of B, Hg, Pb, F higher 2 or more times. The low concentration in Estonian soils is due to the low values in the local bedrock and in the material from the Fennoscandian Shield. The concentrations of K, Na, Ni, Mo, Zn, V, B, Ba, Cd, Co, Cr, Cu, Th, U and some other in soils are influenced by crushed rock material from the shield area.

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AN EXPERIMENTAL USE OF SLASH-AND-BURN CULTIVATION IN KARULA NATIONAL PARK, ESTONIA

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Slash-and-burn, also known as swidden cultivation means a clearing of forest for agriculture by cutting and burning the

vegetation. Plots are cultivated for a few seasons and then abandoned as fertility declines. Such plots become used as pastures, later forest recovers. Swidden cultivation has played an important role in land use for about 4000 years in Estonia. It survived the longest, up to early 20th century, in Eastern and South-Eastern Estonia. As all traditional cultivation systems, slash-and-burn has also shaped the modern landscapes but the impacts are still unexamined.

Karula National Park has been chosen as the slash-and-burn experiment site. In this region of extensive forests and the traditional settlement pattern of single farms swidden cultivation has historically been an important land-use strategy. To study the impacts of slash-and-burn cultivation the interdisciplinary approach is essential.The experimental sites will serve as base for long-term research as some developments relevant from the viewpoint of historic land-use as well as that of environmental effects occur on the site 10-20 years after the end of cultivation.

The project objective is to study:

- the impact of burning practices and slash-and-burn cultivation methods on soil and vegetation;
- the dynamics of crop yields during the years;
- vegetation regeneration after cultivation, that enables to draw conclusions about the impact of slash-and-burn cultivation on formation of plant communities;
- how slash-and-burn cultivation and the subsequent changes of vegetation show in pollen spectra;
- atmospheric transportation capacity of microscopic charcoal particles, used in palaeoecological reconstructions;
- the specific structure of soil and burning remnants, that will serve as comparative material for archaeological interpreting of ancient swidden fields;
- the technology, tools and amount of workforce in traditional swidden cultivation.

Activities and analyses in the experimental fields

The experimental plots have been burned and seeded with rye in traditional way in 2006, 2007 and 2009. Archaeological inspection has been carried out on the chosen sites. Soil analyses and vegetation mapping have been completed in the fields I and II prior burning to get background material for the forthcoming studies. The effect of burning was analysed using the soil samples: the first taken immediately after burning and the second two months later and the soil temperature was measured during the burning process. To study atmospheric transportation of microscopic charcoal particles during burning and ploughing glycerol jelly covered glass plates were used.

THE ACTIVITIES TO PRESERVE BUMBLEBEE COMMUNITIES IN ESTONIAN AGRICULTURAL LANDSCAPES

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Introduction

Bumblebees are important natural pollinators whose number is declining and one of the reasons is claimed to be changes in land use and agricultural production (Goulson et al., 2005). A possible way to mitigate such impacts and preserve bumblebees is agri-environment scheme (AES) which in Estonia has been implemented since 2004 in the frame of Estonian rural development plan (RDP). The independent evaluator for the RDP 2004-2006 AES and for Axis II measures of Estonian RDP 2007-2013 is Agricultural Research Centre (more information about evaluation: http://pmk.agri.ee/pkt). In the frame of AES evaluation data about bumblebees are collected and here the main results are presented.

Methods

The data were collected in 2006-2008 in three regions: West, Central and South Estonia, 22 monitoring farms in each. In addition to farms where the AES was implemented (organic farming and farms with environmentally friendly production) a reference group was selected from the producers who were receiving single area payment scheme payments and were not applying for AES payments. Bumblebees were counted every year three times from June to August by using transect method (400 m of transect covered field margins and 100 m arable fields with entomophilous cultures; transect was 2 m wide). In addition, data about the use of pesticides was gathered (by interviewing the farmers or from field record books). In 2007 the average field size was also calculated for the area of 500 m around transects by using the database of Estonian Agricultural Registers and Information Board.

Results and discussion

The results showed that the diversity of bumblebees (Shannon diversity index) in organic and environmentally friendly production farms was higher than in farms without AES. Meanwhile the use of pesticides had an impact on the number of bumblebees which was significantly higher in the case no pesticides were used. So, it seems pesticides affect bumblebees directly through repellency or lower food resource. At the same time production type rather affects bumblebee diversity which shows the uniformity of a community and is probably a result of more long-lasting processes. This is also confirmed by the fact that production type had an effect on bumblebee diversity above all in Central Estonia which has more intensive agriculture than in two other monitoring regions. In 2007 the relations between bumblebees (the number of individuals and species) and average field size was analyzed and a significant negative correlation was found. In addition, all bumblebee indices (the number of bumblebees and their species, Shannon diversity index) were positively correlated to the number of flowers. So, on the base of these results to mitigate the negative impacts from agriculture on bumblebees more environmentally friendly production types should be favoured, less pesticides used, large uniform fields avoided and enough food resource provided.

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EXPERIENCE OF ERADICTION OF INVASIVE *HERACLEUM* SPECIES IN ESTONIA

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Heracleum sosnowskyi and *H.mantegazzianum* are lised in the Estonian „black book" as invasive species which are threathening native species distribution and communities. An eradiction over Estonia started in 2005 and has continued ever since. More then 1300 hectares is covered with *Heracleum* colonies and there are still quite some colonies to map up. Approximately 75% of the colonies are situated on private land.

The best practice used are manual and mechanical extermination with glyfosat based Roundup and manual dig up. After 5 years of eradiction measures approximately 50 hectares of colonies have been destroyed but are still under observation.

The management plan will expire in 2010, the new plan will be ready by the end of 2010. The new plan will try to find the solution to some problems that have appeared: how to eradict the colonies from „tricky" places such as rocky river-sides, closed territories, border areas and eco-farms; how to rise the motivation and quality of private land owners and contractors.

Outmost purpose is to get Estonia free from these two invasive *Heracleum* species but it can still take up to 10 years to achieve this.

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