Biodiversity Research – Safeguarding the Future

Bonn, May 12-16, 2008

Abstracts

Symposium I:

Acceleration of Biodiversity Assessment and Inventorying

Time: 9.10 – 9.30

P.0

Addressing Future Challenges in Biodiversity Science and Policy - A UNESCO Contribution

W. Erdelen[1]

[1] United Nations Educational Scientific and Cultural Organization, Natural Sciences Sector

No Abstract.

Time: 9.30 – 10.15

P.1

A world where Biodiversity counts

M. WALPOLE [1]

[1] UNEP-WCMC

Biodiversity loss is occurring at an unprecedented rate, yet our ability to chart that decline, let alone do anything about it, remains severely under-developed. The task is hampered not only by gaps in taxonomic knowledge, but also by a lack of sufficient attention to monitoring biodiversity change over time and by our inability to show convincingly what difference biodiversity loss will make to society and human wellbeing. A range of global initiatives are attempting to answer policy-relevant questions, often in impractically short time-frames which marginalise the role that science can play. Real progress will demand better integration of science and policy over the longer term, incorporating both immediate, priority research questions and sustained assessment and monitoring initiatives. In a world where biodiversity counts, biodiversity science must count for much more than it currently does.

Time: 10.15 – 10.35

T I.1

Present situation of Brazilian biodiversity studies

C.R. BRANDAO [1]

[1] Museu de Zoologia, Universidade de Sao Paulo

The Brazilian scientific community organized the international conference "Biodiversity – The Megascience in Focus" prior to COP8 in Curitiba, which produced recommendations presented to COP delegations. The aim has been to enhance biodiversity studies, to meet CBD objectives. Our reading of Brazilian official politics is that it is focused on benefit sharing and failed to attend to other components of CBD, but for the recent efforts by Brazilian Federal and state governments. The proposal for a law to regulate collection and transport of organisms, access to molecular information and the protection of traditional knowledge, guarantees the rights of planters, fishermen, and traditional communities, while imposing heavy regulations to basic research. This is based on the false principle that research may negatively affect the environment, and that research may put in risk rights of communities. We seek a positive agenda, with compensation measures and, in case of legal transformation of ecosystems, previous surveys. We believe there is no need to sign contracts in case of research aiming products with commercial potential; the existing regulations to launch new products guarantees benefit sharing. Meanwhile the Brazilian biodiversity is under severe risk. We surveyed what is known and evaluated our capacity to apply names to organisms. We know where and to which groups of organisms concentrate collecting efforts and in which fields focus the formation of new scientists. It is time to act.

Time: 10.35 – 10.55

T I.2

Biodiversity conservation and sustainable development: feasible solutions to real challenges, the case of Mexico

R. Medellin[1]

[1] Institute of Ecology, University of Mexico, UNAM

Megadiversity, OECD, oil exports, poverty, population growth. All these terms and subjects apply to Mexico. This makes the country an interesting case study to follow closely and learn from its mistakes and achievements. Mexico has been ranked number 5 in the world because of its very rich biological diversity. At the same time, it has been a member of the OECD since 1994, ranks fifth in oil production, 40% of its people are below poverty line, and is number 13 in population. Additionally, very recently Mexico stopped being the head of the mouse (among the richest of the poor countries) to be the tail of the lion (the poorest of the rich countries). Challenges and opportunities abound in Mexico. So over the past 10 years, Mexico has initiated a series of policy-driven programs to understand its biodiversity, use it sustainably, and mainstream its benefits. Among them, the Mexican Commission of Biodiversity has put the country at the leading edge in the knowledge of its biodiversity, the Secretary of the Environment has launched innovative programs to benefit land owners from biodiversity conservation initiatives, and environmental NGOs have undergone significant growth and impact in the country. Many shortcomings are still to come, but lessons abound to continue pursuing a brighter future. Despite efforts such as CONABIO's, assessing biological diversity, even from supposedly well-known groups such as mammals, is a critical necessity. Many taxa are only superficially understood. Beyond that, monitoring and assessing ecosystem services, such as declining pollination, is also a top priority. We are still in time to gather data on all aspects of biodiversity so that we are optimally prepared to slow down the extinction pulse, to maximize biodiversity benefits, and to ensure the vital ecosystem services it provides, but we must act now.

Time: 10.55 – 11.15

T I.3

Accelerating global taxonomy - the *Solanum* Planetary Biodiversity Inventory experience

S. Knapp[1], L. Walley[1], L. Bohs[2]

1 Department of Botany, The Natural History Museum

2 Department of Biology, University of Utah, Salt Lake City, UT, USA

The pace of taxonomic research is not keeping up with demand for taxonomic information – creating what is known as the "taxonomic impediment". Many solutions to this problem have been proposed, ranging from the purely technological to largely people-centred. The National Science Foundation of the US government established the Planetary Biodiversity Inventory programme in 2002 with the aim to accelerate taxonomic research with a series of "mission[s] to an (almost) unknown planet". Projects funded by the PBI programme were to be global in scope, focused on the species-level taxonomy of a monophyletic group, undertake new research, and to be presented on-line. Here we will discuss our own PBI project "PBI *Solanum*: a worldwide treatment" in terms of its success in accelerating work on the taxonomy of one of the largest genera of flowering plants and in terms of the use of this sort of model for accelerating taxonomy in general. Speeding up scientific research can cause problems as well as providing solutions. We will particularly explore issues associated with working as large dispersed teams, presenting taxonomic information on-line and with the maintenance of such in-demand information for the long-term.

Time: 11.45 – 12.05

T I.4

Networks by Design: Recommendations for a Global Biodiversity Monitoring Program

M.R. Willig[1]

[1] Center for Environmental Sciences and Engineering & Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, Connecticut 06269-4210

On a global scale, climate change and landuse change are accelerating at a rapid rate, with potentially serious threats to biodiversity as well as to its emergent ecosystem services. Nonetheless, little is known about the mode or tempo of response by the abundance or distribution of organisms, and how such changes will affect patterns of biodiversity at multiple spatial scales. Consequently, a synoptic network of biodiversity monitoring sites is required at the global scale. Sites should be deployed and configured so as to evaluate temporal trends in hierarchical aspects of biodiversity (e.g., alpha, beta, and gamma components), especially in regions of the globe that are predicted to experience heightened change in the next few decades. A number of extant (e.g., US-LTER) and emerging (e.g., NEON) national networks, as well as international networks (e.g., CI-TEAM) provide important insights regarding the nature of a global biodiversity network and its potential to act as an early warning system of the well-being of the earth's biota.

Time: 12.05 – 12.25

T I.5

iBats: Global acoustic monitoring of bat biodiversity

K. Jones [1]

[1] Institute of Zoology, Zoological Society of London

Biodiversity is being lost at an unprecedented rate in human history as the world population continues to grow and use a greater share of global resources. We urgently need to evaluate the effect of human development on our biodiversity and the benefits we obtain from ecosystems (e.g., clean water, flood and disease control, climate stability). However, basic information on how species abundances and distributions change in response to development are lacking for most areas and species. Bats show the potential to be useful biodiversity monitoring indicator species as they are distributed globally, use a wide range of landscapes and play an important role in ecosystem functioning (controlling insect populations, pollination and dispersing seeds) and their population declines reflect changes in climate, water quality and agricultural practices. Here I present an innovative method for monitoring bat biodiversity at national and international scales to generate data on changes in bat species distributions and abundances to evaluate the impact of global change on biodiversity. Specifically, I develop methods for collecting acoustic transects of bat ultrasonic echolocation calls along roads and demonstrate the feasibility of this approach with preliminary results from annual surveys carried out between 2005-2007 in the United Kingdom and Eastern Europe.

Time: 12.25 – 12.45

T I.6

DNA barcoding for biodiversity assessment

P. TABERLET [1]

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DNA barcoding, i.e. taxon identification using a standardized DNA region, has received much attention recently, and is being further developed through an international initiative. The now well-established Consortium for the Barcode of Life (CBOL; http://barcoding.si.edu/), an international initiative supporting the development of DNA barcoding, aims to both promote global standards and coordinate research in DNA barcoding. For animals, the gene region proposed for the standard barcode is a 658 base-pair region of the gene coding for the mitochondrial (mt) cytochrome *c* oxidase 1 (COI). For plants, the target is chloroplast (cp) DNA, but the situation is controversial, due to the relatively low sequence variation of this genome. With more and more DNA sequences allowing species identification accessible in databases and new sequencing technologies dramatically expanding available sequencing power, we anticipate that DNA barcoding techniques will be increasingly used by ecologists for biodiversity assessment. They will be able to not only identify a single species from a specimen or an organism's remains using the standardized approach, but also determine the composition of complex source material. For example, the use of very short DNA fragments that persist in the environment will allow an assessment of local biodiversity from soil or water. In my talk, I will emphasize the perspectives offered by the analysis of environmental samples.

Tme: 14.00 – 14.20

T I.7

Activities on species conservation and DNA barcoding as one of ways on monitoring species in Korea

C-B. KIM[1]

[1] Korea Research Institue of Bioscience and Biotechnology

Biodivesity research in Korea with emphasis on the species conservation has been systematically well organized and documented even though it is far from comprehensive. The major taxonomic works have been published in the Illustrated Encyclopedia of Fauna & Flora of Korea since 1959. As the national repository for the biodiversity, the National Institute of Biological Resources is working for the mission. In spite of continuing efforts, extinction of taxonomic specialists, drastic species loss and introduction of foreign species have been popular following the global tendency. The DNA barcoding has been suggested to cope with the situation, in a complementary manner for the traditional approaches. Since 2006, four barcoding projects supported by government funding sources have been initiated in Korea. The Korean Bioinformation Center develops a database system for Korean barcode data in collaboration with the BOLD. Even though a barcoding center that is devoted to barcoding activities does not exist, an infrastructure for collection, molecular biology laboratory capacity and bioinformatics for the barcode data is well established. Finally, we hope to work and share with other countries to promote barcode activities as a way for safeguarding the future.

Time: 14.20 – 14.40

T I.8

Impacts of Global Climate Change on Tropical Ecosystems: Recent Findings and Debates

W. Laurance[1]

[1] Smithsonian Tropical Research Institute

Global climatic and atmospheric changes could potentially have wide-ranging effects on tropical ecosystems and their biota. Some possible changes are relatively well understood, others are not, and many are subjects of active debate. I will highlight the various kinds of global-scale changes that have been hypothesized or putatively demonstrated for tropical forests. These include deleterious impacts of global warming on cool-adapted biotas at higher elevations, increasing effects of pathogens, and declining primary productivity in lowland forests as a result of higher plant-respiration rates. Another potential category of changes, which might arise from increasing atmospheric CO_2 concentrations, involves increasing forest productivity from CO_2 fertilization, elevated forest dynamics, and nonrandom changes in plant-species composition. A third category of change, around which there is great uncertainly, concerns the effects of global warming on rainfall regimes and storm intensity in the tropics. Any of these changes could potentially interact with, and exacerbate, the effects of rapid forest loss and disruption in the tropics.

Time: 14.40 – 15.00

T I.9

KeyToNature: new tools for teaching and learning biodiversity

P.L. Nimis[1]

[1] Dept. of Biology, University of Trieste

After Gutenberg, information useful for identifying organisms was printed on paper. The constraints of a paper-printed text have forced most authors to organise information according to the hierarchical scheme of biological classification. Classification and identification, however, belong to two different operational processes. Supraspecific taxa often need "difficult" characters, and hence the classical identification tools are intrinsically "difficult". However, several program packages were developed in the last decades, which enable the rapid and esay creation of interactive identification tools which are not necessarily based on systematics. Such tools have a high educational content, since they are much more user-friendly than the traditional paper-printed keys, and can be easily adapted to different educational levels. Their introduction into the educational world will overcome one of the most serious gaps in biodiversity education: the lack of identification tools adapted to user-specified needs. The new tools require the connection of different - presently scattered - databases, including those concerning images, sounds, textual descriptions, thesauri of scientific and common names, etc. - KeyToNature (http://www.keytonature.eu) is a three-year project started in 2007, funded by the EU Commission under the eContentplus programme. The project joins the experience of 14 partners from 11 European countries, including leading centres in biology, pedagogy, education and information technology. It aims at achieving a common approach in teaching biodiversity, mainly focusing on identification, improving the searchability and usability of existing digital contents for the emergence of a European educational service related to teaching and learning biodiversity with novel, advanced, powerful approaches, filling a serious gap. The new technologies raise a series of novel issues and problems, which require solutions. The main objectives of KeyToNature are to: 1) Increase access and simplify use of e-learning tools for identifying biodiversity, 2) Address interoperability among existing databases for the creation of identification tools, 3) Optimise educational efficiency and increase quality of educational contents, 4) Add value to existing identification tools by providing multilingual

access, 5) Suggest best practices against barriers that prevent the use, production, exposure, discovery and acquisition of the digital contents required for designing the identification tools. A selection of primary and secondary schools and university courses in the EU will be involved in testing, using and accessing the educational products of KeyToNature. International data standards will be used to make existing e-contents more accessible, usable and exploitable in formal education, both for face-to-face and distance learning.

