

Second Sino-German Workshop on Biodiversity Conservation

Management of Ecosystems and Protected Areas: Facing Climate Change and Land Use



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2009

Management of Ecosystems and Protected Areas: Facing Climate Change and Land Use

**Results and documentation of the
'Second Sino-German Workshop on
Biodiversity Conservation'
March 30th - April 1st, 2009**

organized by

German Federal Agency for Nature Conservation (BfN)
Chinese Research Academy of Environmental Sciences (CRAES)
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Part I: Introduction

'Second Sino-German Workshop on Biodiversity Conservation' - Management of Ecosystems and Protected Areas: Facing Climate Change and Land Use

Introduction by Prof. Beate Jessel, President, BfN

The background of the 'Second Sino-German Workshop on Biodiversity Conservation' is the cooperation between the BfN (Bundesamt für Naturschutz-German Federal Agency for Nature Conservation) and China, in particular its partner CRAES (Chinese Research Academy of Environmental Sciences). In the recent past, the political and economic status of China has continued to rise. The globally noticeable effects of its economic development and the serious environmental stress it imposes on the world become increasingly clear each day. In the environmental area, Germany and China already maintain a close collaboration, e.g., in the area of 'renewable energy'. Until now, however, 'Biodiversity and Nature Conservation' subjects have not been covered nearly as much in the cooperation, despite the fact that China is known as a mega-diverse country and an important partner in international negotiations. Therefore, biodiversity and nature conservation subjects were first brought into discussion in the 'First Sino-German Workshop on Biodiversity Conservation' in March 2008 in Beijing.

SINO-GERMAN COOPERATION

The cooperation between CRAES and BfN now exists for over two years. In March 2008, the first Workshop on 'Biodiversity Conservation' was organized by CRAES and BfN, together with the GTZ office in Beijing. The workshop in spring 2009 in Bonn was the second in a series of workshops which will take place in annual exchange between China and Germany. The workshop series aims to discuss different issues dealing with 'Biodiversity and Nature Conservation'.

Another aspect of BfN's collaboration with CRAES is the exchange of experts. Also in the context of this cooperation a new important project has recently started, entitled 'German-Chinese Cooperation Platform for the Conservation of Species-Rich, Highly Carbon-Sequestering Ecosystems', that is supported by the international climate initiative of the German Ministry of the Environment and carried out by GTZ in cooperation with CRAES and BfN.

China is an important partner for Germany. Numerous German governmental and non-governmental organizations and companies cooperate with Chinese partner organizations or companies. Since 1994, there has been a bilateral German-Chinese environmental agreement. In the field of the environment, Germany and China already cooperate closely, and now the issue of biodiversity becomes more important. There is an increasing exchange on topics concerning the conservation of biodiversity between Germany and China which was highlighted in January 2008. The environmental ministers of both states, Mr. Zhou and Mr. Gabriel, agreed to strengthen their involvement and cooperation in the field of biodiversity.

Especially scientific and technical cooperation in the focus points 'biodiversity' and 'nature conservation' between the two countries turn out to be very promising. Through the exchange of international approaches, for example, in the subjects 'biodiversity-monitoring', 'protected area management' or 'scenery planning' vital synergies, that are important for all, can be developed. Therefore, an intensive exchange appears to be necessary. Especially important is the coordination of possible joint activities along with the exchange

of experiences in order to avoid duplications, to learn from experiences, and to prevent contradictory project results. Therefore more conferences and workshops are planned to cover several different subjects with the main focus set on biodiversity and nature conservation.

CHINA'S BIODIVERSITY

China is a country with one of the most extraordinary biological diversity. It inhabits 10 percent of worldwide plant species and 14 percent of worldwide animal species. With this, China belongs to the leading group of the 17 mega diverse countries. On the other side China's economy is growing at an enormous pace. Successful management of its ecosystems and protected areas becomes a central challenge for China as the country is facing growing threats for its biodiversity and the provision of ecosystem services. With rapid developments in the field of environmental protection China has proved its competence and willingness to learn as fast as the ecosystems are changing. One example that set an important signal was the transformation of the SEPA (State Environmental Protection Agency) into a Ministry of Environmental Protection in March 2008 by the Chinese government. New pressures on the functions and services of the ecosystem, like climate change, and continuing pressures resulting from multiple demands on land use make it necessary to share knowledge on ecosystems and protected areas management at the international level.

THE WORKSHOP

The 'Second Sino-German Workshop on Biodiversity Conservation' was entitled 'Management of Ecosystems and Protected Areas: Facing Climate Change and Land Use'. From March 30th to April 1st three topics were discussed at the BfN, Bonn: 'Nature Conservation facing climate change and land use', 'Monitoring and Information Management' and 'Management of Protected Areas'. The purpose of the workshop was to foster the scientific exchange of methodological approaches, research results, and experiences from the field. It offered the unique opportunity to discuss the topics with a delegation of

Chinese scientists from CRAES and practitioners from Jiangxi Province together with German and European experts. It allowed an intensive exchange of experiences with current and future programs and projects in the field of biodiversity and the newest scientific developments. In addition the workshop gave the opportunity to discuss the main focuses and strategies of Germany's engagement in the area of biodiversity and to discuss the possibilities of a closer cooperation and interlinking of German-Chinese organizations.

THIS ISSUE

This BfN-Script gives a detailed overview on the discussed issues and the major outcomes of the workshop. In addition to the introductory part it contains the presentations, the syntheses of the working groups, and some insights from the excursions that followed the workshop.

Before the presentation slides the reader will find summaries that outline the main thoughts and argumentation of the presentation. At the end of each abstract we placed key literature and useful web pages that allow the interested reader to further deepen his knowledge in the specific field. After each topic you will find personal information on the author. This includes contact details as well as information regarding the author's background and current occupation. In case you would like to get more information or even start a cooperation, this allows you to get in contact with the contributors directly.

The syntheses of the working groups reflect problems in the specific fields in general and in China and Germany in particular. Scientific challenges and fields of possible future cooperation are laid open.

Part I: Introduction

Second Sino-German Workshop on Biodiversity Conservation: Strengthening Sino-German cooperation to deal with climate change

Welcome Address by Mr. Shu Jianmin, Vice-President, CRAES, on March 30th 2009

Respected Prof. Dr. Beate Jessel, President of BfN,
Distinguished Guests, Ladies and Gentlemen,

I am honored to lead the delegation from CRAES to attend the 2nd Sino-German Workshop on Biodiversity Conservation. First of all, on behalf of CRAES, I would like to extend my sincere thanks to BfN for your great efforts organizing such a successful workshop. Also thanks to GTZ for your great support, and heartfelt greetings to all German experts present here.

Since 2008, CRAES and BfN carried out a series of academic activities and communication in field of biodiversity conservation, obtaining abundant fruits. In March 2008, the 1st Sino-German Workshop on Biodiversity Conservation was successfully held in Beijing, after which MOU was signed jointly by CRAES and BfN, establishing a long-term cooperative mechanism of joint research and academic communication. Through our efforts together, the project of "Sino-German Cooperation Platform for the Conservation of Species Rich, Highly Carbon-Storing Ecosystems" jointly applied for by CRAES, BfN and GTZ was approved by BMU. Since this project will be carried out in Jiangxi Province, in order to better implement it and achieve more effective project results, we especially invited experts from Jiangxi Provincial Environmental Protection Bureau and Jiangxi Academy of Environmental Sciences to attend our meeting. Later, they will introduce to us the work carried out by Jiangxi Province in the field of natural conservation. The above mentioned joint project will further enhance Sino-German cooperation in the field of climate change and biodiversity conservation. Actually, China is paying

high attention to climate change and biodiversity conservation. It is one of the first member countries joining Convention on Biological Diversity. It is also an active participant in international cooperation of climate change. With high sense of responsibility, Chinese government is dedicated to implementation of sustainable development strategy, while developing its economy. In 2007, a Leader Working Group of Climate Change, Energy Saving and Emission Reduction was established by the State Council. Premier Wen Jiabao is the group leader. China's National Climate Change Program and Comprehensive Work Planning of Energy Saving and Emission Reduction were issued by the group to set up a target responsibility system. While making transformation of economic growth pattern, Chinese government conduct effective protection of its biodiversity resources, through legislation, regulation and planning, on-site conservation and off-site preservation methods, as well as scientific research, publicity and education. Till the end of 2006, there are already 2395 natural reserves of varied types and different levels, taking about 15% of land territory, which form a preliminary national natural reserve network of comparatively complete types, appropriate distribution and full function.

It is well known that climate change has become an indisputable fact. It is clearly pointed out in the Fourth Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC) that climate change in the past has already caused significant impacts on biodiversity, some of which has even lead to extinction of certain species. The climate change in the future will bring definitely more profound influence on biodiversity. 25-40% of the earth's current ecosystem structure and

function will encounter great change, which is undoubtedly a great challenge for biodiversity.

The Chinese government is paying great attention to issues on climate change. It has signed and approved United Nations Framework Convention on Climate Change and Kyoto Protocol. In 2007, China's National Assessment Report on Climate Change and China's National Climate Change Program were established. It is noticed that China's biodiversity is rich with its special characteristic. However, the ecological environment here is comparatively fragile, with its biodiversity tending to be more easily affected by negative impact of climate change. In the China's National Assessment Report on Climate Change and China's National Climate Change Program, biodiversity conservation's adapting to climate change is clearly stressed out to be key contents for China's strategy dealing with climate change.

CRAES is attaching great importance to climate change problems. Last century in the early 1990s, Research Center of Climate Change Impact was established in our academy, working for research on climate change and active participation to relevant international activities. The impact of climate change on biodiversity and the adaption is the focus research field of the Research Center of Climate Change Impact of CRAES, which has already conducted vulnerability analysis on climate change's impact on typical ecosystem's structure and function, the impact on rare and endangered species as well as the impact on alpine ecosystem and species. Currently, it is starting research on rare and endangered species' adaption to climate change, which will be of significant sense for further study on biodiversity conservation and its adaption to climate change, laying good basis for relevant cooperation between CRAES and German partners.

Ladies and gentlemen, Biodiversity conservation is a vital matter closely related to each one of us. It is hoped that through this workshop, both Chinese and German experts would enjoy better

communication and discussion with each other. Wish more Sino-German cooperation and collaboration would be carried out in field of biodiversity conservation in future. Let's arm in arm to make our best promoting biodiversity conservation for the whole world and to fight together for a better earth and a better global environment.

Thank you!

Part I: Introduction

Impressions of the workshop



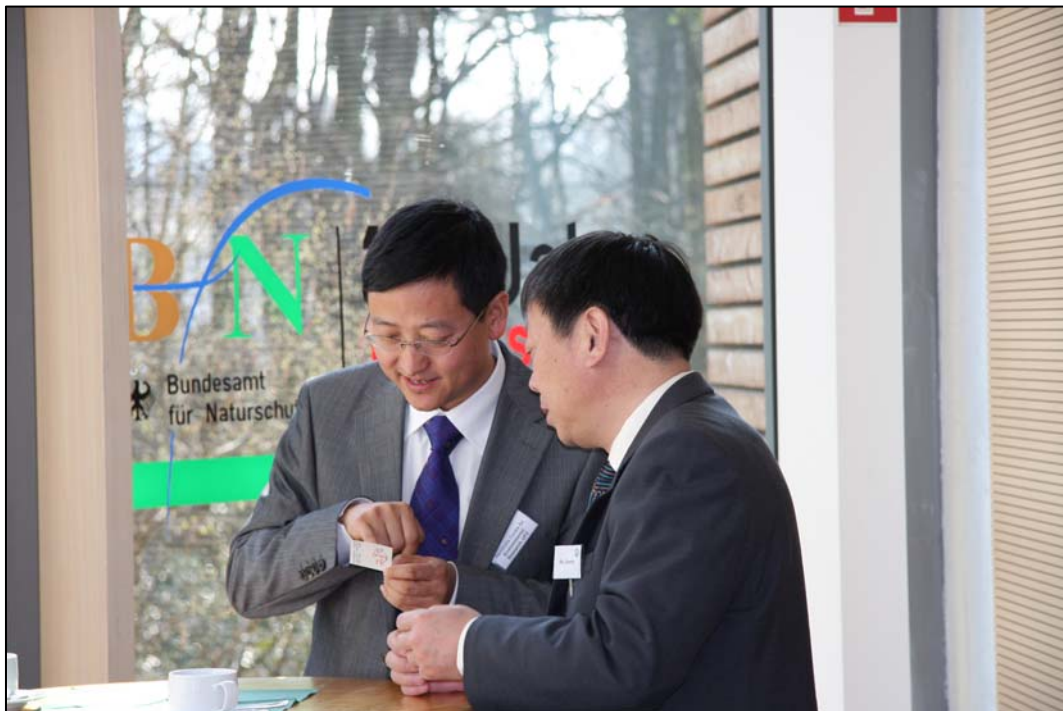
Prof. Beate Jessel, President of BfN, introduces the topics of the workshop



Mr. Shu Jianmin, Vice-President of CRAES, stresses the importance of international cooperation



The participants of the workshop in front of the old BfN-Building in Bonn



The workshop was an excellent platform to share ideas, visions and business cards



The working group led by Cordula Eppler debated in the conference room



The working group led by Zhou Yun discussed crucial topics in a convenient atmosphere

Part II: Workshop Presentations

1 Nature Conservation facing Climate Change and Land Use

Climate change presents big new challenges for nature conservation worldwide. Important measures which are currently being discussed in the context of the expected climate change and the reduction of atmospheric greenhouse gases are: the saving of greenhouse gas emissions and the increase of carbon storage in ecosystems. With regard to these discussions and measures, it is of

great importance to keep in mind that not all measures against climate change necessarily have positive effects on biodiversity.

The role of biodiversity – in particular in relation to climate change and the protection of ecosystem services – is of global, often underestimated importance. These subjects also came up during the first part of the workshop.