Symposium II:

Biodiversity: Function and Uses

Ecosystem Services:

Provision, Regulation & Support

Time: 9.00 – 9.30

P.2

Ecosystem Services: Human use of biodiversity functions

H. Mooney[1]

No Abstract.

Time: 9.30 – 9.50

T IIa.1

Biodiversity & Marine Resources

J. McGLADE[1]

[1] European Environment Agency

No Abstract.

Time: 9.50 – 10.10

T IIa.2

Biodiversity and Infectious diseases

T. CHAKRABORTY [1]

[1] Institute for Medical Microbiology, Justus-Liebig-University Giessen, Germany

Understanding the ecology and evolution of infectious diseases remains one of the grand challenges in environmental science. Emerging infectious diseases are a threat to biodiversity and their role in species extinction are only recently been realised. Traditionally, it was held that the complex interactions between pathogens and their hosts are the principal driving force of emerging pathogens. Recent evidence suggests that non-host environments and social behaviour may play even more important roles. Indeed, changes in biodiversity at every level, from genes to ecosystems, contribute to infectious disease transmission. Thus quantitative and qualitative relationships between anthropogenic stressors, changes in disease host or vector biodiversity, and infectious disease transmission from permissive to non-permissive hosts all impact on the emergence of infectious disease. In my contribution I examine the role of environmental and social factors that contribute to diversity change, the population dynamics of animal reservoirs, and vectors of disease and the processes whereby infectious diseases emerge and spread.

Time: 10.10 – 10.30

TIIa.3

Biodiversity, Carbon storage and Trace gas release

D. WALL[1]

[1] Dept Biology and Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, CO 80523, USA

Research on carbon cycling and the relation to biodiversity is at the forefront of understanding how ecosystems will respond to global changes. While much of the research has concentrated on aboveground plant production, there has been considerable research belowground. Soils contain a large volume of carbon (1500Gt) and the balance of C storage and CO2 release to the atmosphere is dependent to a large degree on the activities of soil biota. Key questions include: Is soil biodiversity important for soil carbon dynamics? Can soil biodiversity loss affect the functioning of ecosystems and the services they provide to humans? Soil biodiversity (animals, microbes) provides ecosystem services such as soil aeration, soil formation, erosion control, nitrogen transformation, waste recycling, biocontrol of plant and human pests and soil fertility. At smaller scales, studies of low diversity (< 10 species) show a positive diversity-function relationship, whereas those with greater diversity (>10species) often show no relationship between diversity and ecosystem function, indicating low diversity ecosystems have less redundancy. A global experiment of >30 sites showed that soil animals increased decomposition rates in temperate and wet tropical regions and suggests loss of a species, abundance or biomass could impair decomposition of litter. Additionally, numerous studies show some taxa (earthworms, termites) are more influential in ecosystem function than others.

Nature as a model for technical applications and innovations

Time: 11.00 – 11.30

P.3

Biomimetic diversity

J. VINCENT [1]

[1] Mechanical Engineering, University of Bath, UK

We are at a very early stage in appreciating the ways in which biological organisms solve the technical problems of existence. Our current technical problems are related to climate change, energy consumption and generation, water conservation and, crucially, the development of materials with which we can realise novel technologies which will ameliorate these problems. In nature we have answers to these problems from animals and plants living on the environmental edge. These are the most exposed to ecological pressures and so the most vulnerable. We know that these organisms provide novel insights for new biochemistries. Their utility as a reservoir of inspiration for other technologies has hardly been explored. We are investigating them both physiologically (e.g. water capture mechanisms) and theoretically (the role of information in materials processing).

Time: 11.30 – 11.50

T IIb.1

Biomimetics: Industrial innovation driven by nature

R. Bonser [1]

[1] Centre for Biomimetics, University of Reading

Protection of intellectual property can be regarded as an essential for realising the value of inventions, however, it is costly and may indicate some degree of confidence in a commercial return on this investment. Recent analyses of patenting trends reveal a consistent level of growth in patents containing aspects of biomimetics, or design inspired by natural systems. This may imply that natural systems are increasingly providing the basis of commercialiseable technologies in the marketplace.

Time: 11. 50 – 12.10

T IIb.2

Nature inspired technology: tapping into biodiversity

J. Casas [1], T. Kesel [2]

[1] Université de Tours/CNRS, Institut de Recherche sur la Biologie de l'Insecte

[2] Hochschule Bremen, Bionik-Innovations-Centrum (B-I-C)

This talk will present two points of views of bionics. First, we will present the approach and results of an EU-wide effort to design MEMS (Micro-Electronical-Mechanical Systems) for fluid flow measurements inspired from crickets hairs. The continuous back and forth dialogue from insect physiology and ecology to the technological implementation was a key to the design of a successfully functioning new measurement device. We also learned a lot of new biology, driven by questions stemming from the engineer's corner. In terms of returns, however, technology was the sole winner. If time permits, other sensors inspired by insects, designed with a similar spirit, will be presented. In the second and smaller part of the talk, the work done on anti-fouling paints for ships inspired from sharkskin will be discussed. The increased fuel consumption by large tankers and the highly toxic paints requires urgently better technology. Hence, a biomimetic solution would make a lot of sense, both in economic and ecological terms. The reasons for such a successful implementation of a biomimetic approach will be exposed and hints for increasing the number of win-win solutions will be presented.

Time: 12.10 – 12.30

TIIb.3

Do we need the Sacred Lotus Flower? – A Case Study in Biomimicry

W. Barthlott[1]

[1] Nees-Institut für Biodiversität der Pflanzen, Bonn

Biodiversity stands for life and its diversity, the only quality specific to our planet. In millions of years some 10 million species evolved a vast variety of fascinating functions and abilities, which provide a wealth of information for technical innovations. Loss of species means loss of information. One of some 300 000 plant species is the Sacred Lotus. Without having any serious economic value it only plays a role in Asian religions as a rather obscure esoteric symbol of purity. Do we really need this species? Over the last three decades, our analysis of the Lotus leaf surface revealed its surprising secrets. Like most biological interfaces it is not flat and smooth, but exhibits a most intriguing geometry of micro- and nanostructure with water repellent abilities. Even submersed in water the leaf remains absolutely dry for days. Dirt and other contaminants do not adhere to the surface and are washed off by rain drops. Lotus was proven to possess a novel self-cleaning mechanism based on specific physicochemical properties of its surfaces. It was successfully transferred to biomimetic technical products like facade-paints. Today, some hundred thousands of buildings with self-cleaning lotus surfaces exist worldwide. The economic and ecological benefit of bioinspired materials cannot be overestimated. Bionic applications and biomimicry are further unexpected values of biodiversity. Lotus is only one example out of millions of species, providing an immense archive of potential innovations.

Regulations of Access and Benefit Sharing

Time:. 14.00 – 14.30

P.4

Access and Benefit Sharing: the current debate on regulation in perspective

M. Footer[1]

[1] University of Nottingham, School of Law

Both the Convention on Biological Diversity (CBD) and the more specialist regime of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) endorse the sovereign rights of States over their genetic resources and consequent authority to regulate access and benefit sharing (ABS) although each of these treaties accomplishes these objectives in different ways.

The CBD regime seeks to strike a balance between a State's authority to regulate access to genetic resources and it obligation to facilitate access by others to those resources. When it comes to access to genetic resources under Article 15 CBD the emphasis is on each individual Contracting Party granting access on 'mutually agreed terms' and based on 'prior informed consent', which is a clear indication that access is most likely to be granted on the basis of bilateral agreements.

Likewise Article 15 CBD calls for the sharing in a 'fair and equitable' manner of the results of research and development as well as the benefits arising from commercial and other forms of utilisation of genetic resources. The only caveat to this is that developing countries should enjoy priority access to biotechnologies based on their genetic resources on 'a fair and equitable' basis while transfer of technology to developing countries for the purposes of conservation and sustainable use of biological diversity should proceed on 'fair and most favourable terms'.

In theory, Contracting Parties to the CBD enjoy a wide discretion as to how to regulate ABS and this has already led to a variety of national and regional regulatory developments, which cover a broad spectrum of both statutory and contractual rights, such as bioprospecting arrangements between governments and individual entities. The scope of national and regional access legislation may also extend to the regulation of traditional knowledge,

including the prior consent of local and indigenous communities for access to genetic resources and their subsequent utilisation. Even so, Article 15 CBD makes it clear that national ABS legislation does not cover ex situ collections of genetic resources acquired before the entry into force of the CBD and this has particular significance for collections of seed germplasm, most of which are held in national agricultural research centres or NARCS, agricultural research stations, marine biological institutes, botanical gardens and similar institutions.

In practice, Article 15 CBD is the unsatisfactory outcome of compromise between States and many issues remain unreconciled. Moreover, it is unclear as to how the ABS regime will operate in practice and whether it can meet the pace of agricultural and biotechnological research and development in the real world. To that end work has been going on since 1995 to elaborate and negotiate an international ABS regime while ensuring the effective participation of indigenous and local communities in the process (Article 15 and Article 8(j) CBD). This initial work culminated in the 2002 Bonn Guidelines on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits Arising out of their Utilization (Bonn Guidelines). The Bonn Guidelines are a set of voluntary, non-binding provisions aimed at guiding Contracting Parties, which are countries of origin of genetic resources, on ways to implement the CBD's articles on ABS and serving as a model for private contracts and other arrangements. Following the January 2008 meeting of the ABS Working Group agreement has been reached on a five-part framework for further negotiations on an international ABS regime, which will include coverage of fair and equitable sharing of benefits, access to genetic resources, compliance issues, traditional knowledge and genetic resources as well as capacity building. Matters such as the long-term sustainability of the planned international ABS regime, including an appropriate funding mechanism, have not yet been dealt with.

The specific regulation of access and benefit sharing of plant genetic resources for food and agriculture (PGRFA), which remain outside the scope of the CBD, has proceeded along a different, but at times parallel track to that of the CBD. Under the previous legal framework for plant genetic resources the sharing of PGRFA, and knowledge derived from their conservation, were the guiding principles and were of particular importance for scientific research and the transfer of technology. The ITPGRFA follows the lead of the CBD in being more sovereignty-based whilst also seeking to balance the need for conservation of PGRFA against their sustainable utilisation. However, it is precisely in this latter context that the ITPGRFA breaks new ground and has moved ahead of the CBD in establishing an ABS

regime, the most important aspect of which is the establishment of the Multilateral System of Access and Benefit-Sharing' (the Multilateral System).

A consequence of a policy reversal in the field of PGRFA, which has seen crop germplasm pass from the domain of common heritage of humankind to that of national sovereignty over biological resources, the ITPGRFA continues to recognise this sub-species of plant genetic resources as a common concern of humankind and the fact that all countries depend to some extent on PGRFA which originated elsewhere. Just like the provisions regulating access under the CBD, Parties retain full authority to regulate their own PGRFA but where the ITPGRFA differs from the CBD is that it places strict limitations on the ability of Contracting Parties to restrict access to that PGRFA from other states. Moreover, while the ITPGRFA covers all genetic material for food and agriculture, states that are Parties to it are under a de minimis obligation to guarantee access to the genetic material of 35 crop genera and 29 forage species that are in the public domain and are considered essential for global food security and human nutrition.

In terms of an ABS regime, the Multilateral System's provisions on access under Article 12 of the ITPGRFA are both complex and sophisticated. Access to PGRFA in the Multilateral System is limited solely to the conservation and utilisation of essential crop germplasm for the purposes of research, breeding and training for food and agriculture. However, there are different levels of access, dependent upon whether the crop species is in the public domain, whether it is listed in the Annex I crops and forages, whether it is forms part of an in situ or ex situ collection and in the latter context whether the species is found in one of the ex situ CGIAR collections. Benefit sharing under Article 13 ITPGRFA is regulated on the basis that all crop germplasm accessed acquired through the Multilateral System is to be shared equitably through one of four mechanisms: exchange of information; access to and transfer of technology; capacity-building; and the sharing of monetary and other benefits arising from commercialisation.

The presentation will demonstrate the differences and similarities between the two regulatory regimes, analyse potential gaps and comment on issues that may arise from the partial and incomplete regulation of ABS under the CBD and the ITPGRFA.

Time: 14.30 – 14.50

TIIc.1

Transaction Costs in ABS procedures

K. Holm-Mueller [1], S. Taueber [1]

[1] University of Bonn

In the past years less ABS agreements have been signed than expected. High transaction costs in ABS procedures are named as one main reason for this. Model contracts are one of the measures under discussion. Basis to this discussion has to be an in depth understanding about the realities of transaction costs in ABS procedures. Theoretical and Empirical research on transaction cost indicates that the transaction characteristics and the transaction environment determine the efficiency of organizational solutions. Three large groups of transaction can be differentiated in ABS: direct provider-user transactions; transactions between providers and intermediaries and intermediaries and users. We assume that there are significant differences in transaction costs and organisational solutions for these groups. Especially transactions with the participation of intermediaries are highly relevant for a successful ABS implementation and yet are not at all analysed from a transaction cost perspective. Research in this area needs to systematise the experiences and solutions of stakeholders in genetic resources transactions under ABS requirements concerning transaction costs and transaction environment. Only with this information will it be possible to assess the suitability of model contracts for different sorts of transaction.

Time: 14.50 – 15.10

TIIc.2

Access to genetic resources and benefit sharing: Undoing or tightening the knot

E.C.. KAMAU

1 University of Bremen

The Convention on Biological Diversity (CBD) entered into force on December 29, 1993 with only three objectives. Article 1 states that, "*[T]he objectives of this Convention, (…), are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources*". More than a decade after, realising these objectives has proved to be a nightmare. From the observation of an international workshop held in Bremen by the Research Centre for European Environmental Law (FEU) of the University of Bremen in February 15/16 2008, a balance between the interests of provider and user countries (or of the traditional and modern sectors within countries) is far from being reached. Departing from this thought, crucial issues of ABS are discussed with the aim of finding amicable solutions. They include: ensuring and facilitating prior informed consent for the use of knowledge, coping with the special features of disseminated traditional knowledge, tailoring and streamlining access to genetic resources as such, designing schemes of benefit sharing, and triggering user countries' benefit sharing obligation under Article 15.7 of the CBD. The talk concludes with a reflection on the need for promoting "cross-fertilisation of legal transplants" as a valuable source of law development equal to "vertical" development through international harmonisation.

Symposium III:

Biodiversity Change – The 2010 Target and Beyond

Time: 9.00 – 9.45

P.6

Taking the pulse of biodiversity: a vision for a Global Biodiversity Observation Network

R.J. Scholes[1]

[1] DIVERSITAS vice chair, and CSIR-NRE, PO Box 396, Pretoria 0001, South Africa

It is common cause that the information systems relating to global biodiversity trends are currently inadequate for the purposes of detecting and managing the rapid and far-reaching changes that are occurring in the current era. A large group of biodiversity data providers and users, under the auspices of the Global Earth Observation System of Systems (GEOSS) and the leadership of DIVERSITAS and NASA, have been in discussion on how to put a sufficient system into place. At this time it seems technically feasible to do so, although many details remain to be worked out. The envisioned system would be strongly focussed on satisfying user needs. The core of the system would be observations on the state and condition of biodiversity, at the species, gene and ecosystem levels, but the system would also contain indicators of drivers of biodiversity change, impacts of the change, and measure of the effectiveness of the responses. Some of these indicators would come from other GEOSS areas, taking advantage of the synergies provided by an integrated system. The system would need to be able to provide useful information at several scales, ranging from the sub-national to the global, and for the immediate past as well as modest projections into the future. For these reasons, the observation system must contain integrated models. Most of the technical elements of such a system already exist, but are not yet linked into a seamless whole. To do so will take a high level of cooperation between a large number of players, including both national agencies and international non-governmental organisations. This will involve additional costs (modest in relation to the investments already sunk into observation systems), but will yield disproportionately large benefits.

The loss of biodiversity and approaches for a sustainable world: A state of the art assessment

Time: 9.45 – 10.05
T IIIa.1

Approaches to biodiversity planning in a changing world

G. MACE[1]

[1] Centre for Population Biology, Imperial College London

Plans for biodiversity management at local to global scales will be more effective if the goals are set to meet societal needs, and if targets are realistic in relation to known trends in direct and indirect drivers of change. Both direct evidence from biodiversity sampling, and indirect evidence from observed and modelled information on drivers can be used to focus the targets to be relevant and achievable.

Time: 10.05 – 10.25

T IIIa.2

Challenges and approaches in (a/the) mega-diversity country(ies) of the south.

J. SOBERON[1]

[1] University of Kansas

To conserve and manage their biodiversity, the megadiverse countries face a number of daunting challenges. One of the most frustrating is the lack of detailed knowledge upon which to base decisions and provide society with elements to demand answers. In this presentation I will analyze this problem from the perspective of scaling of the data and the process of knowledge transferring to decision makers. I will present some experiences that show that certain problems can be faced using available information. Monitoring, specifically, can be addressed using
combinations of tools, like Ecological Niche Modeling, and data (remote sensing and primary biodiversity databases) previously almost unavailable to many developing countries.

Change of ecosystem functions and services

Time: 11.30 – 11.50

TIIIb.1

Pollinators as critical ecosystem service providers: the biodiversity of species interactions

J. Ollerton [1], N. Waser [2]

[1] School of Applied Sciences, University of Northampton

[2] University of California, Riverside

Plant-pollinator interactions are fundamental to the sustainable functioning of the majority of terrestrial ecosystems: they are essential for the reproduction of most plant populations and are directly or indirectly responsible for significant levels of trophic movement of energy and nutrients. The Convention on Biological Diversity has mainly considered the economic importance of pollinator conservation in relation to the agricultural services highlighted by the Sao Paulo Declaration. It is important to recognise, however, that biotic pollination is a critical aspect of biodiversity that has a value far in excess of its significance to crop pollination. There is an urgent need to develop a toolbox of standardised survey and statistical methods to allow rapid assessment and monitoring of plant-pollinator interactions, using historical surveys as a baseline for comparison where possible. Ecosystem monitoring should be undertaken to assess the role of landscape complexity, anthropogenic disturbance and climate change on pollinator diversity in order to develop indices of current and future habitat quality. Meeting the targets of 2010 and beyond requires us to go further than taxonomic inventories and consider changes to, and extinctions of, species interactions.

Time: 11.50 – 12.10

T IIIb.2

Conservation genetics: from species to habitats

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2 Inst. for Animal Health
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Conservation genetics, as does conservation in general, falls into the two broad areas of the identification and preservation of endangered species and the identification and preservation of biodiverse habitats. Most research has been in the first area, with hard-won findings on the importance of genetic variation in population management, but genetics promises to be at least as important in the second great aim. Molecular phylogenies have long been proposed as an important approach that has been shown to capture conservation worth and evolutionary distinctiveness better than simple species richness and avoids common problems in defining species identity and boundaries. Progressively faster and cheaper DNA sequencing and the rise of DNA barcoding are making the phylogenetic approach to habitat conservation widely applicable. Barcoding was seen initially as a means to species discovery and to species identification, but it now holds promise as a resource-efficient means of estimating the evolutionary history preserved by different sets of reserves. Initial indications are that biodiversity assessment using the short cox1 sequence usually used in barcoding animals reliably reflects the picture from longer sequences. The phylogenetic approach not only infers evolutionary history via barcoding, but in synergy with morphology will speed species discovery and the subsequent expansion of general biological knowledge.

Towards an integrated biodiversity observation system

Time: 14.00 – 14.20

T IIIc.1

A Global Biodiversity Observation Network: What Do Satellites Have to Offer?

W. Turner [1]

[1] Earth Science Division, NASA

Satellite data typically come to us at spatial resolutions too coarse to detect two of the three key elements of biodiversity (i.e., genes and species). Nonetheless, many see satellite imagery as a vital component of a biodiversity observation network. What do satellites actually have to offer the biodiversity research community, limited in both resources and time? Do satellite products justify the funds, time, and effort required to use them effectively in biodiversity research? Recent developments are converging to make satellite data and related products an integral part of any strategy to understand, monitor, and conserve biodiversity across spatial scales. Rapid growth in the number and variety of sensors on orbit is giving us unique looks of the Earth at new spatial resolutions, wavelengths, and repeat times. The widespread availability of geopositioning devices has enabled field researchers to put their in situ data into a broader context while the revolution in geographic information systems has provided platforms to overlay site-based biodiversity data with satellite information. The Web allows us to move digital information around the world. We may also be entering a time of greater political integration in the realm of Earth observation. All of these are positive signs. Yet, it is still necessary for the tools to work. My talk will focus on remote sensing solutions to the challenge of understanding biodiversity and how it is changing over time.

Time: 14.20 – 14.40

T IIIc.2

Techniques & targets: The present potential and the future role of projections & predictions

P. LEADLEY[1]

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No Abstract.

Time: 14.40 – 15.00

T IIIc.3

Observatories and exploratories: German interdisciplinary approaches to realise biodiversity changes and understand their functional consequences

E. Beck[1]

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The Millenium Ecosystem Assessment 2005 clearly shows the interactions between biodiversity, ecosystems and people. To detect changes in biodiversity, to unravel their drivers and causes, and to assess their consequences, interdisciplinary collaboration of scientists from life sciences, geosciences, social sciences and economics is necessary. Beyond that, research into biodiversity changes requires combined research activities on the same areas or regions, long-term perspectives of research and funding, and a database, that allows handling of a great variety of data sets in easy accessible formats. Efforts have been made worldwide towards those goals, e.g. in the ILTER programme. However, there are many plans, few conclusive results and even less ecological experiments. Nevertheless, politicians and stakeholders call for scientifically sound and workable scenarios as decision support information. German approaches tackling the problems associated with biodiversity changes or losses will be briefly presented, such as the BIOLOG/BIOTA-programme, the Exploratories-programme and some other relevant research projects. Although some of them are now running for up to 10 years and have accumulated a wealth of mainly scientific data, development of reliable guidelines and their implementation remains a major problem.

Time: 15.00 – 15.20

TIV.1

Experiences from implementing CBD in the local context; Restoring *Satoyama* and urban biodiversity through citizens' participation in Higashiyama, Nagoya Aichi

Ryo Kohsaka [1]

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As a potential city for hosting 10th meeting of the Conference of the Parties (COP10), Nagoya designed a plan for urban biodiversity. Despite its size of 2.2 million residents, Nagoya has two unique ecosystems, tidal flat and urban forests within its area.

Historically, the city struggled to balance urban pressure and resource needs against conservation of its urban biodiversity. Increasing pressures by neighboring residents are threats to urban forests. Conservation of biodiversity is aimed by designing sustainable use patterns of urban forests.

Based on past experiences, current plan targets the restoration of its urban forests by facilitating the participations of local residents. As part of the plan, urban forests are categorized into five areas based on human uses: Satoyamaya, animal watching, environmental education, cemetery and waterfront. Satoyama means forest areas that exist between residential and mountainous regions and they used to supply fuel and daily commodities for local communities.

The challenge with the current plan is to translate conservation and sustainable use, two of the three objectives of the Convention on Biological Diversity (CBD), into implementation. Restoring Satoyama is regarded as a one model in achieving such objectives. In this paper, examples of citizens' participation will be discussed.

P I.1

Plazi.org: A service to provide access to the content of the published taxonomic literature

D. Agosti[1], T. Catapano[1], W. Egloff[1], C. Klingenberg[1], G. Sautter[2]

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2 Universität Karlsruhe

Access to taxonomic literature is a vexing problem at a biodiversity crisis, and rapidly developing World Wide Web (WWW) allowing unlimited sharing all this information. This highly structured, over 100 million pages of printed and increasingly electronic documents of taxonomic literature covering the world's species, includes a often unique source of information. Through its structure, this corpus is predestined for machine reading and data mining. The Biodiversity Heritage Library and animalbase.de, as well as taxon based services like antbase.org are increasingly providing access to the old printed record; however for a large part of new literature it is assumed that they fall under copyright protection and thus are not accessible for open access. The Plazi.org association aims at developing and building technologies to transform legacy documents into semantically enhanced, machine readable documents, providing a repository or archive for species descriptions, exploring the legal issues, and collaborate with partners to make all the taxonomic publications open access. Tools already developed include a taxonomy specific XML mark-up schema (TaxonX), a dedicated XML editor (GoldenGate), a repository (Dspace) for marked-up publications, and a dedicated server to provide access to the descriptions enhanced with Life Science Identifiers for names, specimens, and legacy publications. The system provides over 3,700 descriptions and is supported from GBIF, US-NSF and German DFG.