THE PRESENTATIONS TOPICS

1.1 Impacts of climate change on nature conservation strategies

by Beate Jessel, President, BfN

1.2 The impacts of climate change on endangered species: vulnerability and adaptation in China

by Wu Jianguo, CRAES

1.3 The role of nature conservation in cross-sectoral adaptation strategies to climate change - and related activities of the German Federal Agency for Nature Conservation

by Cordula Eppe, BfN

1.4 Impacts of urban land use/land cover changes on regional landscape and vegetation species diversity: Beijing as an example

by Wu Xiaopu, CRAES

1.5 Impacts of climate change on biodiversity at different scales - input, models, output

by Ingolf Kühn, UFZ

1.6 Responses of forest-steppe ecotone on the Eurasian grassland under global climate change

by Feng Chaoyang, CRAES

1.7 German-Chinese cooperation platform for the conservation of species rich, highly carbon-sequestering ecosystems

by Eva Axthelm, GTZ

All presentations are available for download at http://www.bfn.de/0502_skriptliste.html

Part II: Workshop Presentations

1.1 Impacts of climate change on nature conservation strategies

by Beate Jessel, President, BfN

Climate change poses new challenges to nature conservation that make it necessary to find new, adapted answers by integrating all sectors involved. On the other hand protection of certain types of ecosystems and sustainable land use might contribute significantly to adaptation and mitigation strategies for climate change (Jessel 2008, 2009).

Direct effects on biodiversity result from changes in temperatures, rainfall, frequency, and intensity of extreme weather events. These factors influence aspects like seasonality, behaviour, reproduction, and competition success or potential distribution range of species and populations. As not all species are able to adapt to these changes in an equally successful way, the numbers of occurrence and the distribution ranges of species will change in different degrees. Some biocoenotic relationships (e.g. temporal synchronisation of development stages, predator-prey and concurrence relationships) will be decoupled. As a result, new life communities will evolve that dynamically change with preceding climate change. Negative effects of climate change are especially expected for species of the mountain and coastal regions, water and peatland species, spatially very restricted species, species living at small special locations, and for species with a low distribution potential (respective a distribution potential limited by geographic or anthropogenic factors). According to a rough estimate by Leuschner & Schipka (2004) up to 30 % of native species might disappear from Germany during the next decades because of climate change. In addition to the loss of biodiversity on the species level, we have to consider the loss of genetic diversity that results from decreasing numbers of individuals and the loss of subpopulations in species that are affected negatively by climate change. Another effect of climate change is the natural shift of

distribution ranges: the range borders of overwintering waterbirds, for example, are increasingly shifting towards Northeast. In Germany, this already has resulted in increased numbers of Northern shovellers and decreased numbers of Mallards. Less desirable than such natural range shifts (which represent necessary adaptation processes) is the climate change-induced spread of invasive alien species.

Climate change also has indirect effects on biodiversity, resulting from the effects of climate protection and adaptation measures in other sectors (e.g. adaptations in agriculture and forestry, flood control measures). There is a foreseeable increasing space requirement and -competition between nature conservation and other sectors: for example, more land will be needed to cultivate renewable energy material, while at the same time, the establishment of effective connectivity measures and the provision of compensatory habitats for species shifting their distribution range as a result of climate change become more and more important. This underlines that nature conservation efforts must not be reduced to protect single species and areas, but should, instead, contribute to conserving the ecological functionality of the landscape, e.g. by establishing ecological networks.

On the other hand ecosystems may actively contribute to the mitigation of climate change, by protection and regeneration of ecosystems which provide a high carbon sequestration or by sustainable and regionally adapted modes of land use which help to prevent greenhouse gas emissions. For instance the functions of soils for carbon sequestration deserve special attention, as about 80% of the global carbon supplies which are participating actively in the global carbon cycle are fixed in soils (Kögel-Knabner & Lützow 2005). Also synergies should be considered, for example by land

use options which contribute not only to mitigation and adaptation of climate change but create further welfare, for instance by protecting not only biodiversity but also natural assets like water and soil.

Because of the estimated changes the main future challenges in nature conservation will also include necessary changes and modifications of our value systems and our strategies for nature conservation: changes in perspectives of consideration (from local to more large-scale perspectives), a relativisation of naturalness (which climax is used for orientation, e.g. with regard to the spread of thermophile species?), a dynamisation of targets (from static concepts to dynamic developments; conservation of development potentials rather than of current conditions), and others. In the face of climate change, we need to revise and to adapt our own moral targets. This cannot be done without an intensive dialogue with the different affected groups and targetgroup-oriented communication. But it might be exactly this necessity, which poses a chance to nature conservation: As the conservation and regeneration of carbon-rich ecosystems (e.g. peatlands, wetlands, old forests) and adapted land

use measures contributes to the mitigation of climate change effects, the role of functioning ecosystem services and, more generally speaking, of synergies that exist between nature conservation and other sectors, may be brought to the awareness of a wider public.

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BACKGROUND AND TASKS

Prof. Dr. Beate Jessel is the President of the Federal Agency for Nature Conservation (BfN), Germany. In this position, her main tasks include researches in

the field of nature conservation and landscape development on national level, informing the public and enhancing public participation in nature conservation issues, etc. She gained her MSc in Landscape Architecture, Technical University Munich-Weihenstephan, and PhD in Landscape Planning and Agriculture, Technical University Munich-Weihenstephan. During 1999-2006 she held the Chair for Landscape Planning at the University of Potsdam. During 2006 and 2007 she was the Chair for Strategies of Landscape Management in the Technical University Munich-Weihenstephan. Her special fields of expertise are environmental impact assessment,

strategies of landscape development and land-use planning, watershed and water resource management, theory formation in the field of ecologically oriented planning. She is also the international co-chair of the Task Force for "Ecosystem Services and Management" of the CCICED (Chinese Council for International Cooperation on Environment and Development).

Part II: Workshop Presentations

1.2 The impacts of climate change on endangered species: vulnerability and adaptation in China

by Wu Jianguo

CLIMATE CHANGE IN CHINA

The surface temperature in China has been increasing since the last century. The long-term warming trend is similar to the global average. The warming in winter is the most significant. The maximum warming was found in North China, Northeast China and Northwest China. Future air Temperature will increase like global air temperature and precipitation will change greatly In China.

CLIMATE CHANGE AND BIODIVERSITY

The evidence suggests that both terrestrial and marine biological systems are now being strongly influenced by observed recent warming. Biodiversity will be affected by climate change and sea-level rise, with an increased risk of extinction of some species. Significant disruptions to ecosystems from disturbances (e.g., fire, insect outbreaks) are expected to increase and changes in climate could also increase the probability of abrupt, non-linear changes in many ecosystems (IPCC Synthesis Report 2001). Roughly 20-30% (varying among regional biotas from 1% to 80%) of species assessed so far (in an unbiased sample) are likely to be at increasingly high risk of extinction if global mean temperatures exceed 2-3°C above pre-industrial levels. The resilience of many ecosystems (their ability to adapt naturally) is likely to be exceeded by 2100 by an unprecedented combination of change in climate, associated disturbances (e.g., wildfire, insects), and other global change drivers (IPCC, 2007).

IMPACTS OF CLIMATE CHANGE ON ENDANGERED SPECIES IN CHINA

It is very plentiful in biodiversity in China, and there are many endangered species. Climate change in China could cause distribution of plant species.

Some species are likely to enlarge their distribution. Some will probably decrease their distribution. Many will change their spatial pattern. Climate change will also cause changes in distribution of endangered animals. Some animal would enlarge the distribution. Some would decrease the distribution. Many would change the spatial pattern. It can be assumed that climate change has an impact on species diversity.

ADAPTING BIODIVERSITY CONSERVATION TO CLIMATE CHANGE

How to protect endangered species following climate change will be a huge challenge for the biodiversity conservation community. Successful adaptation is an adjustment by an ecosystem or community to a new or changing environment without simplification or the loss of structure, functions and components. Adaptation activities may include scientific, technological, institutional, behavioral, political, financial, regulatory and, or individual adjustments. Ecosystem and biodiversity adaptation to climate change is an important subject for the National strategy of adaptation to climate change in China.

Protected areas are important for adaptation of biodiversity to climate change. There are many nature reserves at different levels in China. Effective responses depend on an understanding of likely regional climatic and ecological changes. Monitoring environmental change, including climate, and associated ecosystem responses is vital to allow adjustments in management strategies. Expansion of reserve systems can potentially reduce the vulnerability of ecosystems to climate change. Reserve systems may be designed with some consideration of long-term shifts in plant and animal distributions, natural disturbance regimes and the

overall integrity of the protected species and ecosystems. Main tasks for successful biodiversity managers are: Reducing existing threats to biodiversity by building resilience for natural systems and species, incorporation of climate change information into management tools for biodiversity managers, assisting the natural adaptation of species and ecosystems through improved on- and off-reserve. Conservation areas should be enlarged where appropriate, buffer zones and habitat mosaics around conservation areas should be created and restored. Ex-situ conservation and translocation strategies need to be implemented.

Monitoring of climate, associated species, ecosystem responses, and animal behavior for adaptation to climate change is important.

To support the wild horse to adapt to extreme climate events livestock shed are built. Artificial supply fodder and artificial watering for adaptation of wild horse to extreme climate events and drought is important. In Qi lian nature reserve the following

actions are being taken: restoration of vegetation, protection of habitat, monitoring of species and ecosystems, building of grates around grassland for the animal, control forest fire for adaptation to climate change. In Tai bai mountains nature reserve the following actions are being taken: Species adaptation measurements to climate change.

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BACKGROUND AND TASKS

From 1996-1999 Prof. Dr. Wu Jian Guo made his MSc in Ecology at the Chinese academy of forestry sciences. Until 2002 he continued his studies and made a PhD in Ecology at the Chinese academy of forestry sciences. From 2002 onwards he worked at the Chinese research academy of environmental

sciences. In 2005 he was in Canada as a visitor scientist to study the carbon cycle model.

Today Prof. Dr. Wu Jian Guo's special fields of expertise include the impacts of climate change on biodiversity and ecosystems, biodiversity and ecosystem adaptation to climate change, terrestrial ecosystem C and N cycle, biodiversity conservation and global change, as well as policy and technology for adaptation climate change, policy and technology of mitigation climate change and finally environmental pollution and climate change.

Prof. Dr. Wu Jian Guo is a member of the assessment committee of the impacts of climate in China, which belongs to China national climate committee. Further on he is leading author of the national report on climate change in China and reviews on the IPCC assessment reports.

From 2002 to 2005 he was in charge of a project on the impacts of climate change on vulnerable ecosystems in China. From 2004 until 2005, he was in charge of a project on the impacts of climate change on Endangered Species. Currently he is in

charge of the project about the adaptation of endangered species in northwest of China to climate change; the impacts of climate change, enhance the UV-B and Nitrogen deposition on the alpine ecosystem and its adaptation.

Part II: Workshop Presentations

1.3 The role of nature conservation in cross-sectoral adaptation strategies to climate change - and related activities of the German Federal Agency for Nature Conservation

by Cordula Epple

The relationship between nature conservation and climate policy has various sides. On the one hand, ecosystems are an important part of the climate system, mostly because of their role in sequestering, storing and releasing carbon. Terrestrial and marine ecosystems currently absorb a significant share of anthropogenic CO₂ emissions, while their degradation can lead to the release of large amounts of greenhouse gases (approximately one fifth of global anthropogenic emissions). Thus it is clear that climate change mitigation policies cannot be successful without addressing the drivers of processes like deforestation, desertification or peatland degradation.

On the other hand, climate change has direct impacts on the structure and function of ecosystems, with consequences for the conservation of biodiversity and the provision of ecosystem services to society. Indirect impacts also exist – they are caused by human responses to climate change (such as increased use of renewable energy, increased efforts in prevention of natural disasters, changes in agricultural practices, etc.), which may have positive or negative effects on nature, depending on how they are designed. Strategies for adaptation to climate change therefore need to follow an integrated approach, in which nature conservation has to be both an independent topic and a cross-cutting issue.

The Federal Agency for Nature Conservation is taking climate change into account both in its scientific activities and in its role as a political advisory body. Climate change is considered relevant to the tasks of most working units at the agency.

The development of adaptation strategies in Germany is guided *inter alia* by the provisions of

the United Nations Framework Convention on Climate Change (UNFCCC), which requires parties to develop national programmes for adaptation. In the Buenos Aires Programme of Work, the Conference of the Parties to the UNFCCC further insisted that planned actions on adaptation should be carefully assessed to ensure that all measures are environmentally sound and support sustainable development.

The German Strategy for Adaptation to Climate Change was adopted in 2008. It is seen as a first milestone in the development of a policy framework which addresses both sectoral and cross-sectoral adaptation requirements, and is due to be further specified by an Action Programme by spring 2011.

The possibility that climate change will lead to increasing competition for land and resources and the potential for synergies and conflicts between adaptation decisions in different sectors are explicitly recognized in the Strategy, as is the need for a cross-sectoral, integrated approach.

Biodiversity considerations are addressed in a specific chapter outlining the needs and options for activities to minimize the negative impacts of climate change on biodiversity (e.g. further development of biotope networks and protected areas, research and monitoring to identify the most vulnerable species and biotopes, adaptation of conservation strategies and landscape planning approaches to accommodate increasing natural dynamics, consideration of biodiversity concerns in mitigation activities such as the production of renewable energy), as well as in other sectoral and cross-sectoral chapters.

With regard to the adaptation requirements of other sectors, both potential synergies with nature conservation measures (e.g. restoration of watercourses and floodplains to improve flood prevention, maintaining a wide range of genetic resources as a basis for adaptation in agriculture, decreasing soil sealing in urban areas to alleviate heat stress) and necessary precautions to avoid unintended negative side-effects of sectoral adaptation on biodiversity (e.g. taking downstream effects on nature into account in the management of dams, applying the instruments of Integrated Coastal Zone Management to align economic development, nature conservation and societal adaptation in coastal areas) are mentioned. (For further details on the content of the Strategy, please refer to the presentation slides or the link to the full document given below.)

The Strategy thus provides a good basis for a coherent approach to adaptation. However, the actual outcomes on the ground will depend on the further development and implementation of measures.

In addition to policy at the level of the German federal government, developments at other levels are also relevant, such as the European Commission's Green Paper and White Paper on Adaptation (published in 2007 and 2009, respectively), and the strategies at the level of German regions which have been developed or are currently being elaborated by several of the 16 Federal States (e.g. Bavaria, North Rhine-Westphalia).

As can be seen from the examples above, cross-sectoral adaptation strategies provide many opportunities, but may also pose risks and challenges to nature conservation. To achieve environmentally balanced outcomes, dialogue and

The full text of the German Strategy for Adaptation to Climate Change is available at: <http://www.bmu.de/english/climate/downloads/doc/42841.php> (in 2009).

awareness-raising with stakeholders and decision-makers are necessary. There is also a need for further applied research on appropriate solutions to reconcile different adaptation goals.