P I.2

Freshwater fungi: Biodiversity research before they vanish ?

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Freshwater fungi are a phylogenetically heterogeneous group predominantly found on organic matter in lotic ecosystems. They are keyplayers in the carbon cycling and energy flow of aquatic habitats. Human impairment of nature results in a dramatic decrease of natural and near-natural aquatic habitats. Especially, the amphibian ecosystems seem to be sensitive to climate changes. Climate change scenarios include the increase in summerdroughts in Europe. Two effects of low rainfalls are already apparent: The premature leaf fall and the fragmentation of streams into small pools. As the leaf litter degradation is part of the global carbon cycle, the ecological function of microorganisms directly involved, should be well understood. However, our knowledge of freshwater fungal diversity, life cycles, community dynamics, and individual functions in ecosystems remains poor in comparison to other fungal groups such as phytopathogens. Most publications on freshwater fungi concern ecologically aimed studies based primarily on identifying and counting fungal spores. However, the revealed data give an incomplete picture of diversity, disregarding substrate specifity, sporulation conditions, and microbial interactions of freshwater fungi. Furthermore, the lack of taxonomic expertise leads to misidentification of freshwater fungi. We overview the knowledge of freshwater fungal diversity research to date and advert to the need for future studies in both: Diversity assessment and functions.

P I.3

International collaboration between taxonomists in All Taxa Biodiversity Inventories

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"All Taxa Biodiversity Inventories" (ATBIs) are long term efforts by large numbers of taxonomists to identify and document the total biodiversity of a given area in the most efficient way possible. The EU-funded "European Distributed Institute of Taxonomy" (EDIT: Work Package 7 "Applying Taxonomy to Conservation") organizes such inventories as concept for international taxonomic collaboration. The principal objectives are to enhance the relation between taxonomists and other users of taxonomic information, to accelerate the processes of taxonomic science through the worldwide web, and to overall transform taxonomy into an integrative science. In 2007 the first ATBI started in the French/Italian Mercantour and Alpi Marittime natural parks and during the first 3 months over 40 scientists from six EU countries visited the parks with support from EDIT. These participating scientists documented a broad spectrum of taxonomic groups that included conspicuous organisms such as butterflies and birds, but also less conspicuous groups such as diatoms, bryophytes (mosses and liverworts), tardigrades (water bears), and parasites of the park's mammal species. First results underline the high biodiversity of the region, which is, however, locally affected by impacts from anthropogenic activities, for example, high intensity of livestock grazing. Records and specimens collected in the framework of EDIT's ATBI activities are being made available online for participating researchers and conservation management to maximize re-usability of the results. For 2008, field work will be scaled up in the Mercantour / Alpi Marittime parks involving specialists from many additional European institutions. Furthermore, the EDIT ATBI concept will be promoted for implementation in nature reserves elsewhere in Europe (e.g., the Slovakian Carpathians) as well as in biodiversity rich countries outside Europe. In the Mercantour / Alpi Marittime parks, the first EDIT "Summer School in Taxonomy" will take place in 2008 to which students can subscribe for courses in biodiversity field recording and collection techniques.

P I.4

Biodiversity in the deep sea – adding the largest piece to the puzzle

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The Census of Marine Life, an international megaproject involving several hundred scientists from over 80 nations, is a visionary project to assess the diversity of life in the oceans of the world which cover about 70% of the Earth's surface. Several ocean realms were identified which have been sampled according to carefully designed plan with standardised methods to ensure better estimates of the species richness of the ocean and to learn more about the scale with which to assess biodiversity in different parts of the ocean, e.g., coastal waters or the deep-sea basins. One of the so-called field projects of the Census, CeDAMar, assesses the diversity of abyssal plains and basins. During more than ten cruises to areas in the southern Atlantic, the Southern Ocean and the eastern Pacific, stations were sampled with a large array of gear to collect qualitative and quantitative data on organisms ranging from bacteria to whales. Sedimentological and biogeochemical data are used to relate distributional patterns of selected taxa to ecological parameters. Molecular genetics are used to reveal evolutionary processes that might drive biodiversity in the deep sea. All projects of the Census are entering their synthesis phase, preparing products to be presented to the scientific community as legacies which are hoped to foster further research beyond 200 when the Census in its current form ends. Among these legacies are OBIS, a portal to marine data bases, and EOL, the Encyclopedia of Life.

P I.5

Mitochondrial DNA Variation in the invasive North American beaver (Castor canadensis) in Tierra del Fuego (Argentina) and spatial analysis in the control of populations.

M. Fasanella[1], S. Poljak[1], M. Gabrielli[1], M. Vitali[1], M. Lizzaralde[1]

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North American beaver Castor canadensis was introduced in Isla Grande of Tierra del Fuego, Argentina, in 1946 as a potential source of wild fur. The species showed a growth capacity reaching close to 100,000 individuals from an original founder stock of 25 females and 25 males. Beaver adapted rapidly to its new environment became an invasive species providing an excellent model of a successful adaptation of introduced population to a new habitat. In this study, we used polymorphic mitochondrial (mt) DNA to evaluate genetic variation in the introduced Tierra del Fuego beaver population. Nucleotide variation in partial sequences of the main non-coding region DL (521 bp) were analyzed. Our study has allowed us to identify 7 different mtDNA lineages in the invasive population indicating an ausence of gene flow that could be explained by a halt of the original expansion of the 50 founder beavers from rivers and watershed network of Isla Grande since the time of its introduction. This approach will help to understand the effects of genetic change on the survival ability and reproductive success of invasive species also have important implications to management of invasive species.

P I.6

Primate biodiversity: characterization, mechanisms, and conservation

C. Fichtel[1], J. Fischer[2], E. Heymann[1], K. Hodges[3], P. Kappeler[4], C. Keller[2], C. Matauschek[1], D. Meyer[3], C. Roos[5], V. N. Thinh[5], T. Ziegler[3], D. Zinner[2]

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Although primates represent one of the most diverse mammalian orders, which currently include about 700 species and subspecies, their taxonomic status and phylogenetic relationships are far from being resolved. Moreover, more than 40 taxa have been discovered and described within the last 15 years. Since 62% of all primates are endangered, they represent important flagship-species for initiating conservation activities in regions of high biodiversity. The aim of this research initiative is to better understand the causes and mechanisms contributing to primate biodiversity. Using a comparative approach, we are studying eight genera, representing the main radiations of primates in South-east Asia (*Presbytis, Nomascus, Macaca),* Madagascar *(Cheirogaleus, Microcebus, Lepilemur, Propithecus),* Africa (*Papio*) and South America *(Saguinus*). Specifically, we address three interrelated aims and questions. 1. Characterization of biodiversity: How many taxa exist in these primate groups? Genetic traits, biogeographic and morphometric data are being used to characterize different taxa, identify evolutionary independent units and clarify their phylogenetic relationships. 2. Causes and mechanisms of diversity: Which specific processes may have caused speciation and radiation within the groups? How do primates in the macro-geographic regions differ in this respect? 3. Conservation: By delineating taxa, we can help determine effective conservation units for primates and conservation priorities.

P I.7

From sugarcane plantations to primary rain forest: Ants in the Kakamega Forest area (Kenya)

G. Fischer [1], *F. Hita Garcia* [1], M. Peters [1]

[1] BIOTA East Africa, Zoological Research Museum Koenig

Ants are highly abundant and important elements of tropical ecosystems and perform a variety of ecological functions. In particular, they are among the most important predators in natural and agricultural ecosystems. However, up to now it is scarcely known, if human caused environmental degradation affects the diversity, composition and ecological function of rain forest ant communities. In our newly established project within the framework of the BIOTA East Africa project we investigate how habitat degradation affect ant communities and try to evaluate patterns and consequences for ecosystem functions. The study was done in the Kakamega Forest, Kenya, and the surrounding agricultural area. We set up 27 transects along a degradation gradient (primary and secondary forest, extensively and intensively managed farmland). The ant sampling was performed by using 2 standard methods for the collection of ground-dwelling ants: Winkler litter extraction and pitfall trapping. However, up to now only 50% of the pitfall traps have been processed and analysed, so that we present our first results. We tested if ant species richness and species composition differed among the habitats and we found significant differences in both. Our preliminary results suggest that extensively managed farmland habitats may sustain a high number of ant species. Nevertheless, the conservation value of farmland habitats for the ant fauna of East African rainforests seems to be rather low, as many ant species depend on forest habitats.

P I.8

Beyond economic efficiency in biodiversity conservation

F. Gatzweiler [1], J. Volkmann[1]

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The paper aims at explaining the importance of the democracy stance as compared to the efficiency stance in order to deal with complexity in biodiversity conservation. While the efficiency stance refers to the realm of relatively simple systems, individual rationality, and instrumental values, the complexity stance transcends these boundaries into the realm of complex systems, social rationality and intrinsic values. We argue that the task of biodiversity conservation is impossible to achieve in merely economically efficient ways, because (a) it is impossible to come to a (fully informed) complete account of all values, not only because it is costly but also because (b) moral values are involved which (by their nature) exclude themselves from being accounted for, and (c) biodiversity conservation can be regarded as an end in itself instead of only a means towards an end. The point we raise is, that in order to cope with biodiversity conservation we need to apply valuation methods which are from the complexity stance, take better account of intrinsic values and feelings, as well as consider social rationality. Economic valuation methods are themselves 'value articulating institutions' and as biodiversity conservation confronts us with the complexity of social-ecological systems, the choice of the 'value articulating institutions' needs to consider their ability to capture instrumental and intrinsic values of biodiversity. We demonstrate a method, based on cybernetics, which is able to take into account the issues raised.

P I.9

Rapid assessment of fungal diversity using genetic fingerprints

U. C. Giesselmann[1]

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Fungi are of great ecological and economical value. However, the knowledge about fungal diversity, especially in the tropics, is still scanty.
Due to the proceeding destruction of old growth tropical rainforests and the associated loss of plant hosts and capable habitat, a loss of fungal diversity is expected. Old growth forests are often replaced by secondary forests. The successional dynamics of fungal diversity in these secondary habitats is unknown and therefore even the magnitude of the expected loss in fungal diversity can not be evaluated. As a first step, a rapid assessment of fungal diversity in secondary forest sites of different successional age is necessary to direct the conservation and restoration of fungal biodiversity.
Our study is part of the SOLOBIOMA project, a German-Brazilian co-operation with its focus on the Atlantic rainforest in the Brazilian state of Paraná. This rainforest is known to be a biodiversity hotspot and also one of the most endangered rainforests in the world. The aim of the study is an assessment of fungal diversity in forest sites of different successional age.
We use ARISA, a genetic fingerprinting method, which is appropriate for a quick assessment of fungal diversity with a high resolution and reproducibility. On the basis of length variability of a given, non-coding DNA region (ITS) operational taxonomic units are defined, which are used for further diversity analyses. First experiences and results with this method are presented.

P I.10

The EU Project ALARM: Assessing Large-scale Risks for biodiversity with tested Methods.

V. Hammen[1], J. Settele[1], I. Kühn[1], S. Klotz[1], J. Spangenberg[1]

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Based on a better understanding of terrestrial and freshwater biodiversity and ecosystem functioning, research will focus on assessment and forecast of changes in biodiversity and in structure, function, and dynamics of ecosystems. This relates to ecosystem services and includes the relationship between society, economy and biodiversity. In particular, risks arising from climate change, environmental chemicals, biological invasions and pollinator loss in the context of current and future European land use patterns will be assessed. There is an increasing number of case studies on the environmental risks subsequent to each of these impacts. This yields an improved understanding on how these act individually and affect living systems. Whereas the knowledge on how they act in concert is poor and ALARM will be the first research initiative with the critical mass needed to deal with such aspects of combined impacts and their consequences.
Risk assessments in ALARM will be hierarchical and examine a range of organisational (genes, species, ecosystems), temporal (seasonal, annual, decadal) and spatial scales (habitat, region, continent) determined by the appropriate resolution of current case studies and databases.
The ALARM consortium combines the expertise of 68 partners from 35 countries. ALARM encompasses 7 SMEs as full partners with central responsibilities and with a share of >10% of the project resources. Total project costs are 22 Mio Euro.

P I.11

Documenting and Explaining Biodiversity: Insights and Prospects from Danthonioid Grasses (Poaceae)

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Species level phylogenies are a valuable tool for explaining processes underlying changes in biodiversity, globally and locally. For >200 years the temperate grass subfamily Danthonioideae has been the focus of active research and the number of recognised species, currently 288 distributed worldwide, is still growing. Real advances in our understanding of species diversity, however, have only been made recently, due to increases in the availability and power of molecular and analytical techniques and due to collaborative research efforts. Molecular phylogenetics has shown non-monophyly of several genera, e.g. pampas grasses, Cortaderia, and the African Merxmuellera. The need for a reliable nomenclature has thus led to a reconsideration of generic delimitation criteria. Molecular clock and likelihood optimisation methods have allowed us to infer the origins and spread of this group in time and space. Only in a phylogenetic context can we infer just how frequent intercontinental dispersal has been. Global species diversity and distribution today are the result of several such events, originating in southern Africa (~15 Mya). While local species richness in some areas chiefly results from repeated immigration (Drakensberg), in others it is attributed primarily to in situ diversification (Cape). The importance of taxonomy, for the continued documentation and communication of biodiversity, and of phylogenetics, in explaining dynamicity of biodiversity globally, and accumulation of biodiversity locally, is evident.

P I.12

Diversity of Baboons – Genes, Vocalizations, and Social Behaviour

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The taxonomic status and phylogeny of the genus *Papio* is a current subject of speculation. Although baboons are a well studied genus the number of species within the genus is debated and the phylogenetic relationships among the taxa are widely unknown. For the assessment of genetic diversity contact zones of different taxa are of special interest. Thus we focused our study on southern Africa were, according to different sources, two to six taxa meet. Using different genetic markers (mtDNA, nDNA, Y-chromosome) we aim to clarify the genetic relatedness between taxa and elucidate the evolutionary mechanisms that led to the current pattern of genetic clades. Genetic material was extracted from faecal samples we collect in different regions of southern Africa. First results confirmed the proposed genetic distinctiveness of the Kinda baboons (*Papio cynocephalus kindae*) in Zambia and narrowed the southern border of this taxa down to less than 100 km. Furthermore, at least two genetically distinctive forms of Chacma baboons (*P. ursinus*) occur, a south-western and a north-eastern clade. We conducted a detailed study of baboon vocalizations and social behaviour in Namibia the western habitat border. Our aim is to compare these results with the data we will collect from a Mozambican population as representatives of the easternmost Chacmas. The combined results will shed light on the forces that caused and influenced the ongoing process of speciation in the genus *Papio*.

P I.13

Sulawesi: Island between the Realms – Biodiversity Research in Central Indonesia

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The majority of earth's biodiversity occurs in the tropics. Indonesia with its thousands of islands is one of the megadiversity countries of the world bridging Asia, Australia and the Malay Archipelago. Sulawesi (formerly known as Celebes) lies right in the centre of this vast archipelago. Due to its exceptional topographic position between these distinct faunal regions, Sulawesi together with the Lesser Sunda Islands in the south, and the Moluccas in the east represents a zoogeographic transitional region called Wallacea. Thus, Sulawesi's fauna comprises an assemblage of typical Oriental and Papu-Australian species. In addition, and because of long periods of isolation in its geological history Sulawesi is characterized by a high degree of endemism (e.g., >40% in butterflies) embedded in a complex biogeographic setting. Despite the investigations of numerous famous scientists of the 19th and 20th century such as P. Bleeker (fish, amphibians, reptiles), G. A. Boulenger (fish, amphibians, reptiles), L. Martin (butterflies), G. G. Musser (rodents), F. and P. Sarasin (fish, invertebrates), E. Stresemann (birds), and M. Weber (fish), recent fieldwork on Sulawesi reveals several new records for that island as well as many more undescribed species of fish, amphibians, reptiles, and butterflies. Thus, the peculiar fauna of Sulawesi is still far from being completely inventoried and further systematic investigations are urgently required to fill these gaps.

P I.14

Characterisation and valorisation of grapevine cultivated in coastal oasis.

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The oasis of Chénini (in south East of Tunisia) presents a wealthy genetic diversity. The grapevine is one of the oldest fruit trees cultivated in this oasis. The valorisation and the conservation of this threatened inheritance remain a preoccupation of oasis population. Eight local varieties have been collected for its description based on pomological and chemical characteristics of its fruits and leaves. This characterization showed that most of these varieties present a good adaptation to the environment conditions and an acceptable quality of fruit (low acidity and high sugar content). Vitamin C is present like a trace in this varieties (3, 22 - 6, 69 mg/100g).The eight grapevines studied could be useful as follow: Mguergueb, Miski, Sawoodi and Khalt for grapes, the Medina and Bezzoul Kalba Akhder for table wine and Akhal for dry grapes.These varieties need a particular attention and valorisation to carry out genetic improvement.

Keys words: oasis, grapevine, varieties, characterisation, pomological, quality, valorisation.

P I.15

Development of a European Environmental Risk Assessment Toolkit (RAT) for biodiversity and ecosystems

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ALARM (Assessing LArge-scale environmental Risks for biodiversity with tested Methods), an Integrated Project funded under the European Union's Framework Programme 6, aims to develop methods to predict risks to a range of aspects of biodiversity associated with the combined action of key drivers such as climate and landuse change, environmental chemical pollution, biological invasion, and loss of pollinators. Such risk assessments should account for interactions between drivers, and reflect natural variability and qualitative and quantitative uncertainty in our knowledge. An important challenge in communicating biodiversity risk assessment is therefore how to present such a complex and uncertain picture across scientific disciplines, and to policy makers, politicians and the wider public. Here we describe the initial

development of a European Risk Assessment Toolkit (RAT) by the ALARM consortium which aims to provide an interactive tool to allow users to explore uncertain multiple and varied biodiversity risk assessments generated at the European scale by the ALARM project. The aim is to provide access to individual risk assessments, but also allow sets of results to be grouped together according user defined criterion (e.g. all measures of aquatic environments), enabling end-users to build-up more complete pictures of areas of particular concern.

P I.16

Taxonomy and Biogeography of tamarins (genus *Saguinus*, Hoffmannsegg 1807)

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The tamarins of the genus Saguinus (family Callitrichidae) represent one of the most diverse primate radiations. So far, about 30 taxa have been described from Amazonia, but detailed information on their taxonomic status, phylogenetic relationships, biogeography and the mechanisms of speciation is still lacking. The general aim of this study is to clarify the taxonomy and internal relationships within the genus Saguinus. Therefore, several molecular markers, including mitochondrial, autosomal and gonosomal markers, will be applied. Two expeditions to the Peruvian Amazon (an area of high tamarin diversity) are conducted to collect faecal samples from different wild tamarin populations. For the non-Peruvian taxa tissue samples of museum specimens and captive animals will be used. Taxonomic data will be combined with biogeographic evidence to analyse the biogeography and speciation of Saguinus and to develop a model for tamarin radiation throughout Amazonia in the Pleistocene, and to explain the complex extent tamarin diversity and distribution. This may also provide general evidence for speciation processes and the role of riverine barriers and Pleistocene refugias in Amazonia, one of the biodiversity hotspots of the planet.An additional outcome of the study could be the detection of tamarin taxa in certain parts of Northern Peru, which are unknown to science so far.

P I.17

Phylogeny and biogeography of the Asian leaf monkey (Colobinae) genus Presbytis

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With more than 50 previously described taxa (Groves 2001), the Asian leaf monkeys (Colobinae) of the genus *Presbytis* represent one of the most diverse genera within the Old World monkeys (Cercopithecoidea). Although many studies on the taxonomy of *Presbytis* have been carried out during the last three decades, the phylogenetic relationships within the genus and the current biogeographic patterns of distribution are still disputed and controversially discussed. Almost all previous studies are based on anatomical features, particularly pelage colouration, and the very few molecular genetic data are heavily based on captive animals. The main objectives of this study are therefore to clarify the taxonomy, phylogeny and biogeography of *Presbytis* using molecular genetic analysis and bioacoustic data. In an initial field survey, faecal samples for DNA extraction have been collected from selected wild populations on Java and Sumatra. Male loud calls were recorded with the use of a playback experimental design. Phylogenetic reconstructions will be based on maternal, paternal and biparental genetic markers. Structure analysis of the loud calls will be applied and used as an additional parameter to supplement the phylogenetic reconstructions. The results of this study will contribute to a better understanding of the process of speciation and biodiversity in colobine monkeys and provide important information for the assessment of the conservation status of the genus.

P I.18

Phylogeny, taxonomy and distribution of crested gibbons (genus *Nomascus*)

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Currently, several classification schemes based on morphology, fur colouration and genetics are available, but no consensus of crested gibbon taxonomy exists and the distribution areas of different taxa are not well defined. All gibbon taxa are endangered at different levels, knowledge about their taxonomic classification and their exact distribution zones is a major issue for crested gibbon conservation. The present study is set up to clarify the taxonomy of crested gibbons and to elucidate their exact distribution zones. Therefore, an approach will be used in which acoustic, morphological and genetic data will be combined. Call parameters from acoustic signals will be extracted and analysed in combination with already published data. In order to detect hybridization or introgression, genetic studies will include maternal, paternal and biparental marker systems. As maternal inherited marker, the complete mitochondrial cytochrome b gene and the hypervariable region I of the mitochondrial D-loop will be sequenced. To obtain paternal and biparental data, partial sequences from the genes coding for the testis-specific protein on the Y-chromosome and von Willebrand factor will be generated, respectively. Based on the expected results, it will be possible to 1) clarify the taxonomy of crested gibbon taxa, 2) depict their exact distribution zones, 3) reconstruct phylogenetic relationships among them, 4) reconstruct biogeographic patterns leading to their current distribution, and 5) detect possible hybridization zones.

P I.19

Decline of ant-following birds in african rainforest fragments: patterns and causes

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In the tropical rainforests of Africa and America specialized insectivorous birds follow the swarm raids of army ants and prey on insects which are flushed by the ants. In a Congo-Guinean rainforest in western Kenya, I studied the consequences of habitat fragmentation on African ant-following birds and analyzed if their response is related to the availability of army ant colonies in habitat fragments. Similar to ant-following birds in the Neotropics most specialized ant-followers totally disappeared or strongly declined in small forest fragments. My data suggests that the decline of these birds is best explained by a decrease in the size of forest fragments and by the loss of Dorylus wilverthi army ants from small forest fragments. Even though a second army ant species, Dorylus molestus, compensated the decline of D. wilverthi in terms of mean abundance it can not functionally compensate it because the daytime activity of the former but not of the latter species is depending on high humidity conditions. Consequently, in the dry season specialized ant-followers in small fragments missing D. wilverthi colonies suffer from food scarcity due to a cease of army ant foraging. My study elucidates that a subtle alteration of the species composition in fragmented rainforests may have large ecological consequences.

P I.20

Phylogeographic approach in two species of armadillo from Argentina: *Chaetophractus villosus* and *Chaetophractus vellerosus* (Dasypodidae, Xenarthra).