The Federal Agency for Nature Conservation has commissioned a number of research and development projects to investigate some of the most relevant aspects of the relationship between biodiversity and climate change from the German perspective.

These include for example:

- an analysis of current biotope networking approaches and possibilities to improve their potential to mitigate the negative impacts of climate change on sensitive biotope types, species groups and species;
- an analysis of the risks arising from climate change for the protection targets of selected protected areas in Germany and possible response options;
- an assessment of available options to optimize biomass production systems on a regional scale in order to increase their efficiency from a nature conservation point of view;
- a study on the potential benefits of floodplain restoration for adaptation to climate change, climate change mitigation and biodiversity conservation with a view to identifying priority areas for restoration projects;
- an assessment of possible approaches to minimize negative impacts of technical measures for the establishment and upgrading of Federal Waterways; and
- an investigation of new requirements towards the design of traffic networks and compensation measures in the light of climate-related stresses on biotopes and species.

LINKS FOR FURTHER READING

The EU White Paper 'Adapting to climate change: Towards a European framework for action' is available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0147:FIN:EN:PDF> (in 2009).

The EU Green Paper 'Adapting to climate change in Europe – options for EU action' is available at: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0354:FIN:EN:PDF> (in 2009).

More information on the project 'Protected Areas in Germany under Global Change – Risks and Policy Options' is available at: <http://www.pik->

potsdam.de/forschung/aktuelle-forschungsfelder/klimawirkung-vulnerabilitat/vme/schutzgebiete/index_html?set_language=en.

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She supports the further development and implementation of the United Nations Convention

on Biological Diversity as well as administrative and scientific tasks related to the operations of the Federal Agency's competence centre on biodiversity and climate change. This has included involvement with the elaboration of the biodiversity-relevant sections of the German Adaptation Strategy.

The competence centre on biodiversity and climate change is an inter-departmental committee within the Federal Agency which has been established in order to promote information exchange and develop coordinated positions and strategies on all aspects of the relationship between biodiversity and climate change.

Part II: Workshop Presentations

1.4 Impacts of urban land use/land cover changes on regional landscape and vegetation species diversity: Beijing as an example

by Wu Xiaopu

As a process of global change, climate change and the exploitation of land resources by human beings have brought significant impacts to natural vegetation on the earth. Beijing, the capital of China and an international metropolis, has been greatly changed in regional landscape patterns with a rapid urbanization process in the past 20 years. With field survey data, climatic data, digital elevation model (DEM) and remote sensed (RS) images analysis, this study aims at explore the structure, distribution and changes of vegetation patterns and land cover in Beijing during the last 20 years. The main results are summarized as follows:

The analysis results suggested that the vegetation community structures were simple and the tree species richness were very limited in Beijing. According to field investigation, the 72 plots collected were classified into 9 main communities by TWINSpan with the importance value matrix of arbor species: *Quercus. variabilis* forest, *Q. dentate* + *Q. acutissima* forest, *Pinus tabulaeformis* + *Q. acutissima* mixed forests, *Larix principis-rupprechtii* forest, *Betula* forest, *Q. mongolica* forest, *P. tabulaeformis* + *Q. mongolica* + *Populus* + *Betula* mixed forest, *Q. liaotungensis* forest and *Q. liaotungensis* bosquet. Based on the classification results, all communities' structure characteristics were analyzed.

All sample plots and tree species were correlated by geographic environmental and climatic factors by using CCA ordination. Geographic environmental factors ordination results indicated that AX1 had significant relationship with elevation. CCA ordination by using climatic factors demonstrated that moisture was the most important factor that influenced the community

distribution in Beijing, and heat also worked simultaneously.

Species diversity indices suggested that the greater the species richness was, the higher the biodiversity level the communities had. The correlation between environmental factors and community structure and species diversity demonstrated that the community structures were destroyed intensively by human activities in lower elevations. The species diversity of the tree layer had significant and negative correlation with heat variables. The species diversity decreased with the increasing elevation, and increased with the increasing of temperature and moisture.

For the urban green land, 79 plots from urban green land were classified into 4 groups with TWINSpan according the important values of all species at shrub layer and herbaceous layer in all communities. The biodiversity indices suggested that some plots from those parks with intensive disturbance had the greater species richness, while other plots that were disturbed less had lower species richness and higher evenness.

Based on the interpretation results of TM images between 1984 and 2001, and SPOT images of 2002, the changes and status of Beijing's urban green land were analyzed in the past 20 years. The results suggested that the green land coverage proportion in the urban zone was 32.9% in 2002, and forest coverage proportion was 15.5%. The vegetation coverage proportion of the northern area was more than the southern area. With the rapid urbanization process of Beijing in the recent 20 year, the area of green land has been enlarged also, with coverage proportion increased from 23.7% to 30.1% between 1984 and 2001. The

forest coverage in the urban area increased from 8.7% to 12.3%.

From 1978 to 2001, the main land cover change occurred in Beijing have been as follows: From 1978 to 1984 and from 1996 to 2001, the most significant urbanization process took place in those suburb districts that are situated closer to the core urban area, which turned out as prompt expanding of settlement and durative shrinking of farmland. The transformation from farmland to settlement contributed to the rapid urbanization process. Forest area also enlarged during this period, and the coverage was rising from 17.2% to 24.7%. To some extent, this has been due to afforestation and conversion of cropland to forest. Terrain

condition is of great importance to the distribution and transformation to land cover. With the increasing of elevation and slope, farmland and built-up area decreased, and forest and shrub area enlarged.

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Ms. Wu Xiaopu is an assistant professor in Chinese Research Academy of Environmental Sciences,

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Part II: Workshop Presentations

1.5 Impacts of climate change on biodiversity at different scales - input, models, output

by Ingolf Kühn

Impacts of climate change on different aspects of biodiversity were presented at three different scales: Europe, Germany and plots within Germany. The European scale analyses result from the European Union FP 6 Integrated Project 'ALARM: Assessing LArge scale environmental Risks for biodiversity with tested Methods' (Settele et al. 2005). Modelling impacts on plant species across Europe (Thuiller et al. 2005) shows that some regions are less impacted by climate change (e.g., British Isles, Central Europe) whereas others are projected to suffer from high losses in plant species richness (e.g., Northern Iberia, the Alps and Northern Scandinavia). The mean loss of species is projected to be 27-42%. Although species respond individually to changing environmental conditions, a shift of vegetation zones is expected (Hickler et al. 2009). Especially Mediterranean sclerophyllous scrub is projected to largely increase in Iberia, temperate mixed broad-leaved forests shift northwards in Eastern Europe on the expense of hemiboreal mixed forest and arctic-alpine tundra is projected to largely disappear. This has drastic consequences on the vegetation in the NATURA 2000 network, especially in the Mediterranean, the Baltic States and the high Scandes.

A recent analysis on butterflies in Europe (Settele et al. 2008) shows similar dramatic impacts on many butterfly species. This is even worse for closely interacting species such as butterfly larvae depending on specific host plants e.g., *Boloria titania* (*Titania's* fritillary) feeding monophagously as larvae on *Bistorta officinalis* (Adderwort). Under current conditions, the species exhibit already some pronounced mismatch in their spatial niche. Potentially, *B. titania* is modelled to have large niche space in northern as well as southern Europe but cannot occur there due to a lack of its host

plant. The current range of *B. titania* is hence restricted to the Alps and the Baltic. Due to differential response to changing climate, this mismatch will remain or increase. Under climate change the overlap of both potential ranges are projected to shift northwards under moderate (SEDG: Sustainable Europe Development Goal) and even more under severe (GRAS: Growth Applied Strategy) scenarios. Assuming a dispersal limitation of the host plant, the population of the butterfly may largely decline (Schweiger et al. 2008).

For Germany the Federal Agency for Nature Conservation (BfN) funded the project "Modelling the impact of climate change on the flora" (FKZ 805 81 001) and the main results were summarized (Pompe et al. 2008, Pompe et al. 2009): Especially in south-western and eastern Germany high species losses are projected, while some species gains are expected in the Southeast. Still, they are largely outweighed by the losses, resulting in high species turnover in the Southwest and East. Under a moderate scenario (SEDGE) of climate and land use change, only few changes are projected, assuming that species can follow their niche space. Under full dispersal limitation, species' losses can be as high as 10% per grid cell on average. Under the more severe scenarios, especially GRAS, even under the assumption of full dispersal, high losses are expected with significant effects under the assumption of limited dispersal abilities. The gains in species richness from species coming into Germany from neighbouring countries are not able to compensate the losses. Despite the discussion about alien species and their threat to native biodiversity, we probably will have to accept new species from adjacent biogeographic areas as being the new natives that are adapted to future climates (Walther et al. 2009). However, for most

species it is unknown how good dispersers they are and many will behave intermediately. Still it can reasonably be assumed that wide-spread common plants are less dispersal limited and suffer less while rare plants are highly dispersal limited and suffer more. This is corroborated by an analysis of the species of the German Red List of endangered species. They will suffer more from climate and land use change than the species not listed. Due to model uncertainties, we are unable to provide results from small regions (cities, counties "Bundesländer"). Still, some regionalization is possible (except for the Alps, which are too small in Germany). The north-eastern lowlands will suffer from the highest loss while the north-western lowlands and the pre-Alps probably from the least. The lowest gains are also in the Northwest while the highest gains are projected for the eastern mountains and the pre-Alps.

Even on very small scale i.e., 1 km² of dry grasslands in Central Germany, changes in the vegetation due to climate change were discernable on the basis of plant groups (Matesanz et al. 2009). Over the past 20 years, an increase in spring temperature and a decrease in spring precipitation were observed. This resulted in decreasing richness of perennial species and an increase in annuals. Hence, changes which are not discernable on a species level can be detected when considering functional traits in vegetation composition.

A plethora of literature exists on modelling procedures and associated assumptions and limitations. Interpreting model results, one has therefore to be very aware of the caveats involved in any of these techniques. Models can never represent the truth and are always caricatures of reality; otherwise they would be too complex to run and interpret with the danger of masking relevant processes. While in the past much progress was achieved in the mathematical foundations and implementation of relevant processes, the largest limitations of model accuracy nowadays result from the data quality of the input data. Incorporating land-use data and the

respective scenarios increased model accuracy of our models. Still, data from Germany (or any smaller area) is completely inadequate to model impacts of climate change since the full range of the species' environmental niche cannot be represented in such data. Therefore, they are bound to largely overestimate the consequences on biodiversity. And even though in Germany, we consider our data as being among the best in Europe (maybe except for the British and Dutch data), recent analyses showed clearly that the data used for most modelling approaches in Germany does not necessarily represent natural patterns but is largely determined by the different mapping protocols and procedures of the 'Bundesländer' or other regional mapping schemes (Mahecha/Schmidtlein 2008). This yields clearly discernable patterns of the 'Länder' or even parts thereof (e.g., Rhineland and Westphalia) or larger regions (e.g., the former Federal Republic of Germany and the former German Democratic Republic), part of which results from different opinions about taxonomy or status.

Temporal analysis (trends) would be most urgently needed to improve projections to the future by learning from the past. In Britain, for example, mapping was organized across the whole country in defined time periods. There it is possible to analyse temporal trends of different groups of alien species in response to changing environment (Hulme 2009). The analysis of temporal changes in Germany, however, is impossible since many data are already outdated and each region was mapped at a different time and temporal analyses will not show temporal changes but only changes in spatio-temporal mapping intensity. But when considering 'environmental changes', it is clear that climate is only one part of the problem. And while this may be relevant on larger scale, on small scale, it is still land use and habitat availability that matters as long as the habitat of a species is within its climate envelope (Araújo/Rahbek 2006).

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BACKGROUND AND TASKS

Dr. Ingolf Kühn is vegetation science with his PhD (2000, Ruhr-University Bochum) on flora and vegetation of ancient and recent forests in Westphalia. In 2001 he joined the UFZ. Currently he is senior scientist and head of the Macroecology group at UFZ and coordinator or deputy coordinator of several national and international projects (such as 'Modelling the effect of climate change on the flora of Germany', 'Virtual Institute Macroecology', 'MACIS: Minimisation of and Adaptation to Climate change Impacts on biodiversity', 'ALARM: Assessing Large-scale environmental Risks with tested Methods') on the impact of climate change on biodiversity or about biological invasions. He is further interested in urban ecology and the analyses of functional traits of species. His methodological area of expertise is in statistical modelling, especially in spatial and phylogenetic context.

Part II: Workshop Presentations

1.6 Responses of forest-steppe ecotone on the East Eurasian grassland under global climate change

by Feng Chaoyang

The presentation includes four parts: (1) the distribution and characteristics of forest-steppe ecotone, (2) the regional environmental dynamics and changes of landscape structures and (3) some conclusions.

The forest-steppe ecotone in Hulunbuir is an important region in which forest ecosystem changes into grassland ecosystem. It is also an area suffering from most acute human activities. In the last decades, due to the changes of global climate and the general impacts of human activities, timberline in the transition region moved up, vegetation deteriorated, grassland changed into desert and water and soil cycles lost in quality to a dramatic extend. All these factors, in combination, severely constrain the sustainable development of local resources, environment, economy and society.

Based on theories and methods like agro meteorology, community ecology, landscape ecology and environmental ecology, the study analyzes the dynamic changes of regional hydrothermal factors, plant community structure, spice diversity level, land utility and landscape pattern. It also gives a quantitative description of the boundary and width of the transition region. After analyzing the principal components and evaluating the vulnerability of the eco-environment, the study clearly defines the spatiotemporal pattern of regional eco-environment's vulnerability and the inducing factors of the vulnerability. The study provides theoretical references and basis for efficient research on scientific ecological protection pattern. Major conclusions of the study are as follows:

(1) Due to global climate change, the annual average temperature and precipitation rose significantly in the past 40 years in the transition

region. The annual average temperature grew by 1.6 % and the precipitation by 10.0 %. Meanwhile, the atmospheric drought index increased on a year-on-year basis.

(2) The laws of the community composition, community structure and life form changes of the transition region are: Closing forests of white birch and mountain polar. opening forest - shrubbery of white birch + siberian apricot. Siberian apricot + spiraea japonica + leymus chinensis meadow. Filifolium sibiricum + leymus chinensis + forb meadow steppe. The variety of species increased from the original 32 varieties in the closed forests to 53 varieties in the meadow steppe. The variety and evenness of various communities increased from 1.1863 and 0.6235 to 1.9347 and 0.9546 respectively. The highest point of variety stood at 2.1045. The variety also kept rising and reached the highest point of 0.9074 in the meadow steppe. This indicates that the replacement rates of two species are comparatively higher and there is an evident transition belt between the white birch timberline and the meadow steppe.