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Living xenarthrans are representatives of the initial South American mammalian stock. This order is the second offshoot of the placental tree, after the rise of Afrotheria, and represents one of the four major placental clades. Armadillos are the oldest and most diverse xenarthran lineage, with about 21 extant species, 14 of which are present in Argentina including Chaetophractus villosus and Chaetophractus vellerosus. The phylogenetic and phylogeographical aspects of these species have not been elucidated thus far; consequently, analysis of molecular markers, such as the Control Region (CR) of mitochondrial DNA, has been proposed to study molecular evolution of these armadillos. The CR has three components: two lateral hypervariable domains, namely ETAS (extended termination asociated sequences) and CSB (conserved sequence blocks), and a Central Domain (CD), which evolves, in terms of mutation rates, as any mitochondrial gene. Particularly, variable regions of ETAS and CSB are used for population structure and phylogeography studies. Sixty nine CR sequences were analyzed and 17 haplotypes for the Control Region were identified for the first time for genus Chaetophractus, constituting a novel contribution for the elucidation of Xenarthran molecular evolution. This study has important implications in biodiversity and species conservation

P I.21

Biodiversity Characterization of *Ephedra* in Lahul & Spiti (India)

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The relative differences in responses of growth forms to habit conditions are useful in determining the relative status of build - up of diversity and adaptation of the different species. The success of biodiversity conservation and management programme depends greatly on how we encourage the human capacity to devise and carry out intellectual and realistic tasks, ranging from survey and inventorization to integrate sound management of biological resources. The holistic understanding of the multifaceted mechanisms that manage biodiversity and their spatial and temporal dynamics, requires synergetic implementation of measurement approaches, sampling designs, and technologies especially for the plants growing in extreme conditions. The Gymnosperms represent the most primitive type of seed plants, has its own implication because of attractive foliage, ecological, economical and therapeutic values, grand appearance providing splendor to the hills, at higher elevations and are closely associated with the life of human beings. Living Gymnosperms in the world comprises about 70 genera and 750 species. Indian boundaries encompass only 48 species, and 10 varieties under 15 genera, growing in wild state in different environmental habitats. *Ephedra* is such a taxon that grows in extreme conditions in hot and cold deserts in India. The monitoring of *Ephedra* in Lahul & Spiti region (alt 3600 m) exposed its value in ethnobotany, medicine and ecology. It thrives in open, dry loose gravel soil, as well as rock crevices, road side cuttings in the high ranges of North West Himalaya. The stem possesses an active constituent (ephedrine), which is used to cure respiratory passages infections and tooth ache. Successful tissue culture practices will be an invaluable contribution for rapid propagation and for *in vitro* conservation in this regard. The present paper emphasizes diversity, systematic studies including variation in populations, reproductive behaviour of Indian Ephedras to realize a way of sustainable utilization and bioprospecting by extensive field explorations. An attempt has been made to solve the disputed taxonomy considering morphological markers and the combination of characters in Lahul and Spiti,. which may be the additions to the existing data. The patterns of morphological variation within and among populations of *Ephedra* in the Western Himalayan region have been investigated. Populations of *E. intermedia* collected from the

various localities of Lahul and Spiti, depict contrasting results in the character states of habit, morphology of scale leaf, male and female strobilus. The major distinct characters included are shape, size, number, extent of connation of scale leaf at the nodal region on stem, bract, synangiophore with synangium in mature male strobilus and bract, colour of seed, degree and nature of coiling of micropyle in mature female strobilus. On this basis a new species *E. sumlingensis* Sharma & Uniyal has been established and much more to be explored for new inventions to come up in near future.

P I.22

Towards a Global Assessment of Taxonomic Needs and Capacities: what taxonomists do we need where?

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The Global Taxonomic Initiative (GTI) is a cross-cutting issue of the UN Convention on Biological Diversity (CBD), and as part of it Programme of Work has asked in 2002 for national, regional and global assessments of taxonomic needs and capacities (CBD/COP6/Decision VI/8). Whereas several national and regional assessments have already been undertaken, a global assessment is still pending. As an important contribution for a global assessment, information about the current state of knowledge of national biodiversity and taxonomic capacities is being compiled. The German GTI National Focal Point contributes to the global assessment with a study analyzing the numbers of taxonomists and taxonomic resources in relation to the species numbers recorded and estimated per taxonomic groups and countries, also with a focus on species inventories of protected areas. As expected, preliminary results indicate that existing taxonomic knowledge and resources are distributed unequally among countries and taxonomic groups. Numbers of taxonomists and the relative state of knowledge about a countries' biodiversity are positively correlated, whereas numbers of taxonomists negatively correlate with the known or estimated actual species richness per country. Especially tropical regions of Africa are in need of more taxonomic expertise, as many parts of SE Asia. The state of knowledge of not especially prominent and unpopular groups such as micro-organisms, algae, fungi, and several invertebrate taxa is generally poor.

P I.23

The EDIT network: Taxonomy to enhance capacities in conservation.

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Introduction The conservation of biodiversity requires not only a solid knowledge of existing organisms, but the ability to assess, identify and measure change as it happens. Taxonomy covers the whole of these techniques and scientific enquiries; to maintain good conservation, therefore, we need to develop and upgrade taxonomic practice and standards. The European Distributed Institute of Taxonomy (EDIT) is a European Commission-sponsored Network of Excellence aimed at starting to overcome the "taxonomic impediment" through collaboration, integration and a joint work programme (http://www.e-taxonomy.eu). It is made up of 22 major European scientific centres in taxonomy, along with Russian and US partners. Through EDIT we hope to build capacity globally and provide information and tools for use by all. The EDIT proposal is an initiative of the Consortium of European Taxonomic Facilities (CETAF) which since 1996 has been working for better integration of the taxonomic effort in Europe.

P I.24

Aquatic Biodiversity in Latin America

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Latin America is famous for harboring many hot spots for biodiversity, however, very little is known about its aquatic fauna and flora. Information is scattered for different geographical regions, and combined datasets about taxonomy and ecology of individual species are hardly available. This scarcity of knowledge is opposed to a fast dwindling diversity of aquatic species due to a large number of ecological impacts. An international team of editors have combined their efforts to combine the current state of knowledge in taxonomy *and* ecology, in order to produce a concise and affordable handbook for each group. Information on the ecology and status of the taxa (written in English) is combined with illustrated identification keys to families and genera, in both English and Spanish. Four volumes on Fish Parasites, Ephemeroptera, Simuliidae and Ceratopogonidae of South America are already available, other volumes on Plecoptera, Mecoptera and Neuroptera are close to be published. The series is essential tool for standardizing and accelerating biodiversity assessments and monitoring, for training purposes, and to identify lacunae for future research and conservation.

P I.25

Collections, Research, Data and Informatics - Integrating and Accessing Knowledge on Biological Diversity at the BGBM

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With a permanent staff of about 150 the BGBM is the largest German collection institution. The botanical garden is one of the three largest in the world with respect to species and accession holdings. The herbarium again counts among the top 20 world-wide, and the library has the most complete holdings of botanical literature in the German-speaking area. Since 2007, the BGBM DNA bank coordinates the establishment of a network of German DNA banks. The institution thus offers excellent access to taxonomic primary information which forms the basis for a wide array of research activities, ranging from biosystematics and the inventorying of phytodiversity to molecular genetics and applied conservation research. The BGBM's Biodiversity Informatics Department, which is one of the global leaders in its field, develops IT services and tools to integrate taxonomic and specimen data from multiple, disparate resources. The BGBM's objective is to communicate scientific knowledge of the plant kingdom and to increase awareness of the public to the threats the living world is facing today. The integration of biological knowledge using voucher specimens and organism names facilitates 'taxonomically intelligent' information and enables comparative biology. Thus, biodiversity knowledge can be used more readily by researchers and decision makers in applied contexts – such as the study of climate change effects on the conservation of species and habitats as well as questions of health and well-being of humans.

P II.1

Livelihood demand and its implicationon the alpha and beta diversity of tropical rainforest in southwester Nigeria

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This study examines the demand place on the diversity of tropical rainforest by the interaction of local communities with forest estates in their bid to secure a livelihood. The linkages between poverty and environmental degradation is investigated and the implications of these for the biodiversity forest communities are discussed. The implicit relationship between the socioeconomic status of rural communities and biodiversity loss was also established. The need to meet the livelihood requirements of the rural poor, especially in developing countries, so as to secure maximum value from forest biodiversity is recommended.

P II.2

The effect of diversity on light mediated changes in phytoplankton production and stoichiometry: A field experiment

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The functioning and sustainability of ecosystems may depend on their biological diversity. The proposal of Darwin that more diverse plant communities are more productive has received much attention and field and laboratory experiments show that more diverse communities can indeed be more productive. This effect may result from a more efficient resource use of more diverse communities. Here we use data from field experiments with algal communities from 42 lakes to show that the resource use efficiency of phytoplankton communities is related to their diversity. Increasing light levels resulted in a higher increase of carbon incorporation in more diverse communities. This coupling between biodiversity and ecosystem functioning was related to plant biochemistry. Taxonomic diversity was closely correlated with (biochemical) functional diversity. Highly diverse algal communities were able to absorb light at a broader range within the photosynthetic active radiation (PAR). This resulted in a stronger increase of photosynthesis with increasing light in species rich algal communities. Additionally, the higher increase in photosynthesis and carbon assimilation with increasing light of species rich algal communities resulted in higher phytoplankton biomass carbon to phosphorus ratios.

P II.3

Revealing genetic diversity and phylogeographic pattern of an inquiline gall wasp

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Gallwasps (Hymenoptera: Cynipidae) induce a wide diversity of highly complex galls on a variety of host plants. However, around 12 % of known species have lost their ability to induce galls (Synergini), and develop as inquilines inside galls of other cynipids. *Synergus umbraculus* is the representative of the latter group and has been reared from oak galls of more than 30 gall wasp hosts. In contrast to the gall inducers, we know little about inquilines. Species identification is difficult, resulting ambiguities in the taxonomy of *Synergus* genus. We examined (i) the genetic diversity within the species; (ii) the degree of genetic differentiation within and between populations, considering the possible effects of their hosts; and (iii) the large-scale phylogeographic pattern in Western Palearctic. Based on sequences of three different mitochondrial and nuclear loci of 250 individuals remarkable degree of genetic differentiation was detected. Considering the orthologue sequences of other *Synergus* species, *Synergus umbraculus* can not be regarded as one uniform species since at least four cryptic species was found. Further analysis suggested that *S. umbraculus* does not depend on a particular host association. In the Carpathian Basin the effect of each sampled glacial refugium was observed.

P II.4

Evaluation of Functional Biodiversity in Tropical Agroforestry Systems - The Case of Tomé-Açú, Northern Brazil

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A multi-criteria evaluation protocol has been developed to evaluate the functional biodiversity of agroforestry systems. The approach combines productive, ecological and operational factors to describe the functional biodiversity and aims at the identification of supporting management decisions and interventions. The suitability of the evaluation protocol was tested with three groups of farmers which had been defined based on the time of settlement, property size, technological know-how, organization and access to market: i) 'established', ii) formerly 'immigrated', and iii) recently arrived farmers ('newcomers'). The analyses reveal that the most relevant factors supporting functional biodiversity in agroforestry systems are (1) the farmers' preference for low impact techniques, (2) their adaptation capacity to environmental-social-political changes, (3) the diversification of the species composition on a plot, (4) the increase of the share of perennial species; and (5) the financial profitability of the system. Concerning the differences among groups, the 'established' farmers are significantly different from the two other groups only in agricultural practices related to production. The newly developed multi-criteria evaluation protocol has proved to be feasible in a first instance. Nevertheless, its further validation, testing and adaptation as a monitoring tool is necessary.

P II.5

Globalization and management of phytogenetic resources by cocoa farmers' communities: Opportunities to promote agro and wild life biodiversity conservation in Southern Cameroon

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With the drop of cocoa prices and liberalization of economic and agricultural sectors in the 90th, Cameroonian cocoa farmers' strategies to maintain and increase their incomes shifted toward increasing integration/management of forest species, fruit trees and annuals in/outside cocoa agroforest. Based on the participatory rural appraisal with 45 rural communities in southern Cameroon, the study evaluated: (i) the phytogenetic resource preferences of farmers in view of diversifying and increase their income in and outside cocoa agroforests; and (ii) the contribution mix of incomes between cocoa and other phytogenetic resources. Intensifying and diversifying non-cocoa phytogenetic resources inside agroforestry can help in minimizing ecological/economical risk and increase ecosystem services. Results from the exchanges with farmers are discussed in the perspective of biodiversity conservation in and outside cocoa plantations in the forest landscape. The study thus offer a good example on how trade-related policies in the agricultural sector (ex: Liberalization of the cocoa sector in Cameroon) can influence biodiversity management and conservation in forest fringe.

P II.6

Faunal Diversity in Tiger Reserves of India

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The Convention of Biological Diversity (1992) to which the Government of India is a signatory, dwell a great deal on the need to document the biological diversity existing with in the Indian territory. The 28 Tiger Reserves of India encompassed by surrogate species (Tiger- a flagship species) should hold viable populations of other species in order to act as a robust conservation tool, but there are virtually no studies that have tried to measure the viability of background populations. By focusing on, and achieving conservation of that species, the status of many other species which share its habitat – or are vulnerable to the same threats are to the same threats. Documentation of faunal resource in Tiger Reserves therefore, focuses on developing 'indicators' to be used in the assessment which are reflected in a combination of ecological fundamentals, such as biodiversity, critical habitat and key ecological relationships; site-specific considerations, environmental stress and potential impacts. Assessments and documentations also provide biodiversity values that are recognized and taken into consideration in the planning and decision making process. Species diversity in of itself, for example, is valuable because the presence of a variety of species helps to increase the capability of an ecosystem to be resilient in the face of a changing environment.