(3) The moving-split window technique is a simple but effective method to define the boundary and width of the transition region. The proper window generally covers 6 to 10 sample spots. Between the timberline of white birch forest and the meadow steppe, the transition region is about 380 meters in width.

(4) From 1988 to 2004, land types changed frequently in the transition region. Among them, forests registered a net decrease of 7,858 square km, which were mostly turned to grasslands and farmlands, and grassland registered a net decrease of 888.5 square km, which were mostly turned to farmlands and construction lands. The total

number of patches increased by 30.6 times, yet, the average area of the patches reduced by 368.9 square km. On the whole, the landscape variety index grew up, while in comparison, the landscape superiority index dropped gradually.

(5) The analysis on landscape pattern shows that both LPI and LSI netted a drastic increase. The landscape fragmentation and forest patch weighted fractal dimension rose first but dropped later. The separation index maintained a reducing trend. The core of the overall landscape patch moved eastwards 10 to 20 km. Forests shrank, but grasslands expanded obviously.

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BACKGROUND AND TASKS

Dr. Feng Chaoyang got his Ph.D degree in physical geography from the Graduate University of the Chinese Academy of Sciences in 2007. During his Ph.D dissertation research work, his research region was a valley named Tiansi, which belongs to Baihua area, in the north of Taihang mountains. Four different types of vegetation were selected. They are natural shrubbery, *Pinus tabulaeformis* plantations of being planted over 50a, *Robinia pseudoacacia* plantations of being planted over 30a, sloping farmlands of being abandoned for 25a that are under condition of natural restoration. The theses studied the changes of ecosystem services in the course of vegetation being destroyed and being restored by observing four types of ecosystem functions mainly include biodiversity maintenance, water maintenance and soil conservation, nutrients conservation and carbon storage, and also study the ecosystem

services effect and its mechanism of the different vegetations restoration approaches in degraded ecosystems.

As a member of CRAES, Dr. Feng Chaoyang took part in the construction of Hulunbuir Grasslands Eco-environmental Long-term Research Station. This is the most important work of his duty, and most of his research region turned into the forest-steppe ecotone and grasslands ecosystem.

Part II: Workshop presentations

1.7 German-Chinese cooperation platform for the conservation of species rich, highly carbon-sequestering ecosystems

by Eva Axthelm, GTZ

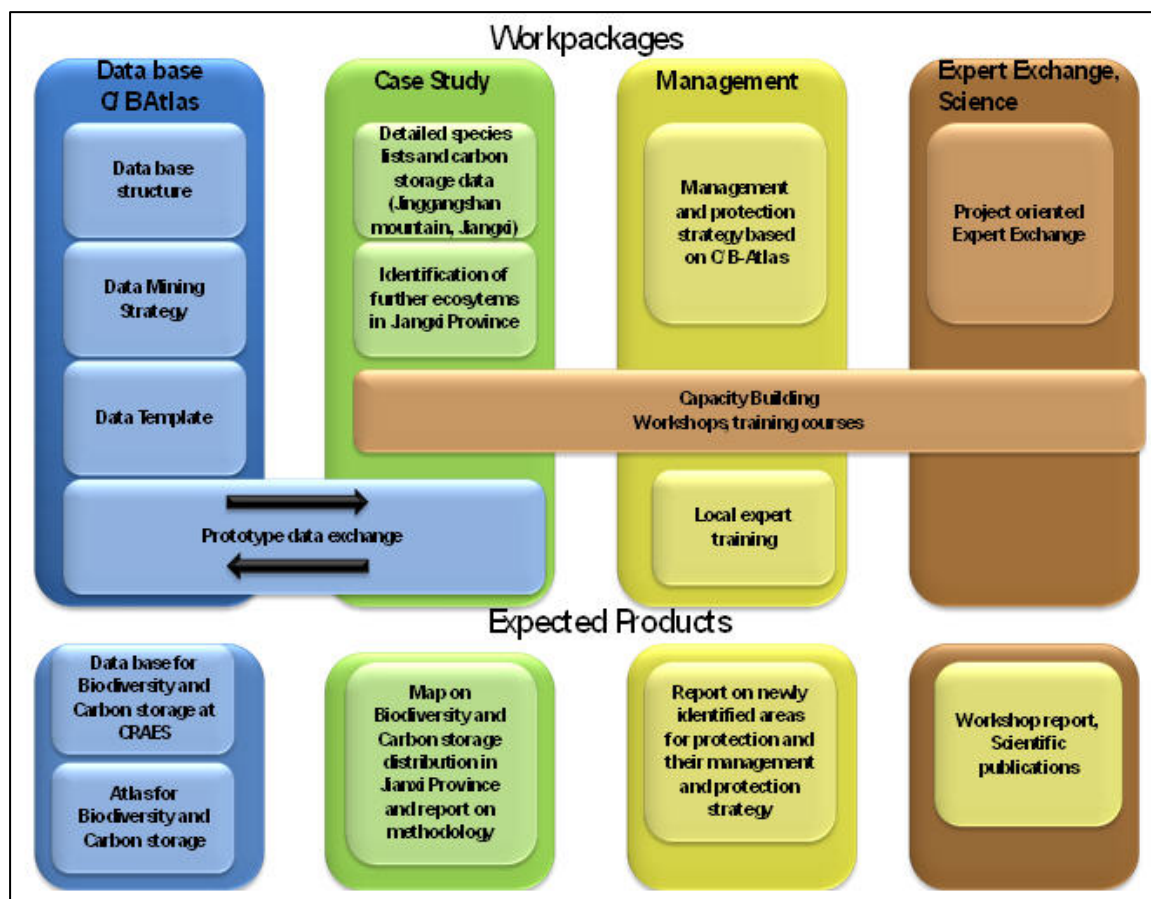
OBJECTIVE

Biodiversity and ecosystem services play a central role with regards to the regulation of climate on a local, regional and global scale. Oftentimes, the capacity of forests, wet- and peat lands to store carbon is in the foreground; however biodiversity also affects climate by regulating the water cycle or the radiation budget of the earth. Intact ecosystems also have greater adaptation capacities to a changing climate. This 3-year project was launched in March 2009 and aims at capacitating responsible Chinese institutions apply appropriate protection and management strategies for the conservation of highly carbon-storing ecosystems and their biodiversity.

CONTEXT

This project is implemented in the context of the international climate change initiative which is supported by the German Federal Ministry for Environment, Nature Protection and Nuclear Safety (BMU) and is considered part of the life web initiative, launched at CBD COP 9. It is also based on an expanding technical exchange on biodiversity related issues between the German Federal Agency for Nature Conservation (BfN) and the Chinese Research Academy of Environmental Sciences.

Fig 1: 'Workpackages' and products to achieve the project's objective



APPROACH

The project contains two sets of measures, the setting of scientific and administrative preconditions to ensure the sustainable protection of carbon-storing ecosystems and their biodiversity, as well as the development of a mechanism to ensure an information exchange between Chinese and German experts

This approach will be implemented by using instruments such as the provision of short and long term experts for technical counseling of Chinese

partners, the design and implementation of education and training courses of Chinese practitioners, the support for the improvement of administration structures concerned with the cultivation of carbon-storing and species rich ecosystems as well as through the establishment of a database on carbon-storing ecosystems and their biodiversity.

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BACKGROUND AND TASKS

Eva Axthelm studied European Studies and International Relations in Osnabrueck, Temuco (Chile) and Lausanne, thematic focus of my master

studies was Environment and Free Trade in Central America. From 2007 to 2008 she worked as an Advisor for issues relating to the Convention of Biological Diversity (CBD) in the Federal Ministry for Economic Cooperation and Development (BMZ). In this context she participated in relevant Council Working Groups at EU level, intercessional working Groups (Protected Areas and Article 8j). In 2009 she started working as a GTZ-Project Manager for the BMU Project 'Sino-German Cooperation Platform for the Conservation of Species-Rich, highly Carbon-Storing Ecosystems' in China.

Part II: Workshop Presentations

2 Monitoring and Information Management

The second part of the workshop dealt with the topic of 'Monitoring and Information Management'. This is of outmost importance as successful nature conservation work requires the gathering and the management of nature-conservation-related data and information. The task of environmental observation is to cover the information needs for an effective nature and landscape protection and to provide up-to-date

data. The results of the monitoring activities are processed into information and indicators, which can be used by authorities and policy makers as a solid basis for decision-making. Mainly experts from German Think Tanks, the BfN and the UNEP World Conservation Monitoring Centre presented on Tuesday current developments in this context in Germany as well as worldwide efforts made on these subjects.

THE PRESENTATIONS TOPICS

2.1 Carbon and biodiversity: a demonstration atlas
by Barney Dickson, WCMC

2.2 Invasive alien species monitoring and management in China
by Xu Jing, CRAES

2.3 A tiered approach to develop indicator systems for biodiversity conservation
by Ulrich Sukopp, BfN

2.4 Shared data bases - common knowledge: information infrastructures for nature conservation
by Michael Bilo, BfN

2.5 PortalU: A 'one stop' for publicly owned environmental information in Germany
by Martin Klenke, PortalU im Niedersächsischen Ministerium für Umwelt und Klimaschutz

2.6 Management of environmental data collections - experiences of long-term, interdisciplinary research projects
by Jens Nieschulze, Max-Planck Institut für Biogeochemie

All presentations are available for download at http://www.bfn.de/0502_skriptliste.html

Part II: Workshop Presentations

2.1 Carbon and biodiversity: a demonstration atlas

by Barney Dickson

This atlas demonstrates the potential for spatial analyses to identify areas that are high in both carbon and biodiversity. Such areas will be of interest to countries that wish to reduce greenhouse gas emissions from land use change and simultaneously conserve biodiversity.

Emissions from land use change, primarily deforestation, contribute to an estimated 20 per cent of total anthropogenic greenhouse gas emissions (IPCC 2007), equivalent to approximately 5.8 Gigatonnes (Gt) of carbon dioxide (CO₂) a year.

Recognition of the scale of CO₂ emissions from land use change has led to the decision that reduced emissions from deforestation and degradation (REDD) in developing countries should be considered for inclusion under the United Nations Framework Convention on climate Change (UNFCCC). The Bali Action Plan, adopted by UNFCCC at the thirteenth session of its Conference of the Parties (COP 13) in December 2007, mandates Parties to negotiate a post-2012 instrument, including possible financial incentives for forest-based climate change mitigation actions in developing countries. Although REDD is necessarily focussed on reducing carbon loss, the Bali Action Plan recognizes that actions to support REDD can also promote other benefits that may contribute to achieving the aims and objectives of other relevant international conventions such as the Convention on Biological Diversity (CBD).

The atlas uses global datasets on carbon storage in terrestrial ecosystems and areas of high priority for biodiversity conservation to provide regional overviews of the spatial

overlap of these important values in the tropics. National-scale maps for six tropical countries draw, where possible, on finer scale nationally developed biodiversity datasets, and show where existing

protected areas coincide with high carbon and biodiversity areas. A variety of statistics are drawn from the national-scale maps to demonstrate the different types of information that these maps can provide.

These maps are intended solely as demonstrations of how combining spatial data can help to identify areas where the opportunities for carbon and biodiversity benefits coincide. REDD-related decision-making at the national scale will need to be based, if at all possible, on nationally developed data for both carbon stocks and biodiversity. In order to reduce emissions effectively, and realize other co-benefits of reducing deforestation, such decisions will also need to incorporate information on the country-specific pressures causing land use change.

These approaches need to be developed further using national scale data on the distribution of carbon and biodiversity (and potentially other ecosystem services) that take into account national priorities and country-specific pressures. A particularly important aspect of REDD is the potential to affect local livelihoods, and it may be possible to incorporate socio-economic data into future mapping. It will also be important to develop an understanding of those areas with high importance for biodiversity but lower carbon stocks that may be vulnerable to land use pressures displaced by REDD actions in high carbon areas. UNEP-WCMC will be developing these spatial analyses in 2009 in ways that address these issues.

UNEP-WCMC aims to work closely with national authorities in developing this work, and will collaborate with other partners who are undertaking related spatial analyses. The atlas will be developed in a way that can take account of new information as it becomes available and it is

likely that it will be primarily web-based. The aim is to produce a flexible tool that can assist countries in their decision-making in order to deliver multiple benefits from climate mitigation policies.

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BACKGROUND AND TASKS

Barney Dickson (BA, MA, D.Phil) is Head of the Climate Change and Biodiversity Programme at UNEP-World Conservation Monitoring Centre, Cambridge, UK. The Programme provides policy-relevant analyses in three main areas:

- The impacts of climate change on ecosystems
- The role of ecosystems in climate change adaptation
- The role of ecosystems in climate change mitigation

Under his leadership the CCB Programme is focusing much of its current work on supporting the development of an effective REDD mechanism that also delivers co-benefits for biodiversity and ecosystems. UNEP-WCMC is actively engaged in the UN REDD Programme.

Before joining UNEP-WCMC, Barney Dickson was at Fauna & Flora International for over six years where he was the first Head of International Policy and responsible for developing FFI's international policy programme. He has published extensively on issues of conservation policy, including CITES, recreational hunting, the precautionary principle and the links between conservation and poverty reduction.

Part II: Workshop Presentations

2.2 Invasive alien species monitoring and management in China

by Xu Jing

China's Invasive Alien Species (IAS) control and prevention principles are designed as following: Pre-prevention policy, Prevention & controlling policy and Government sectors organize IAS countermeasures according their duties. To implement these principles, China has built up National IAS Prevention & Control Working Group to discuss and perform related measures. The Working Group includes Ministry of Science & Technology (MOST), Ministry of Agriculture (MOA), Ministry of Environmental Protection (MEP), State Customs, General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), State Oceanic Administration (SOA), and Chinese Young Pioneers Working Group (CYPWC).

At present, a national legislation system (7 laws, 9 national legislations, and 41 regulations) concerned about IAS has been set up in China. And a well-organized species import process is also built up. Besides, an IAS National Monitoring Network which is ran by several governmental sectors is also set up and still expands within the country.

As a country has huge territory, China needs to clearly grasp the current status of IAS. In 2001-2003, 2006 and 2008, MEP organized three national IAS surveys. These surveys can assist policy makers to understand serious problems caused by IAS, then to develop more policies, legislations, strategies, and actions to eliminate IAS.

In 2001-2003 survey, 283 IAS (188 plants, 76 animals and 19 microorganisms) were found in Chinese ecosystems, about 55.1% from American countries, 21.7% from European countries, 9.9% from Asia and 8.1% from Africa, reflecting China has massive cargos and personnel exchange with America and European countries. The survey also found that 49.3% of IAS were introduced unintentionally and 39.6% were intentionally

introduced. These IAS cost ¥ RMB 120 billion (Equivalent to \$17.5 billion) direct or indirect economical and social loss per year. The survey prompt policy maker released 1st China Invasive Alien Species Name List in 2003, which include 16 the most harmful IAS in it.

In the year of 2006, to investigate IAS impact to Chinese natural nature reserves, the MEP organized 2006 Typical National Protected Areas IAS Investigation. Twenty-seven National Protected Areas along the coastline and in the biodiversity hotspots were selected to do the survey. Field groups found 44 families, 131 IAS, 119 plants and 12 animals during field survey. They also found that several protected areas potentially suffered from IAS. IAS were normally found in Experimental and Buffer Zones in several protected area. This reminds nature reserve authorities to take more actions on IAS control and prevention.

To investigate the current distribution and to evaluate the damage of IAS, MEP organized 2008 Typical Provinces IAS Survey, three provinces (Jiangxi, Jiangsu and Liaoning province) were involved into the survey. The target of survey is focused on IAS in 1st and 2nd China Invasive Alien Species Name List (N.B. 2nd List is planed to be published in 2009). The results of this survey are still under evaluation before they are being published.

There are still problems and constraints on IAS issues although China made so many achievements, such as an National Specific Law regards to IAS control and prevention needs to be drafted; Responsibility of related government sectors should be more cleared, overlaps and gaps regards to IAS control and prevention still could be found; Scientific and technical support should be strengthened, more standards on IAS risk

assessment, IAS quarantine, Alien Species Environmental Release Evaluation, etc should be drafted.

In the next decades, the following measures should be done, or should at least be considered in China:

(1) Release 'Invasive Alien Species Controlling Law' and other legislations; (2) Reform IAS control and prevention work coordination system, more responsibilities should be given to MEP; (3) Integrate IAS monitoring network; (4) Gives more

attentions on IAS risk assessment and evaluation standard research; (5) Have further International Cooperation on IAS control and prevention; (6) More public awareness works should be strengthened.

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Xu Jing is Associate Research Professor of Chinese Research Academy of Environmental Sciences (CRAES). He graduated from the University of Hull with a MSc degree in 2004. He has engaged in biodiversity monitoring and conservation research since 2005. He has temporally moved into the National Biosafety Administration Office, Ministry of Environmental Protection (MEP) in 2007 and has been involved in the administration on national biosafety issues; especially the issues regard genetically modified organisms' environmental safety administration, invasive alien species administration and micro organism environmental safety administration. He continues to seek his research interests in the invasive alien species area and also is interested in the risk assessment and management and control and prevention of IAS under global climate change.

Part II: Workshop Presentations

2.3 A tiered approach to develop indicator systems for biodiversity conservation

by Ulrich Sukopp

Comprehensive data on the state and changes of nature and landscape provide fundamental information for planning and decision-making in modern conservation policy. In recent years, much effort has been spent to improve communication of monitoring results particularly towards politicians and the public. For this purpose, many different biodiversity indicators and indicator systems have been developed. The main objective of monitoring programmes is to produce precise and reliable information on the state and trends of different aspects of biodiversity. Indicator reports based on sound indicator systems are then used to make monitoring results known not only to experts but also to decision-makers and the public. Such indicators need to reduce complex biological information to simple and easily understandable messages of political concern (Dröschmeister/Sukopp 2009).

This presentation defines the terms 'monitoring' and 'indicator' in the context of nature conservation as follows: Monitoring comprises empirical records (observations, counts and measurements) of selected elements of communities, habitats and landscapes in regular long-term spatiotemporal sequences which are designed to achieve with standardized scientific methods reliable results on the state and changes of these elements and which are directed to nature conservation and environmental protection objectives (after Sukopp et al. 1986, Dröschmeister 1996, Sukopp/Weddeling 2007). Indicators in environmental sciences and nature conservation summarize empirical data from monitoring programmes in order to depict driving forces, pressures, states, impacts or societal responses related to biodiversity in an easily understandable manner. Indicator results can be used to control the achievement of previously agreed conservation objectives and should provide policy advice. Such

indicators are different from strictly scientific indicators (cf. Turnhout et al. 2007). The common classification of biodiversity indicators into driving forces, pressure, state, impact and response indicators (DPSIR model) is explained. Remarks on how to improve the consistency of both definitions complete this part of the presentation.

In order to develop biodiversity indicator systems, a tiered approach is presented which comprises the following steps: selection of monitoring parameters and monitoring sites, implementation of monitoring programmes, compilation of relevant monitoring data, development of suitable indicators, determination of conservation objectives, communication of indicator results and provision of policy advice. Theoretically, this approach can either be used by starting at the top end or at the bottom end of the mentioned sequence. For practical reasons, a mixture of both ways is usually employed.

Two examples of indicator sets are presented: (1) EEA (2007) published an initial set of biodiversity indicators available at EU and pan-European levels. This set resulted from the first phase (2005-2007) of the Streamlining European Biodiversity Indicators by 2010 (SEBI 2010) project on the development of indicators to assess progress towards, and help achieve the European target to halt the loss of biodiversity by 2010. At present, the set is made up of 26 indicators assigned to 7 focal areas. (2) In November 2007, the National Strategy on Biological Diversity was adopted by the German Federal Cabinet (BMU 2007). It lists about 330 environmental quality targets and action objectives as well as about 430 specific measures. A set of currently 19 indicators has been selected to estimate how successfully the strategy objectives will be met in the future (cf. Sukopp et al. 2008). Implementation of measures and achievement of targets will be reviewed in a summarizing manner

at regular intervals. The indicator set of the strategy is shown in detail.

Finally, the German Sustainability Indicator for Species Diversity (SISD) is presented as an example of an indicator fulfilling the most important standards and requirements for a sound biodiversity indicator (cf. Sukopp et al. 2007). It is the leading national nature conservation indicator based on living organisms. SISD summarizes the trends in abundance of 59 representative bird species. The issue of sustainability and nature conservation objectives become part of the indicator construction by defining target values: an expert panel has determined a target value for each species, which should be attained until 2015, provided that the guidelines for sustainable development and the legislation on nature conservation will be fully implemented in Germany. The indicator results are shown in detail.

At the end of the presentation, main conclusions are summarized.

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BACKGROUND AND TASKS

Ulrich Sukopp studied at the Faculty of Biology of the Free University Berlin with a particular focus on botany and ecology. He graduated with the Diploma in Biology. In the 1990s, he did research on the flora and vegetation of Southern Jordan at the Botanical Garden and Botanical Museum Berlin-Dahlem. On the basis of the scientific results of these studies, Ulrich Sukopp obtained a PhD (Dr. rer. nat.) at the Chair of Biogeography of the University of Bayreuth. Between 1990 and 2003, the author was employed as a scientific researcher and assistant lecturer at the Institute of Ecology of the Technical University Berlin, at the Science Centre Berlin, at the Botanical Garden and Botanical Museum Berlin-Dahlem and at the Chair of Biogeography of the University of Bayreuth.

Since 2004, Ulrich Sukopp is employed at the division I 1.3 of the German Federal Agency for Nature Conservation (Bundesamt für Naturschutz) dealing with biodiversity monitoring and indicators on a national level. Since 2007, he works also as an assistant lecturer at the Institute of Geography of the Friedrich-Wilhelms-University Bonn. His main current research areas cover monitoring of nature and landscape, development and reporting of nature conservation indicators, the flora and vegetation of Central Europe and the ecological assessment of the deliberate release of genetically engineered crops.

Part II: Workshop Presentations

2.4 Shared data bases - common knowledge: information infrastructures for nature conservation

by Michael Bilo

Recent discussions about how to achieve a maximum of sound knowledge on nature conservation issues show that shared decentralized information systems are a sophisticated alternative to central data bases. The advantages of decentralized information systems are the high acceptance of continuously maintained data and the expertise of colleagues who are closed to the data acquisition. Disadvantages of those systems can be reduced by considering some crucial preconditions:

In contrast to central data bases a network of decentralized systems has different data models. The use of harmonized meta data can help to find the relevant information. The German Environmental PortalU® uses a common thesaurus which is not only a harmonized list of more than 40.000 terms. It includes hierarchical relationships as well and enables the user to find what he intended to search. This so-called UMTES is one important basis of the European thesaurus GEMET (General Multilingual Environmental Thesaurus) which includes more than 28 European languages. The access to information on nature conservation is managed by legal rules whereas the German Environmental Information Law (UIG) is the most important one on national level. UIG is compliant to the European directive 2003/4/EG "Access to environmental information". Comparability of information from distributed information systems is the most crucial point. A direct comparability is possible only in those cases in which a common base for data collection does exist. That is true at least for a framework like the Habitats Directive or the Water Framework Directive. New developments on the European level try to achieve a step-by-step harmonization. The Infrastructure for Spatial Information in Europe (INSPIRE) is an existing

example for geographic information. Comparable methods are in discussion for non-geographic information in the context of a Shared Environmental Information System (SEIS).

Some existing infrastructures which are compliant to the above mentioned ideas are already in production: PortalU® (www.portalu.de) is the one-stop-shop for environmental information of German administrations. Access to more than 2 million websites and more than 500.000 data base objects shows proof of practical implementation of the legal input. For geoinformation www.geoportal.bund.de is the central point of entry into the German geodata infrastructure. Concurrent it is the national node to the European geodata infrastructure INSPIRE (Infrastructure for Spatial Information in Europe). Access to geoinformation is supported by thematic and geographic retrieval. BfN is part of those developments in order to encourage the use of information on nature conservation.

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BACKGROUND AND TASKS

Dr. Michael Bilo is Geographer and Information Expert. He did his studies at the University of Cologne, Germany, and his doctoral thesis at

research centre (KFA) Jülich and the University of Tübingen. After working for the Federal Ministry for Research and Technology (BMFT) 1992 to 1994 he switched to the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMU) for the years 1995 - 2001. From 2001 on he is working with the Federal Agency for Nature Conservation (BfN) as Head of Division Z 2.1 'Information on Nature Conservation, Geoinformation' and Head of Section Z 2 'Central Information Services'.

Part II: Workshop Presentations

2.5 PortalU:

A 'one stop' for publicly owned environmental information in Germany

by Martin Klenke

The German environmental information portal 'PortalU®' aims at improving the availability to widespread environmental information held by or for German public authorities. Therefore, the fast growing, decentralised offered, public environmental information in the internet is bundled in an 'one-stop-portal'. PortalU is a federal-state-cooperation between the German environmental administration of all sixteen German 'Laender' and the German Federal Government. The cooperation has the objective to integrate all data providers in the portal holding public environmental information referring to the definition of 'environmental information' within EU Directive 2003/4/EC. Moreover PortalU will be used as instrument to provide metadata about environmental spatial data and services in terms of INSPIRE (Infrastructure for Spatial Information in Europe).

The portal offers central access to over 2,500,000 web pages and about 500,000 database entries from public bodies in Germany. All web pages, metadata and data base entries are accessible with the PortalU search engine. PortalU is currently more than three years accessible via www.portalu.de for citizens and environmental experts and offers several features: General and advanced search options in the rubric SEARCH, up-to-date environmental news and upcoming events in the rubric SERVICES, environmental monitoring data in the rubric DATA, spatial data in the rubric MAPS and historical environmental events in the rubric ALMANAC. Furthermore the rubric TOPICS provides an easy access to 21 selected environmental themes. Besides this, geo- and environmental data catalogues can be built up, updated and published in PortalU by the integrated InGrid®Catalog. The ISO and INSPIRE compliant

InGridCatalog can be maintained by the corresponding InGrid®Editor. For public institutions and organisations on federal, state and municipal level within Germany the use of the PortalU software including the InGridCatalog is possible without any licence fees.

PortalU software components allow an easy connection and integration of external data sources, following the philosophy of keeping the data at the providers. Fast response and adequate results are ensured by indexing and ranking technology. The software can be used in several application scenarios, e.g. as a 'complete' portal, as a metadata broker or integrated in existing Content Management Frameworks. Standardized interfaces ensure communication with other data infrastructures like GDI-DE (German Geodata Infrastructure) and INSPIRE. All PortalU software modules have been built upon open source software components.

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BACKGROUND AND TASKS

Dr. Klenke studied Physical Geography at the Bremen University (Germany) with focus on geomorphology, geomatics and remote sensing. In his diploma thesis he investigated coastal

morphology in the Antarctic Peninsula region. As PhD student at the Friedrich-Schiller University Jena (Germany) he focused on land use classifications by means of passive and active remote sensing data and GIS for distributed hydrological modelling. Afterwards he worked as postdoctoral research fellow at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven (Germany) in the Bathymetry and Geodesy working group. Since 2004, Dr. Klenke is responsible for the technical project management of PortalU / InGrid in the Coordination Center PortalU at the Lower Saxony Ministry of Environment and Climate Protection in Hannover (Germany).

Part II: Workshop Presentations

2.6 Management of environmental data collections - experiences of long-term, interdisciplinary research projects

by Jens Nieschulze

The establishment of database management projects as part of larger environmental research projects becomes standard procedure. Awareness is rising that much can be won by interchanging and re-using data. However, awareness of requirements needed for database or information system development lags behind. In an ideal world objectives, processes, and requirements are defined by a steering committee as part of the initial project proposal or better even earlier. Thus, the computer scientists can prototype structures, functionality, and schemas and implement a solution at project start.

In the real world objectives and processes are only vaguely, if at all, specified and the data management starts with a time lag. A consequence of the insufficient specification of requirements is a wealth of data sources, different with respect to formats, syntax, and semantics, rendering interpretation or re-use difficult to impossible as employed concepts are usually individual.

The presentation provides examples of common pitfalls in interdisciplinary data management and tries to untangle the underlying causes. Humans are much more capable than machines to interpret within context and often emphasize visual arrangement of data at the cost of functionality, eg. with respect to automated or repeated analysis. In order to help to find a balance between human

readability and functionality best practice examples are given. In addition the importance of structured metadata as well as semantical core concepts is highlighted. General recommendation on how to approach efficient management of data collections completes this overview.