P II.7

Biodiversity as an important factor for mosquito control

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Mosquitoes can heavily affect human health, as they are vectors for various diseases (e.g. Malaria, West- Nile Virus). Climate change (particularly parameters like warmer temperature and heavy rainfalls) can potentially induce a geographic redistribution of mosquitoes and pathogens from lower to higher latitudes.
Both microcosm- and field studies have shown that mosquito larvae populations are strongly reduced, sometimes even inexistent, when a diverse community of food competitors have the potential to develop. Mosquito larvae are pioneer organisms and select preferentially as breeding sites temporary water bodies, characterized by low density of competitors or predators. An environment with low biodiversity may thus favour the development of mosquito larvae. This fact is important for the traditionally use of chemical pesticides for mosquito control. Many pesticides affect non-target species and reduce biodiversity in aquatic biotopes. Although mosquitoes are also reduced by these insecticides, they will recover rapidly, as their antagonists disappeared. For a long-term effective and environmentally friendly mosquito control, it is necessary to complement the use of pesticide by the use of a biological approach.

P II.8

Does climate change increase the susceptibility of monoculture pine stands to outbreaks of mass reproduction of pathogenic (phytophagous) insects?

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For eastern parts of Germany and Poland summer temperatures are predicted to increase between 1.5 to 2 C° accompanied by a decline of summer precipitation of 10% to 20% over the next 50 years (Gerstengarbe et al, 2003). Forests are dominated by Scots Pine Pinus sylvestris (Brandenburg 83 %, Poland 63% of total of forested area), which is attributed to be one of the most adaptive specie in areas with low precipitation, soil water and nutrient availability. Consequently, vast areas of eastern parts of Germany (Brandenburg) and Poland were afforested with Scots Pine and are presently pure, single age class stands. However, such homogenous stands are characterised by unfavourable factors such as low biodiversity and an enhanced susceptibility for pest attacks. Pure stands reveal unfavourable conditions for pest antagonists and provide ample food for verminous insects. It is not clear to what extend these mass outbreaks will increase for certain scenarios and neither do we know the cascade of associated environmental reaction like potential elevated soil organic matter decomposition which would be a feedback effect to climate change. In order to alleviate the consequences of outbreaks in forest stands and the associated monetary detriments it is indispensable to take preventive measures such as the transformation of existing species-poor forest stands into site-adapted, resilient management units which in turn will also be earmarked by a higher degree of biodiversity.

P II.9

Access to genetic resources and benefit sharing – Good practice for academic research

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Whenever scientists intend to use organisms or parts thereof from abroad for their research purposes, they need to adhere to a specific code of conduct as stipulated by the Convention on Biological Diversity CBD. The Swiss Academy of Sciences has elaborated a brochure on Good Practice. It offers easy to understand information about the Access and Benefit Sharing system regarding basic research. It explains the necessary steps to take for obtaining access to biological resources for research purposes and sets out possibilities for benefit sharing within the academic context.

P II.10

Linking Development and Conservation: Lessons and Limitations

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2 IDPM, University of Manchester

The questionable conservation success and social aftermath of many protected area initiatives has given way to a series of community based approaches. These have tried to fuse economic development, sustainable resource use and biological conservation. Over the last few decades scholars have concentrated on trying to disentangle the factors that facilitate common resource management. Although these studies have identified a series of conditions for successful collective action there is still relatively little quantitative data that successfully links social characteristics with conservation outcomes. We present the results from a meta-analysis linking social characteristics and institutional arrangements to conservation outcomes.

P II.11

Comparision of species diversity in protected and unprotected area of Chepeghli region in Markazi province (Iran)

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The Chepeghlinprotected area is situated in Markazi province near to Arak. The area of its is about 1000 hectares. Diversity is one of the most important factor to show changes in ecosystems. In this study, all of the species was collected and then species richness, species diversity and equitability were applied to measure the species diversity of three plants type in this area by using of Biodiversity computer programs. The results indicated that Astragalus eriostylus-Centaurea virgata has highest diversity and Astragalus eriostylus-Stipa hohenackeriana has lowest diversity. In present investigation, effects of protection on plant species diversity of two regions of protected site is higher than the unprotected one. although this differences between unprotected and protected part of Chepoghli because of main demolition in last years (cultivation of proposal land and irregular grazing of domestic animals in region)and shortness time of protection (about ten years), were not significant. Thus, for the more effect of protection on flora needs to longer time.

P II.12

Understanding fragmentation effects on Tropical Forests

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Increasing demand for bio fuels may lead to even stronger human land use pressure in the tropics with the consequence of massive habitat destruction and following habitat fragmentation, for example within the Brazilian Atlantic Forest (Mata Atlántica), one of the biodiversity hot spots in the world. Already approximately 92% of the former Atlantic forest has disappeared within the last five centuries and the remaining forests are mostly highly fragmented. Although the fragmentation problem is well known and has global dimensions, its impact on dynamics and biodiversity of ecosystems is still not well understood. To improve the understanding of fragmentation on tropical forests we disentangle the single effects of several processes related to fragmentation on the dynamics of the system. We present simulation results from the individual-based forest growth simulation model FORMIND. Additionally we investigate the potential of external long distance seed rain of compensating the effects of fragmentation. Different levels of external seed rain reflect different degrees of isolation within the landscape, which is analyzed for tropical forest fragments of different size. FORMIND was adapted to the Mata Atlántica at the Plateau of Sao Paulo to the study site Caucaia/Ibiuna and Morro Grande. On the background of the local recruitment dynamics and tree growth we contribute to the understanding how external seed rain and fragmentation act on tropical forest fragments of different size.

P II.13

Biodiversity in Change

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The poster will present the different activities of the long-term project "Biodiversity in Change" of the Academy of Sciences and Literature, Mainz. The project focuses on four main objectives:
Global biodiversity mapping
Rock outcrops & forest islands Diversity, dynamics and functional aspects.
Life at the canopies Tropical epiphytic diversity in natural and anthropogenic influenced vegetation.
Diversity & biogeography of the genus Impatiens in Africa and Madagascar.

P II.14

The Potential of Green Gene Technology in Biomass Production. Harming or Protecting the Environment - A legal examination

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The European Union and Germany have both set ambitious targets for renewable energies to represent a 20% share of all energies consumed by the year 2010. The use of biomass in fuel production will increase as well due to the EU-Biomass-Action-Plan and National Acts governing the share of biofuel to be around 17 % in 2020. Relying on those targets, this lecture will illustrate how Gene Technology has the potential to intensify the cultivation of GM-Biomass-Plants. Necessarily, the lecture will, as well, provide an overview of the current cultivation and research of GM-Plants for biomass production in both the International and European arenas. The rise in the use of biomass from agriculture and forestry is likely to put an additional stress on biodiversity. Therefore relevant European and German Laws, Acts, and Regulations such as the GMO-Release-Directive, the Biofuel-Directive or the German Gene Technology Act as well as similar draft laws like the German Biomass-Sustainability-Ordinance and the Best-Practice-Guidelines for GMO Cultivation will be reviewed and analyzed to determine their ability to protect biodiversity.

P II.15

Certification of Ethiopian wild coffee as an appropriate avenue for biodiversity conservation?: A local level perspective

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The montane rainforests of Ethiopia are the worldwide origin of the Coffea arabica gene-pool. Until the present they comprise naturally regenerating coffee populations with a high genetic diversity. Local people gather this wild coffee for income. Concurrently, the forests witness high deforestation leading to an irreversible loss of the wild coffee gene-pool and biodiversity.The poster concerns the question if certification of coffee cooperatives and unions according to generic standards can provide for the conservation of forest biodiversity. Empirical evidence is given that certification of wild coffee is in the given ecologic, socio-economic and institutional context fraught with fundamental problems. The fulfilment and monitoring of certification standards needs for stable value chains, know-how and trust between autonomous actors. These terms are hardly given in Ethiopia in general and the cooperative – union system in particular. In addition, higher prices for producers provide incentives to intensify forest coffee production at the cost of forest depletion. It is argued that the application of generic certification standards are not appropriate to promote conservation of forest coffee biodiversity. Instead, the development and implementation of a distinctive Ethiopian wild coffee certification standard is recommended that directly links consumer's willingness to pay for biodiversity conservation with actual sustainable forest management projects on the local level.

P II.16

The effect of diversity on light mediated changes in phytoplankton production and stoichiometry: A laboratory experiment

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The availability of light may influence the biomass and the structure of phytoplankton communities and causes changes in the biochemical composition and in the rates of photosynthesis and respiration of phytoplankton. The combination of pigments in a species determines which part of the light spectrum the species can utilize for photosynthesis. Existing theory and experiments on phytoplankton competition for light predict competitive exclusion. As a result, species interact by shading each other, and only the strongest competitor for light survives. Communities with more species could use a greater variety of resource capture characteristics, leading to greater use of limiting resources (complementarity) and therefore greater productivity (overyielding). The accessory pigments in an algal species will determine its potential for utilizing particular wavelength. Therefore, one can expect a wide range of physiological responses to variations in light quality. To investigate the effects of diversity on light mediated changes in algal stoichiometry (C:P ratios) we performed laboratory experiments as semibatch cultures. We used different algal communities of defined volume and composition and exposed them to different light intensities. Our results suggest that a strong relationship between diversity and light mediated changes in phytoplankton photosynthesis, production and biomass stoichiometry exists.

P II.17

Effects of land use and genetic variability of oaks on diversity of associated arthropods

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2 National park administration Bayerischer Wald, subject area research
3 LORICULA Agency for canopy research, ecological studies, insect determination and tree climbing

Differences in the chemical and physical traits of plants caused by both genetic and habitat characteristics may influence the diversity of associated arthropods. Oaks (Quercus sp.) are common trees in Germany which give habitat to many specialized arthropods. In the presented study we investigated the effects of oak genetic variability and land use of forest patches on the diversity of beetles (Coleoptera) and true bugs (Heteroptera). Arthropod communities were sampled using flight-interception traps in various forest patches in Bavaria (Germany), genetic variability of oaks was assessed from microsatellite loci. We present results on the relationships between the genetic variability of oaks and their associated arthropods. We also report on the effects of land use of forest patches on the species richness of true bugs and beetles.

P II.18

Characterization of microbial iron oxidizing biofilm populations of the Oder floodplain

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Natural floodplains play an essential role in the processing and decomposition of organic matter and in the self-purification ability of rivers, largely due to the activity of bacteria. The Oder floodplain is located in the National Park Lower Oder Valley and is characterised by an artificial water management, which includes flooding in winter time, while in spring time the water is actually pumped out. This results in contact of all soil systems in the park with highly pollutant water from the river Oder and subsequent deposition of the pollutants in the soil matrix. Due to the special geographical location of the Oder floodplain, the iron cycle plays an important role in this habitat. Anaerobic iron reduction in the floodplain sediments as well as iron oxidation and precipitation in the river Oder is mediated by microorganisms. As iron reduction is used for bioremediation in soil, only little is known about iron oxidizing bacteria and there role in degradation of organic substances, in particular of humic substances. the bacteria responsible for turnover processes and their role in iron oxidation of the Oder floodplain was characterised combining traditional cultivation techniques and molecular methods. For the investigation of the biofilms the DGGE method was used. The iron oxidising bacteria were isolated, cultivated and phylogenetically analyzed. New developed CARD FISH probes on biofilms link our molecular data directly to the biofilm.

P II.19

CoCE - Conservation and Use of wild Populations of *Coffee arabica* in the montane Rainforests of Ethiopia Subproject 5.4: Socio-economic and ecological impacts and implications of certification on the local level

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The overall objective of this project component is to evaluate the role of certification of 'wild' forest coffee in Ethiopia with regard to its specific ecologic, socio-economical and institutional circumstances. This includes a desk study of certification standards that are potentially suitable for 'wild' forest coffee certification in Ethiopia as well as the evaluation of already ongoing 'wild' coffee certification activities on site. Thereby, the socio-economic and ecological impacts and implications of certification on the local level producers' side will be highlighted. In order to ensure the trustworthiness of the certified products and to lay the ground for marketing a coffee of origin, the genetic fingerprinting technique will be tested in practice. Based on these findings, the second objective focuses on the search for and development of realistic alternatives to the currently applied modes of 'wild' forest coffee certification.

P III.1

Towards an International Mechanism of Scientific Expertise on Biodiversity

D. BABIN[1]

[1] IMoSEB Initiative

The poster will present the consultative process towards an IMoSEB and the follow-up of this initiative.