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I studied forestry and mathematics at the University of Goettingen, Germany, and Berkeley, California USA and received a doctoral degree in forest biometrics and applied computer science from

Goettingen University. I have been involved in the management of environmental data collections of interdisciplinary and international research projects since 2002 and currently hold the position database manager of the Biodiversity-Exploratories (www.biodiversity-exploratories.de).

Within this long-term research platform my working group works on the XML-schema driven capture, harmonization, and integration of the many data sources across disciplines. We have a developed and implemented an information system which we currently try to make semantically aware and supplement it with value-added services such on on-line cross-data set statistical or visual analysis capabilities.

Part II: Workshop Presentations

3 Management of Protected Areas

'Management of Protected Areas' was the topic of the discussions and presentations in the third part of the workshop. The 9th meeting of the Conference of the Parties (COP 9) of the Convention on Biological diversity (CBD) that took place in May 2008 in Bonn introduced new impulses and placed the subject of biodiversity into the view point worldwide.

Based on its rich biological diversity and its economic and political importance, China is an important partner in the context of the convention. Protected areas can be seen as a central instrument of biodiversity preservation. Therefore this topic was dealt with during the workshop. Some representatives of Chinese and German protected areas reported from their experiences and their most urgent problems.

THE PRESENTATIONS TOPICS

3.1 Assessment of conservation of Qinling mountains natural reserves network - the example of giant panda nature reserves network *by Li Junsheng, CRAES*

3.2 Assessment of conservation status in protected areas in the EU and Germany
by Sandra Balzer, BfN

without abstract

3.3 Management of protected areas in Jiangxi Province
by Li Xiaogang, Jiangxi Provincial EPB

3.4 Protected area systems: management and added value
by Karl Eberhard Henne, EUROPARC Deutschland e.V.

without abstract

3.5 Conservation and management of nature reserves in Jiangxi Province, China
by Hu Xiaohua, Jiangxi Academy of Environmental Sciences

3.6 Management of bogs, fens and other carbon storing wetlands - a brief overview
by Uwe Riecken, BfN

All presentations are available for download at http://www.bfn.de/0502_skriptliste.html

Part II: Workshop Presentations

3.1 Assessment of conservation of Qinling Mountains natural reserves network - the example of giant panda nature reserves network

by Li Junsheng

Qinling Mountains is an important mountain area which is located in Shanxi and Gansu Province as one of the most famous eco-geographical regions in central China. It covers a total area of 55,000 square kilometer and has the highest elevation with over 3,700 meters.

Qinling Mountains is one of the 17 biodiversity hotspots in china with rich biodiversity: over 15 animal species have been listed in the national priority protection wildlife list. Besides, it is the remaining natural habitats for China's national symbol, the giant panda.

The Qinling panda population is an independent panda population with about 200-300 individuals. The population is relatively small and it is distributed in a separate mountain range with little connection to others, which makes the Qinling population very fragile.

Due to approximately 5 million people living in the Qinling Mountains, some areas of the range have been highly degraded through inappropriate farming, logging, overuse of natural resources and encroachment over many decades.

Since 1965, 19 nature reserves have been established in the Qinling Mountains to protect the rich biodiversity in the area. However, people are still doubt that if these established reserves can really protect the panda populations.

To understand the protection status of Giant Pandas and their habitats, five parameters were selected in our research: elevation, vegetation, food accessibility, slope and aspects of habitats.

To analyze the relationship between the parameters and the giant panda distributions, suitable habitats for giant panda have been evaluated. Satellite images of the panda's

distribution area were analyzed. After that, elevation, slope and aspect criteria were established for the suitability assessment of giant pandas habitats. A suitability habitat map was produced by using these criteria to classify combined digitalized parameters and vegetation images.

The discovery sites data for giant panda traces within the area during the 2nd and 3rd National Giant Panda Survey and five giant panda populations' habitats were confirmed, digitalized, and then overlaid with suiting habitat maps.

A gap analysis was used to understand the relationship between suitable habitats and panda distribution. The result shows that panda population is till stable in larger nature reserves which has more suitable habitats. In smaller habitats, however the populations seem to decline. Besides, between the nature reserves, there are still some suitable habitats, but pandas are not often move to these areas. After analyzing the forest and food (*Fargesia qinlingensis* and *Fargesia dracocephala*) distribution, we found many forest fragments within the gaps between the nature reserves, and food resources are also limited within the habitats and the gaps between them.

The ecological carrying capacity in the panda's distribution region is also analyzed to understand the risk of the population. Risk assessment shows that there are 219 giant panda's in the biggest habitat - Xinglongling-Taibaishan habitat, which fairly exceed ecological carrying capacity of the habitat. However, the panda population has not reached the maximum in the other four habitats, especially in Pingheliang habitat, the population will extinct if there will not be population exchange

with other habitats! Several dead panda's that were found in recent years confirm this.

To reduce the risk of these habitats and reduce death cases in the panda population, an optimization scheme is carried out to improve the nature reserve network development plan in the area: four new nature reserves should be built up, the boarder of three nature reserves should be adjusted, and three corridors should be set up to enhance the individual exchange rate between the habitats.

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BACKGROUND AND TASKS

Li Junsheng is Research Professor of Chinese Research Academy of Environmental Sciences (CRAES). He graduated from the North-east Forest University with Ph.D degree in 2001. Since 2001, he continued his research as a post-doctor in Institute of Zoology, Chinese Academy of Science (CAS), focusing on the spatial and temporal distribution of small rodents in Qilian Mountains, and species, ecosystems and landscape biodiversity within the area. This experience provides him confirmed research ability on ecology. Since 2003, he was promoted to associate research professor of CAS, and then was promoted to senior professor

of CRAES in 2004. During this period of time, his research areas were expand to the research of Ecosystems effect to environment change and regional ecological response to global change, particularly on the impact of climate change and human activities on biodiversity, such as wetlands ecosystem ecological effect and risk assessment, the ecological effect and risk assessment of critical & huge project, and regional/urban ecological conservation and plan. Recently, he is also interested in genetically modified organism environmental risks assessment.

Part II: Workshop Presentations

3.2 Management of protected areas in Jiangxi Province

by Li Xiaogang

Since ancient times there is traditional knowledge at village level that protected and formed the ecosystems for hundreds of years by culture. The Fung Shui Woodland is a foundation that we set up to install 'nature small protected areas' that profits from the local knowledge and protects a large number of wildlife species. It is an effective decentralized method of conservation of biological diversity in densely populated areas of southern China.

To investigate and protect native plant resources the Feng Shui woodland, we choose specific woodland in southern Ganzhou to estimate its biodiversity. On 1.300 square meters we found 64 genus and 147 species of higher plants.

This scientific survey is now being continued on the village level. In 2007 volunteers observed the area 29 times and counted the visible species. We cooperate with the local primary school to do ecological monitoring and ecological training. The project proves that the 'nature small protected areas' are an effective method for biodiversity conservation in densely populated areas in China. But there are many problems and unfulfilled needs this kind of ecosystem protection is facing.

PROBLEMS

(1) There is no correlative law on the nature small protected area. Protection status is weak. It can't only be based on traditional culture and a few

projects. (2) The projects and volunteers need more experience and training. With this the quality of the data can be improved further. (3) Many young people in the countryside moved into cities for jobs and do not join the local activities.

CONCLUSIONS

(1) The nature small protected areas have very important ecological functions. (2) The establishment of correlative laws and regulations is from highest importance and the help from local government is very valuable. (3) The local authorities e.g. head of village and respectful elders have been a great help for the progress of the project; (4) Experts and specialist made great contributions to identify the ecological and cultural value of nature small protected areas to improve the understanding for the importance of the protection. (5) Supports from local primary school assure that the project will continue. The involvement of local children will definitely produce long-term impacts and the data of observation by pupil volunteers has also scientific value. (6) Perhaps a villager has plenty ecological knowledge around his village, but we need to establish a regime and the right way to better understand each other. (7) Presenting the project on the Internet can release the associated information to the public and increase interest on nature small protected areas.

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BACKGROUND AND TASKS

He is carrying out wildlife protection and administration of nature reserves for more than ten years in Jiangxi province. Skills: biological monitoring, basic research and compiling ecological environment and biodiversity protection plans, experience in organizing studies and educational propaganda on biodiversity protection integrated with the concrete conditions and traditional customs of Chinese rural community.

Part II: Workshop Presentations

3.3 Conservation and management of nature reserves in Jiangxi Province, China

by Hu Xiaohua

Jiangxi Province is situated on the south bank of the middle and lower reaches of the Yangtze River, the middle latitude subtropical zone endowed with mild and humid climate (mean precipitation 1638.4 mm), which provides abundant hydrological resources and good conditions for assorted biological forms' multiplying and growing. It is one of the provinces with richest biodiversity in China, characteristic of rich fauna and flora resources, rich wetland resources, especially the globally typical middle subtropical humid zone evergreen broadleaf forest ecosystem in the same latitude well preserved in this region. Currently 171 nature reserves have been established in the province, forming protected areas of 1.135 million ha, accounting for 6.67% of total land area of the Province.

The presentation focuses on how to improve the management of the nature reserves in the province and further the conservation of biodiversity based on a detailed introduction of the natural conditions and biodiversity and an analysis of the main constraints affecting conservation and management of nature reserves in the province. Part 1 provides the baseline information on natural conditions and biodiversity distribution in the province, including detailed data on high conservation level flora and fauna species. Part 2 describes the types and geographic distribution of 171 nature reserves in the province and analyses the features of national level, provincial level and county level nature reserves. Part 3 describes current management status of nature reserves in the province from aspects of the national and provincial policy and strategy, legislation and management system for the conservation and management of nature reserves, the criteria for establishment of natural reserves, and see insight

into the aspects of nature reserves management of the province such as the administrative agencies and staff, baseline data collection on biodiversity, biodiversity monitoring, scientific research and international exchange, and propaganda and education activities in communities in nature reserves. On the basis of the above three parts, Part 4 analyses the main constraints affecting conservation and management of nature reserves in the province. Part 5 presents the contents of the long run plan of Jiangxi Province for nature reserves development (to the year 2030) and analyses its adequacies for well preserving the biodiversity in the province. Part 6 draws some conclusions from the research and advances some recommendations for the more effective conservation and management of nature reserves in Jiangxi Province.

The main conclusion of the presentation is as follows:

Jiangxi is endowed with good natural resources, characteristic of rich biodiversity.

Over 85% of the wild flora and fauna species are preserved inside 171 established nature reserves despite an underdeveloped economy of the Province.

Inadequate input and weak management capacity are main constraints limiting effective biodiversity conservation in the Province.

Effective implementation of relevant governmental plans may be one way of improving biodiversity conservation in the Province, but other walks' effort might catalyze and accelerate the achievement of the goal - a healthy ecosystem of Jiangxi having Global positive externalities.

A more comprehensive and systematic evaluation of the current status of conservation and management of nature reserves in Jiangxi Province is urgent for the purpose of both improving this research and improving the conservation of biodiversity in the province.

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BACKGROUND AND TASKS

I have been working in Jiangxi Research Academy of Environmental Sciences (JRAES) since 1986. JRAES is a provincial level institution for environmental protection research in Jiangxi Province of China. Since its establishment in 1976, JRAES has been actively engaged in environmental research, environmental planning, environmental impact assessment for regional development and single construction project, ecological study and planning, pollution control design and abatement, and other environmental activities. Presently, JRAES has total staff of about 100, among which 3 are research fellow, 20 are senior engineers or associate research fellow and 40 are engineers or assistant research fellow.

My current position in JRAES is the Deputy Director and Chief Engineer, and the professional title is Research Fellow of Natural Sciences. I am

responsible for the technical aspects of the Academy including quality management, technical reports review, academic exchange activity arrangement, technical staff training, etc. In addition to my responsibility in the administration of the Academy, I am actively engaged in environmental research and consulting covering the fields of environmental research, environmental planning and environmental impact assessments for plans and construction projects. Since 1986, I have undertaken and fulfilled over 40 research and consulting projects, among which the representative ones include The Environmental Protection Plan of Poyang Lake Ecological Economic District (2008), The 11th Five Years' Plan of Water Pollution Control for the Downstream Regions of the Long River (Jiangxi Section) (2007), The 11th Five Years' Plan of Environmental Protection of Jiangxi Province (2006), A Study on the Ecological Compensation Mechanism for the Dongjiang River Source Area (2006), and The Environmental Impact Assessment (EIA) of the Modified Project Areas of the World Bank Financed Jiangxi Integrated Agricultural Modernization Project (2005). I am also actively engaged in academic exchanges and have published over 30 academic papers or translations on environmental sciences since 1986.

Presently, I am still busy on fulfilling my administrative responsibilities of the Academy and undertaking several important projects including The World Bank Financed Building-up Poyang Lake Water Quality Monitoring Data Base Project, numbered 7 in a series of research projects of the Poyang Lake Ecological Economic District, The Plan of Water Pollution Control for the Downstream Regions of the Long River (Jiangxi Section) from 2008 to 2015, The 12th Five Years' Plan of Environmental Protection of Jiangxi Province, the state level research project of The Study on the Ecological Compensation and Pollution Payment Mechanism for the Dongjiang River and the project of Jinggang Mountain Ecological Monitoring Station in collaboration with CRAES.

Part II: Workshop Presentations

3.4 Management of bogs, fens and other carbon storing wetlands - a brief overview

by Uwe Riecken

In Germany the following carbon storing ecosystems can be found: fens – (lime-deficient and lime-rich fens) - transition mires - raised bogs - large sedge swamps - bog heaths and wet heaths - birch bog woodland - bog woodland (coniferous) - spruce, Scots pine, bog pine, dwarf mountain pine carr woodlands (elder or birch) - tidal fens of the Baltic Sea coast.

The distribution of these ecosystems mainly depends on the annual precipitation of a certain region. In some cases a special physical and geographic situation are also crucial factors. The most important areas for wetlands in Germany are the north-western German lowlands, the north-eastern German lowlands including the coast of the Baltic Sea, the mountains (mostly small wetlands) and the pre-alpine region [see slide 6 and 7].

FENS AND BOGS

All of these fen and bog ecosystem types are threatened (Table 1: Status of fen and bog ecosystems in Germany. 1: close to extinction; 2: heavily endangered; after RIECKEN et al. 2006)

Habitat type	Status (Red Data Book)
fens	1-2
raised bogs	1
transition mires	1-2
large sedge swamps	2
bog heaths and wet heaths	2
birch bog woodlands	2
carr woodlands	2
coniferous bog woodlands	2

EXAMPLE I: FENS [see slides 8 - 14]

In most cases fens are the result of siltation of lakes and ponds. They depend on high ground water levels. The vegetation is dominated by sedges. If their water household is undisturbed they are more or less free of trees. Fens are often closely connected to wet forests and scrubs. In natural or near natural condition they show an accumulation of biomass (peat).

The most important threats are changes of the water household (draining), intensive agricultural use (mowing, life-stock keeping) and peat cutting. All these impacts are coming up with a loss of peat by biological decomposition instead of carbon accumulation, eutrofication and impacts on surrounding ecosystems. Disturbed fens also face a complete change in vegetation and animal life. If drained fens fell abandoned, scrubs and trees and other plants which are adapted to high nutrient levels occur. This development leads to increasing evaporation, decreasing ground water level and finally enhances peat decomposition.

In many areas a management is necessary. First of all: There is no really sustainable agricultural use of fens without any impacts on the water household with the exception of late year mowing. The most important management measure is to recover the (natural) water household. Therefore in most projects a detailed hydrological planning is needed. Typical measures are closing drains, building dams, active pumping, stopping ground water exploitation, cutting trees and scrubs and reducing (stopping) agricultural use. In some cases it may be useful to bring in typical plants.

The management of fens is also facing some problems. Depending on the water level in some cases a lot of CH₄ or N₂O, two gases which are much more impacting climate than CO₂, can be emitted. An other problem is that due to high

nutrient levels typical fen plant species often are not competitive enough to recover managed areas or only in the long term.

EXAMPLE II: RAISED BOGS [see slides 15 - 21]

Raised bogs are the result of ongoing accumulation of peat and are depending on rain water only. Therefore their distribution is restricted to areas with a high level of annual precipitation. The main biomass comes from peat mosses (Gen.: *Sphagnum*). These plants create a special chemical situation of the water body with low nutrient and low pH-level. Therefore only few other highly specialized plant and animal species can survive under these conditions. Raised bogs often show a typical structure with a centre free of scrubs and trees.

The most important threats have been changes in the water household (draining), peat cutting for peat use in industry, heating and as garden fertilizer and intensive agricultural use. The results are similar to fens: loss of peat by biological decomposition, complete change in vegetation and animal life and in case of abandonment scrubs and trees and other plants which are adapted to high nutrient levels occur leading to increasing evaporation, decreasing ground water level and finally enhanced peat decomposition. There is no really sustainable use of raised bogs without any impacts on the water household. Therefore all raised bogs have to be protected and additionally disturbed raised bogs need to be managed.

The most important management measure is to recover the (natural) water household (for details see 2.1). In contrast to fens it is very important to use water which is poor in nutrients in case of pumping or flooding. In areas with irreversible changed water household extensive grazing can be necessary and useful to stop or reduce succession and the connected negative developments described above. Managing disturbed raised bogs may also come up with an increasing output of CH₄ or N₂O. Therefore a strict monitoring and a smart planning are needed.

OUTLOOK

Wetlands are impressive components of the German natural heritage. Most of them are important for carbon storing. In Germany all wetland ecosystems are legally protected (§ 30 German Nature Conservation Act) and most of them are habitat types of community interest (after the EU Habitats Directive). The management of bogs and fens is one important task of the German National Strategy on Biodiversity and they are target ecosystems of several large scale nature conservation projects funded by the German Federal Ministry of Environment and the BfN. Due to numerous impacts all of them are threatened and need protection and management.

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MSc. in Biology, Christian-Albrechts-University, Kiel, Germany; PhD in Nature Conservation, Phillips University, Marburg, Germany; Member of the scientific board of the 'Institute for Ecosystem Analysis and Evaluation' at the Technical University of Aachen.

The division 'Biotope Protection and Management' within the BfN is, amongst others, in charge of developing guidelines to classify habitats in Germany as well as compiling the German national Red List for habitats. Management of habitats for nature conservation is another focus of Dr Riecken's work, in which he and his team develop concepts and models for habitat management measures and for national and international ecological networks. He has been appointed as national focal point for the 'European Green Belt Initiative' to use the former iron curtain through the continent as axis for nature conservation.

Part III: Working Group Outcomes

1 The impact of climate and land-use change on nature conservation

Climatic change and the change of land use both increase stresses on natural or close-to-natural ecosystems. Therefore the implications on nature conservation, planning and management seem to be evident. But what should new conservation strategies look like, which tasks are most relevant for science, and how can one link research, policy and society more efficient than in the past?

NEW CONSERVATION STRATEGIES NEEDED?

It seems to be clear that new and rapid changes in the conservation subject need new conservation strategies. Once the existing plans are coming to implementation these plans should integrate climate and land-use changes. Nevertheless does it not seem to be clear what these plans should look like. The strategic plans have to move away from long-term landscape planning towards an adaptive land-use planning which can be regarded synonymously as an adaptive management with a high flexibility. This flexibility applies spatial, temporal and financial patterns. Especially the financial flexibility towards more private investment, public-private-partnerships or mechanisms like CDM seems to be of high importance since public finances are constantly insufficient.

Another important issue is the strengthening of international cooperation in the realms of knowledge transfers and technical assistance. Here the Sino-German cooperation is on a good way, but there is still much more potential.

THE ROLE OF SCIENCE

Science plays a central role regarding the changing conditions for precious ecosystems. Scenario-building seems to be an urgent scientific task for the next decades. But differences in scale, missing data and limited financial resources as well as severe time constraints are some of the most challenging matters that hinder solid research

results on changing complex socio-ecological systems.

The understanding of the two dominant drivers, climate and land-use, remains still uncertain and needs to be evaluated more precisely. The lack of integrated modelling approaches is another hindering factor for a solid scenario-building. Different stresses in the focus do not allow necessary comparability. International cooperation should help to fill these gaps and balance basic and applied science at the same time. Basic science is still necessary to understand the processes that change ecosystems, but applied science is oriented towards the most urgent issues regarding ecosystem and protected area management and supports the postulated flexibility and adaptiveness.

HOW TO BRIDGE THE GAP BETWEEN RESEARCH, POLICY AND SOCIETY?

One of the central questions is how to link research, decision-makers and affected society successfully to manage ecosystems in an adaptive way. The translation of different languages (linguistic and technical) across the borders of the different realms is very difficult, and a horizontal and vertical dialogue is urgently needed.

Even within the boundaries of the individual realms misunderstanding is predominant. The research landscape is highly fragmented, and the two main scientific directions, the natural and the social sciences, often do not communicate in a desirable way. One can view this for example in the way the Chinese Academy of Sciences (CAS) and the Chinese Academy of Social Sciences (CASS) communicate with each other. In Germany one can find this problem in many projects that concentrate on men-environment-interactions, but new paradigms are rising and trying to interlink the natural with the social sciences. In the realm of decision-making the different administrative levels

often have differing interests regarding the use of certain ecosystems. Economic growth and nature conservation can often be observed as contrasting aims. Within society, the 'real actor' in the field of sustainable ecosystem management, there are many different and partly opposing perceptions, too.

If the interests are so difficult to mediate even inside a specific area—which is certainly due to a mismatch of the information worked with—one can easily imagine how hard it is to transfer knowledge into the neighbouring realms. The decision-maker needs to decide on a basis of solid facts. But even

within science there are many uncertainties in the field of climatic and land-use changes. Between policy and societal groups there is often a mismatch between projects or laws and the needs of the affected population.

To foster communication and understanding amongst the spheres (science–policy–society) a horizontal and vertical integration is needed. This must happen through dialogue, e.g. in inter- and transdisciplinary projects. In Germany there are a few think tanks coming up to develop this kind of integrated and applied research.

2 Biodiversity and carbon monitoring

Biodiversity Conservation can profit from financial support that carbon sequestering ecosystems will gain from new mechanisms of the international climate change regime. Even if the possible benefit for biodiversity in general is an open question, the demand for knowledge on linkages between biodiversity preservation and carbon sequestration is rising. One key issue in this field is an effective and exhaustive monitoring of biodiversity in the first place, followed by an integration of carbon monitoring.

The first step must be a profound biodiversity monitoring. In some field sites, e.g. in Jianggangshan, a nature reserve in Jiangxi Province, there are successful projects to monitor biodiversity and its ecological functions and processes in a comparable way. But these integrative approaches are still limited to certain research projects or areas. So it is of high importance to develop coordinated indicator sets for single ecological zones or regions, e.g., with comparable sets of atmospheric influences.

China is presently on its way to develop indicator sets to collect nationwide comparable data on its rich biodiversity. Despite the fact that China covers

five climatic regions, in the past forest covers were taken as the main indicator for biodiversity. Meanwhile Chinese researchers start to downscale and to develop more useful indicator sets for China's ecological regions. Different indicator sets must be evaluated to allow the comparability of the gained data to support national monitoring schemes for biodiversity.

Combined efforts to link and measure biodiversity and carbon storage are highly supported by new financial mechanisms of the international climate change regime. Future monitoring sites will increasingly integrate carbon household measuring systems to assess the carbon fluxes of the monitored ecosystems. This is important to consider when new monitoring sites or indicator sets are planned and implemented. One of the biggest remaining questions in this context is how to identify indicators for carbon sequestration, carbon storage, and their linkages with biodiversity. As the workshop presentations ('Day 2: Monitoring and Information Management') have shown, there are huge difficulties, but many ideas on how to overcome the outlined challenges.

Without a doubt, the linkages between biodiversity conservation and carbon storage are just at the beginning of their exploration. It should not be

taken for granted that combined solutions are always an advantage for the biodiversity.

3 Data and information management

Data and information management is a key issue when it comes to successful monitoring of biodiversity. The challenging questions refer to accessibility, usability and comparability of existing data. The status quo and the visions still diverge to a large extent.

ACCESSIBILITY

The accessibility of data depends on technical as well as political and legal aspects. Technically it is closely linked with the question whether data are available at all. Data occur at different levels of research and administration, in different languages and are therefore not accessible constantly. It depends on the modality in which data exist and how the data can be found throughout the different levels of organization.

In terms of law there are highly visible differences between China and Germany. In China it depends on the purpose and on the administrative level if data are made accessible; there is no regulating law. In Germany an environmental information law was developed, following a European directive.

At the moment access is given online, offline, via personal contacts and e-mail. Our vision is a management information system (MIS) that allows sharing data not only within national borders but internationally. Semantically aware systems should

improve the interpretability, and an improvement of the legal accessibility is one of the major prerequisites.

USABILITY

The usability of data depends on the language, on the issue's complexity, on the personal context, and on the condition in which the data are available. Our vision focuses on data management by systems that are easily able to overcome language problems and exclude the personal contexts, so that data can be used for various purposes directly.

COMPARABILITY

The comparability is highly interlinked with the usability and should be much more integrated than it is at the moment. The main problem here is the contextual content. Most of the existing data are gathered for a specific purpose and therefore exclude information important for a broad comparison with other datasets.

Concerning the comparison of Chinese and German data there is another problem. Comparability is weak due to different methods and method sets that are used. But especially in this case the comparability is likely to increase once it will be possible to map different methods.

4 Protected Areas: research, management and sustainable development

Climate and increasing land-use changes put new stresses on natural ecosystems and on protected areas in particular. But protected areas were always facing a number of other stresses that challenged their effective implementation. For finding solutions for the 'new' threats and stresses it is of high importance to build a solid basis first. This includes an evaluation of actual conservation in protected areas, an integration of research into management practices, and the promotion of sustainable development in the buffer zones of protected areas and their surroundings.

ASSESSMENT AND EVALUATION OF CONSERVATION IN PROTECTED AREAS

The assessment and evaluation of actual conservation effectiveness is carried out insufficiently in China as well as in Germany. Very often protected area managers stand alone without a clear set of criteria and without the necessary capacities, knowledge and technology. Due to a lack of funding a comprehensive assessment of data collections on specific species and habitats is often not possible. Solid information is only available for key species like the giant panda in the Qinling Mountains. Due to climate change or to ongoing extinction the expansion of protected area systems might be useful. For this purpose a GAP-Analysis is suggested. This might also be useful for an evaluation of individual protected areas in general.

Assessment and evaluation of the success of protected areas are not very easy regarding administration and legal aspects. The comparison of German and Chinese categories and levels of strictness within the protected area system is complicated. In China there are for example nature reserves, nature parks, forest parks, and national parks. In Germany there are nature reserves, national parks, biosphere reserves, landscape protected areas, and nature parks. Even if the names of the categories are identical, the

guidelines vary to a great extent. But if these structural conditions would be comprehended mutually, China's and Germany's administrations could profit very much from their long histories of protected area systems.

One central issue that seems to be of particular relevance for the protected area performance is their multilevel governance. The responsibilities are shared by many different bodies on different levels. In Germany it is mainly the national level together with the sixteen federal states and their own nature laws. In China national level, province level, prefecture level, county level agencies, and administrative departments are taking part in the governance system. Research on these structures is needed to reveal contradictions resulting from the involvement of manifold actors and to emphasize the strength of specific levels involved.

SPECIES AND HABITAT CONSERVATION: BRIDGING RESEARCH WITH MANAGEMENT

Research and management are not linked sufficiently. Basic research is necessary, and its results are useful for management – but only indirectly. Therefore applied science needs to be strengthened. Transdisciplinary research that incorporates management, stakeholders and communities might be a key to the problem. This would allow an accelerated integration of fundamental and local knowledge as well as of natural and societal sciences at the same time.

As first examples have shown, a direct and problem-oriented dialogue allows ecological, economic and social benefits. Research must be related to the management, and the manager's insights must constantly feed back to the scientific evaluations. This is not the only knowledge transfer that should be advanced. Especially in the rural areas of China, where many important protected areas are located, the integration of traditional ecological knowledge is of high relevance.

LINKING BIODIVERSITY CONSERVATION AND SUSTAINABLE DEVELOPMENT

Biodiversity Conservation and the needs of a livelihood in the communities very often confront each other. This is mainly due to a lack of strategies for the benefits of the local people and for the management agencies.

The task of protected areas must be the maintenance of ecological functions and ecosystem services for the society. This can be regarded as successful only if the communities and their economies are included.