P III.2

The Hidden Freshwater Biodiversity Crisis

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There is clear and growing scientific evidence that we are on the verge of a major biodiversity crisis. Despite the increasing public awareness of the problem, few are aware of the catastrophic decline in freshwater biodiversity on both local and global scale. While Freshwater Ecosystems cover only 0.8% of our planets surface, they hold more than 10% of all animal species (about 126,000). More than 35% of all vertebrate species are restricted to freshwater habitats during at least part of their live. Compared with terrestrial and marine species, there is already a much over proportional rate of extinct and threatened freshwater animals showing, that threads are real and acting today. The main human impacts that thread freshwater biodiversity are water abstraction, pollution, invasive species, overexploitation, river fragmentations and flow modifications. Increasing needs for water already makes freshwater biota the most threatened part of biodiversity. Freshwater biodiversity will also be the first victim of climate change and extinctions are fastening especially in semiarid areas as the Mediterranean biodiversity hot spot. Rivers, lakes, groundwaters, and wetlands offer a remarkably diverse array of natural functions and services to humans; more than any other ecosystem types. Despite their pivotal ecological and economic importance, freshwaters have been almost completely ignored in European and global biodiversity assessments. Therefore, they have not been of primary concern in policy making. Only recently did the EU take the initiative to improve this situation through the European Community Biodiversity Strategy (COM (98)42). Further, governments have set the ambitious target of halting biodiversity loss by the year 2010. The scientific community now faces the challenge of determining the critical factors responsible for loss and for providing the tools to assess the progress made toward this target. In fact, the patterns of freshwater biodiversity and the processes that maintain them at global and European scale are poorly understood for most freshwater groups. This poses a severe handicap for effective conservation planning of freshwater biodiversity as well as the human-related services that depend on it. Substantially increased efforts are needed to evaluate, complement, integrate, and analyse the quantitative data on freshwater biodiversity patterns, and on how freshwater biodiversity responds to environmental pressures at global,

European, and local scale. Centre for Freshwater Biodiversity: Freshwater Biodiversity sensu lato is a key research focus of the Leibniz-Institute of Freshwater Ecology and Inland Fisheries, IGB, in Berlin, Germany. More than 40 internationally recognized scientists deal with all aspects of freshwater biodiversity, from habitat to genetic diversity and from microbes to fish (www.igb-berlin.de).

P III.3

Species Diversity of the two genera Caulerpa and Caulerpella (Chlorophyta, Bryopsidales) in the Vietnamese waters

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Caulerpa and *Caulerpella*, the two genera belonging to the phylum Chlorophyta, order Bryopsidales distributes generously along the coast and islands of Vietnam. Based on the collected specimens, twenty-seven taxa belonging to the genus *Caulerpa Lamouroux* and one species of *Caulerpella* Prud'homme van Reine and Lokhorst are described and illustrated. The list of species includes: *Caulerpa brachypus, C. cupressoides, C. fastigiata, C. lentillifera, C. mexicana, C. microphysa, C. nummularia, C. peltata, C. racemosa, C. serrulata, C. sertularioides, C. taxifolia, C. urvilliana, C. verticillata, C. webbliana* and *Caulerpella ambigua.*

P III.4

Earth Observation for Monitoring Biodiversity in Central America

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1 GeoVille Information Systems
2 Nansen Environmental and Remote Sensing Center (NERSC)
3 Marine Spatial Ecology Lab (MSEL)
4 Collecte Localisation Satellites (CLS)

The ESA DUE project "DIVERSITY aims at defining, demonstrating and validating a number of geoinformation products and services based on Earth Observation technology for supporting the implementation of the UN Convention on Biological Diversity. Based on the requirements of the project users (UNESCO, CBD, CCAD, Marviva) several products are generated for Central America and parts of the Caribbean: 1) a status map of worldwide drylands and their changes, based on existing land cover products. 2) regional and local information on land cover, land cover changes and derived indicators in context with biological corridors. 3) coral reef habitats and their changes across the Caribbean region, hotspot areas in greater detail. In context with related impacts on coral reef systems, water quality in the Caribbean Sea is monitored. 4) mangrove maps and mangrove change maps using classification approaches on radar data. 5) EO based sea surface temperature, chlorophyll, surface currents are routinely provided and analysed for the Tropical East Pacific Ocean in order to determine how oceanic conditions influence migrations of marine animals in this area.General goal of the project is to establish sustainable biodiversity monitoring based on repeatable approaches and earth observation data from space. The experiences gained in the project can support the objective of developing a Global Biodiversity Observation System with respect to data and products specifications and priorities.

P III.5

Expansion of oil palm plantations and their impact on biodiversity and climate change in north-east Pará, Brazil

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Expansion of biofuel industries intensifies the existing competition for land surface between agriculture, urban areas, and natural forests. In contrast to the well-known environmental effects of oil palm cultivation in south-east Asia, the consequences of oil palm plantation expansion in the Amazon basin have hardly been discussed, until now. In a new approach, we combined Landsat-ETM satellite images with QuickBird scenes. This method allowed to distinguish very clearly between oil palm plantations and secondary vegetation. In addition to conventional land use classes, our classification identified the extension of palm oil plantations of almost 10% of the Bragantina region. This means that palm oil production seriously enters into competition with fallow-based agriculture systems of smallholders, which incorporate biodiverse secondary forest fallows. Thus, the increasing biofuel production accelerates deforestation and the loss of biodiversity and ecosystem functions. Our results support a governance scenario, which predicts a reduction by about two-thirds of watersheds, eco-regions, and mammalian species. One of the main driving forces of biofuel development is the benefit of reduced GHG emissions. The assumption that biofuels produce lower emissions than fossil fuels has been disproved by several recent studies. But even a positive final result related to GHG's could not justify the destruction of forests and the consequences on biodiversity and ecosystems involved.

P III.6

Modelling the abundance of a keystone army ant species for a changing East African forest landscape over the past 90 years

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Tropical rainforests are rapidly declining but the consequences for many taxa are little understood. The swarm-raiding army ant Dorylus wilverthi is considered a keystone species of Central African rainforests because a multitude of organisms (e.g. ant-following birds) directly or indirectly depend on this ant. Using land cover information from 1913 to 2003 and an extensive data set on the abundance of army ants sampled over the course of four years we estimated the consequences of forest clearance and fragmentation on the D. wilverthi population in the Kakamega Forest area, western Kenya. We found that the abundance of D. wilverthi strongly increased with increasing forest cover at a spatial scale of 1.6 km (R^2 = 43%). Our model predicts that the landscapes will loose the army ant if the forest cover falls below 23%. Since 1913 the Kakamega Forest area lost ca. 32% of its cover and got, up to 1984, increasingly fragmented. Spatial extrapolation of our regression results by a moving window algorithm suggests that the change in forest habitat over this time period led to a 45% decline of the population of D. wilverthi. It is interesting to note that the forest distribution is affecting the abundance and not just the proportion of forest cover. As only a small part of the forest is under protection, divided into four distinct areas, spatial modelling suggests that the size of two of the reserves would not be sufficient for a long-term conservation of D. wilverthi.

P III.7

The Conservation Commons

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[2] GBIF
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[5] Conservation International
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[7] University of Maryland
[8] CRIA
[9] Plazi.org

Environmental degradation and habitat loss continue to accelerate. Solutions may be found to reverse this trend, but only with comprehensive data, information and knowledge on the conservation and sustainable use of biodiversity. Data access and knowledge sharing are not simple tasks, however. Difficulties abound. Much of the data, information and knowledge conservationists require is fragmented, difficult to find, or simply not accessible to the conservation community. This challenge is magnified in many developing countries where the consequences of the ever-widening "digital divide" impede conservation efforts at national, regional, and global levels. The Conservation Commons is the expression of a cooperative effort of 69 non-governmental organizations, international and multi-lateral organizations, governments, academia, and the private sector, which is responding to this challenge by seeking to break down barriers to access, more effectively connect practitioners to data and information assets, as well as to develop and adopt standards for integrating these assets to support the generation of knowledge and best practice. The purpose of the Conservation Commons is to ensure open access and fair use of data, information, knowledge, and expertise on the conservation of biodiversity for the benefit of the global conservation community and beyond.

P III.8

Monitoring of Forest Ecosystem Biodiversity in Human-Impacted Zones Using GIS Technologies

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Maintenance of forest ecosystem biodiversity and sustainability under ever increasing human-caused environmental stresses is a high-priority task. Siberian boreal forests have been disturbed significantly by logging, fire, industrial pollution, and natural disasters over the past fifty years. This resulted in a prominent ecosystem disbalance including changes of forest biodiversity and ecological functions.Our study was focused on monitoring the current state of forest ecosystems, their regeneration dynamics and biodiversity. The regional vegetation was classified using a topogenetic approach, i.e. by similarity of site conditions, forest community origin, and development trends, rather than easily changeable outward features, such as vegetation species composition.A methodology of building computer vegetation dynamics maps based on the analysis of multispectral Landsat ETM+ images superposed on a digital relief model, and linked with ground observation data was developed using GIS called "Forests of Central Siberia".The vegetation cover maps obtained as polygonal vector layers show the spatial distribution of vegetation regeneration series and stages under various site conditions. These maps allow, as a part of the GIS database, to estimate forest regeneration with an account of differences in ecological conditions. They are actually spatial vegetation models that reflect ecosystem diversity and can be helpful in fulfilling numerous ecological and monitoring tasks.

P III.9

Microclimate and tree community linked to the directional changes in lepidopteran larvae community due to fragmentation of tropical forest

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We investigated the effects of habitat fragmentation on leaf herbivory, larval density, species richness and diversity as well as composition of the herbivorous lepidopteran larvae community in a medium altitude tropical forest in Western Uganda. We looked at microclimate, size of fragment, isolation and tree community as possible explaining factors. We sampled ten Neoboutonia macrocalyx Pax. (Euphorbiaceae) trees on each fragment during dry and rainy season, four times in a year. The rates of herbivory, total larval density and species richness were significantly negatively affected by habitat fragmentation. Species diversity did not change, probably due to influx of matrix species, as 28 % of the species were found only in the fragments. The dominance structure in the larvae communities had changed, and all the communities in the fragments had experienced parallel changes in the community composition. None of the changes we observed were related to the size of the area or isolation. We found an indication of association between the larvae and the tree communities but this only approached significance. The fragments were significantly drier during most of the day and hotter during the afternoons. Our results show that habitat fragmentation affects negatively larvae communities due to hotter and drier microclimate and changed tree communities. Reduced larval densities make the species more prone to extinction; thus the fragments cannot support viable communities in a long run.

P III.10

Climate Change and global plant diversity

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Little is yet known about the impact of global climate change on plant species distributions and species richness patterns. We modeled global contemporary species richness across 1,032 geographic regions worldwide based on environmental predictor variables according to the water-energy-richness hypothesis. The results are then applied on the contrasting A1FI and B1 global greenhouse gas emission scenarios used by the Intergovernmental Panel of Climate Change (IPCC), in combination with corresponding future climate surfaces from 5 global climate models per 110x110km equal area grid. By 2100, the capacity for species richness per standard area decreases by 10.4% in the A1FI scenario in a global average, whereas it remains similar to today in the B1 scenario (+0.2%). Both scenarios indicate is a strong deviance in the predicted changes amongst different geographic regions. Large proportions of species richness are likely to be not longer supported by future climate conditions especially in many tropical and subtropical drylands, but also partly in the wet tropics, whereas the capacity for species richness may increase by more than 10% in Arctic and many temperate regions. However, any rapid shift in contemporary climate conditions that causes changes in the capacity for species richness may have negative impacts on contemporary floras due to species turnover and local extinction, and resulting in possible changes of ecosystem functionality.

P III.11

NATURA 2000 sites under climate change - a challenge for nature conservation

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3 University of Mainz
4 University of Applied Sciences in Eberswalde (FHE)

The loss of biodiversity including genetic diversity, species diversity and ecosystem functions threaten ecosystem services and the maintenance of biodiversity for future generations. The main reasons are land use change, climate change and pollution. The European Union had decided to implement a European network of protected areas, Natura 2000, to reduce the loss of biodiversity. The German Federal National Agency of Nature Conservation (BfN) funds a research project to assess the risk for specific nature conservation targets under climate change. The project aims at quantifying the risk for plants, animals and habitats. Management options are discussed with stakeholders, and political implications are specified: Nature conservation needs more space for dynamic processes, and larger areas to allow adaptation to global change. Functional coherence has to be increased to allow for dispersal, also including a management of the surrounding landscape. The legal framework had to be adapted to allow for dynamic processes without threatening the state that has been achieved for species and ecosystem conservation so far. On one hand, financial resources are needed to implement adaptive management. On the other hand, measures have to be implemented that acknowledge the fact that nature conservation areas contribute to climate change mitigation (e.g. forests, bogs) and to climate change adaptation (e.g. flood control, maintenance of genetic diversity, landscape cooling by evaporation).

List of Authors