If specific ecosystem services of the local people are deprived by an implementation of a protected area they need to gain compensation to fulfil the goals of biodiversity conservation and to avoid social discord. Small scale hydropower and decentralized biogas plants for example can illustrate win-win-situations for the multiple demands on the specific landscape: As electricity and gas stoves are introduced to remote villages, firewood extraction is very likely to decline with enormous rates. The people formerly collecting firewood have more time to invest in other activities to generate additional income.

Another possibility to promote the linkages between biodiversity conservation and sustainable development is an empowerment of the local communities. In co-management approaches the control of the protected area is shared by local and higher levels, in most cases with the national administration. The local communities are put in charge to manage the biodiversity. They get financial support, are interested in protecting their homeland, and have a solid knowledge of the local ecological systems. Ecosystem changes resulting from climatic variations can be best observed by the local residents that are sensitive to their direct ecological basis. A close dialogue between the local communities and the higher level administrations are the key prerequisite to achieve the common goals: biodiversity conservation and sustainable development.

Part IV: Excursions

Insights from the field

After the 'Second Sino-German Workshop on Biodiversity Conservation' that took place from March 30th to April 1st 2009 the Chinese delegation had the opportunity to get insights from the field during three daily excursions within the federal

state of North Rhine-Westphalia. The participants visited the Kottenforst of Bonn City, the biological station in Zwillbrock and the Eifel National Park where they also learned about Tereno, a research project by the Helmholtz association.

THE EXCURSIONS TOPICS

1 Urban forestry in Kottenforst: multiple use for people and nature
by Stephan Mense, City of Bonn

2 Nature conservation and site management in North Rhine-Westphalia: Zwillbrock Biological Station
by Christoph Rückriem and Martin Steverding, Biological Station Zwillbrock e.V.

3 National Park Eifel
by Michael Röös, Nationalparkforstamt Eifel

4 TERENO (Terrestrial Environmental Observatories)
by Heye Bogena, Forschungszentrum Jülich

Part IV: Excursions

1 Urban forestry in Kottenforst: multiple use for people and nature

by Stephan Mense

At the occasion of a visit in the municipal forest of Bonn, the visitors group took part at a presentation in the exhibition room 'The Bonn House of Nature' and a field trip guided by Stephan Mense, the municipal district ranger.

The municipal forest is 700 ha large and together with state and private forest owners, there are two extensive forest areas in the west and east of Bonn which has nearly 40 km² of forest, amounting 28 % of the city's total area. In order to protect forest areas and habitats from uncontrolled uses, including construction, recreation, traffic etc, a total of 71,69 km², or 51 % of the city's area, have been placed under protection: landscape-protection (28 %), nature conservation areas (23 %). Nearly all of them are part of the European network 'NATURA 2000' and relevant coherent European programme.

Especially several small pieces of woodland nearby settlements and industrial areas are endangered, but in the same time very important as a resource for climate, soil, watershed management, recreation and habitat protection.

In the city's managed forest areas, deciduous forest predominate (55 %), followed by coniferous forests (23 %) and mixed forest (22 %). The typical forest for this region (Lower Rhine Bight) is the central European beech forest.

During the field trip, there was an intensive discussion concerning the four functions of a municipal forest and the best way to fulfil them.

HABITAT DIVERSITY

In spite of its small size, Bonn's city area harbours numerous semi-natural habitats. These include sizable, well-developed examples of a wide range of central European deciduous forests (on soils ranging from poorly drained to dry), the Rhine and

Sieg riparian meadows, with their own special water regimes, and it contains also a number of anthropogenic habitats, some of which, as a result of the long periods over which they have developed, have even greater species diversity than pertinent original, natural habitats. Boldly speaking: A greater diversity in landscapes leads to a greater number of niches. Natural forest cells as unmanaged forest areas are located in the municipal forest and they are very important for research, biodiversity and education of visitors.

PROTECTION OF SOIL, WATER AND CLIMATE

Even the woodland in Bonn has only very small global effects, it is very important for the region. It cools the local climate in summertime by giving shadow and transpiration of water, it stores water and nutrients in the soil and it prevents erosion.

Therefore, it is absolutely necessary to make no clear cuts. The management of forest prefers thinning and selective harvest of trees.

TIMBER HARVEST

The municipal forest supplies the citizens with firewood and the local saw mills with logs and timber. Forest products are getting more and more important, because wood is a renewable raw material and can substitute fossil energy. With timber sale, the city earns roundabout 70.000 euro/year.

EDUCATION, INFORMATION AND RECREATION

The forest in a city area is a great opportunity to bring wood and people together and to learn about the human influence and the plurality of interdependences in natural ecosystems. So, the city of Bonn offers guided tours, an information centre, the 'Path of biodiversity' with lots of stations and explanations for visitors and special

programs for school children and students. For Bonn, it is the most important function for the future, because the next generation has to take care for their forest. They can only protect, if they know about the importance of a stable and healthy forest.

The entrance in the forest is free, there is no fee for the visitors even it costs the city of Bonn a lot of money every year. So Bonn spends nearly 300.000 euro/year for the maintenance of the forest. The free entrance in the forest is enforced by German law.

The experiences in the municipal forest of Bonn can be comprehended in three demands:

(1) To guarantee a sustainable development of forest, it is necessary to have a professional management, which means well-educated officers, rangers, wood-workers and a national frame of forest laws. As Bonn shows, the sustainable management is also guaranteed by the certification following the FSC-Standards. This label shows consumers and citizens, that the forest is controlled and works in order to social, ecological and economical principles.

(2) Forest management in agglomeration areas like Bonn is a good chance, to bring people close to their housings together with natural habitats. It is easy to inform and educate them.

(3) Forest needs the support from the society. Politicians, GO's, NGO's, enterprises and industry, citizens and forest owners must work close together. Communication, transparency, responsibility and consideration are key codes to preserve the municipal forest. Democratically structures, as you find them in Bonn, can support this preservation.

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BACKGROUND AND TASKS

Stephan Mense is Dipl. forest engineer and Dipl. scientist for environment, municipal district ranger, manager of the municipal public forest department and manager of the public information center

'Haus der Natur'. After working for 15 year in the forest around Bonn, he brings practical experience, local competence and theoretical knowledge together.

In the focus of his work is the new interpretation of sustainable forest management in modern times and how to communicate the various kinds of influences between the forest and human influence to natural resources. Therefore, the knowledge about the interdependences in natural systems is indispensable. So education and communication are important for modern forest management.

The urban forest worldwide offers a great chance for education and new experiences. Nearly three

Excursions Insights from the field

hundred thousands of visitors every year in the forest of Bonn are a good proof for the interest and curiosity of the citizens for their woodland in the neighbourhood. It is interesting, that we spend a lot of money for operas, theatres and sporting grounds, but the most important place for leisure

time, the forest, is not in this calculation.



Information centre 'Haus der Natur'



The delegation in the urban Kottenforst of Bonn

Part IV: Excursions

2 Nature conservation and site management in North Rhine-Westphalia: Zwillbrock Biological Station

by Christoph Rückriem and Martin Steverding

Zwillbrock Biological Station is one of 40 Biological Stations (1 Biological Station for each district) in North Rhine-Westphalia. Biological Stations are non-governmental and non-profit associations. The concept of Biological Stations was implemented by the State of North Rhine-Westphalia in 1986 with the aims to bridge the gap between nature conservation authorities and local land owners, land users and local people in order to reduce conflicts and to implement local organizations for site management and monitoring.

The history of Zwillbrock Biological Station starts in 1973 with the foundation of the ornithological working group Vreden (NGO), its predecessor. In 1986, the concept of Biological Stations was implemented in North Rhine-Westphalia and Zwillbrock Biological Station as was founded. Since 1983, its sheep farm 'Schäferei Moorhof' plays an important role in management of the Nature conservation sites. In 1992, the 'Naturschutzzentrum Westliches Münsterland', the center for environmental education of Zwillbrock Biological Station, started to work.

Zwillbrock Biological Station consists of 20 Members: local farmers, local nature conservationists, and representatives of Borken district and the community of Vreden. It has a permanent staff of 3 scientists (biologists), 1 public relations and environmental education, 2 administrative assistants, 1 shepherd, 1 technician and additional support by freelancers, volunteers and project staff.

It is funded mainly by the State of North Rhine-Westphalia, the district of Borken and the community of Vreden.

We perform site management of more than 30 nature conservation sites of Borken district and

contribute to several monitoring tasks for the nature conservation authorities of North Rhine-Westphalia within the framework of Natura 2000. We plan and perform nature conservation measures and give advice to farmers acting within the sites.

Our 'Naturschutzzentrum Westliches Münsterland' performs more than 200 nature education courses per year with more than 3000 participants and organises lectures, excursions, guided tours for schools, kindergardens and any interested groups or persons. In our visitor's center an exhibition on nature and its conservation in Borken district can be visited. Our 'Flamingoroute', a nature trail for cyclists and hikers provides individual nature experiences for tourists.

Various projects, for example the LIFE-project 'Optimisation of the SPA moors and heaths of Western Münsterland', the INTERREG-project 'Flamingoroute' or the implementation of a GIS-based model to assess the cumulative effects of disturbances on birds within the Natura-2000-site 'Moore und Heiden des westlichen Münsterlandes' complete our activities.

In Borken district, modern agricultural land use is the major challenge for nature conservation: North Rhine-Westphalia is one of the regions with the highest population density in Germany. The agricultural landscape of Borken district provides very good conditions for a highly industrialized agriculture. So Borken district is one of the districts with the highest density of livestock even in Germany. As a consequence, local farmers are economically highly under pressure to produce high yields in a high quality for low costs. The production of corn for biogas competes with the

production of food and thus additionally increases the lease prices of agricultural land.

In Borken district, farmers still are the main land owners and the main land users. Thus their economic interests play a major role in local political decisions and therefore in nature conservation as well. As public awareness of biodiversity conservation in particular among farmers is not very high, nature conservation in Borken district needs new strategies to fit nature conservation and modern agriculture together.

Actually, important parts of Biodiversity in Borken district are already restricted to nature conservation sites. The distribution of the Moor Frog (*Rana arvalis*) in Borken district, in former times a typical element of moor and heath lands, today corresponds highly with the pattern of nature conservation sites.

But many species are elements of the historic cultural landscape and depend on (former) land use. On modern agricultural land many of them can not survive. Therefore the effective nature conservation needs public ownership of land as an important precondition. More than 2/3 of the nature conservation sites managed by Zwillbrock Biological Station by now is owned by the state. Many of these sites are part of the European Natura-2000-network; 2 of them were visited during the excursions.

But still within public owned nature conservation sites the agriculture plays an essential role in maintaining the Biodiversity of our cultural landscape. As a consequence, effective and sustainable nature conservation is impossible without involving local people and without taking their needs into account.

According to recent studies on Climate Change, the climate in particular in Borken district will only moderately change (<http://www.umwelt.nrw.de/umwelt/klimawandel/index.php>). The resulting change of Biodiversity will probably be small and therefore is not an important topic for nature conservation in Borken district today.

Nevertheless, some responses of Biodiversity on Climate Change can be found in Borken district as well. Among the invertebrates, thermophilous species like the wasp spider (*Argiope bruennichi*), the Small Red Damselfly (*Ceragrion tenellum*) or the Scarlet Dragonfly (*Crocothemis erythraea*) take advantage from the local warming and increased their distribution.

After the lectures and discussions, 2 different excursion sites were visited. The 'Zwillbrocker Venn', part of the Natura-2000-site 'Moore und Heiden des westlichen Münsterlandes' is a former raised bog and nowadays an important breeding and resting place for birds. It hosts a breeding population of European and Chilean Flamingos (*Phoenicopterus roseus* and *Phoenicopterus chilensis*), the main attraction for thousands of visitors a year. The conflict between nature conservation and visitors was discussed.

The 'Amtsvenn', part of the Natura-2000-site 'Amtsvenn und Hündfelder Moor' is a former raised bog and was restored during a LIFE project from 1998 to 2003. The vast heath lands and grasslands are grazed by sheep of a local breed called 'Moorschnucke' and belong to our sheep farm 'Schäferei Moorhof'. The restoration of raised bogs was explained and the need for conservation measures even in these more or less natural landscapes were discussed.

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BACKGROUND AND TASKS

Christoph Rückriem was born in 1962. He graduated with diploma in biology at the University of Münster in 1990. Since 1990 he works in the field of nature conservation. From 1995 to 1999 he worked within the framework of a LIFE project at the Federal Agency for Nature Conservation of Germany in Bonn on the implementation of reporting obligations according to the European Habitats Directive. Since 1999 he is scientific assistant at Zwillbrock Biological Station and responsible for the management of several Natura-2000-sites of Borken district.

Dr. M. Steverding, 37 years old, is biologist and did his doctoral studies on woodpeckers in Bialowieza Primeval Forest in Poland. He is member of the staff of Zwillbrock Biological Station since 2003. Here he works in nature education and in several different projects. From 2006 to 2008 he had a nature education project in cooperation with schools.

He guides various short nature excursions and longer nature travels, for example one-week trips to Bialowieza Primeval Forest, weekend-birding-trips to the wadden sea or for watching crane migration, night excursions for observing owls, bats or nightjars, bicycle tours etc.



The delegation at Zwillbrock



Christoph Rückriem informs the chinese delegation about a Venn in Zwillbrock



Birches are characteristic trees in german bogs

Part IV: Excursions

3 National Park Eifel

by Michael Rööß

National Park Eifel (NPE) is located in the west of the Federal Republic of Germany (GER) within the federal state of North Rhine-Westphalia (NRW) at the border to Belgium. It was established on January 1st in 2004 and is the youngest of 14 German National Parks and it covers 10.800 hectare (10.8 km²). It is owned partly by the federal state NRW (67 %), the federal government (30 %, former army training area) and the water management body and nature conservation foundation (3%). The park administration ('Nationalparkforstamt Eifel') is part of the forest service NRW and financed by the federal state.

SITE CONDITIONS

Elevation: 280 - 650 mNN

Mean annual temperature: 6 - 9° Celsius

Mean annual precipitation: 750 - 1.200 mm

Geography: Nutrient-poor Devonian and Mesozoic sand- and claystones

According to German Nature Conservation Law NPE's main goal is nature conservation. As far as this goal is not affected nature recreation (hiking, cycling, and horse riding on marked trails) and research are allowed.

According to the federal state's legal ordinance NPE aims at fulfilling IUCN (International Union for the Conservation of Nature and Natural Resources) standards and recommendations for conservation 'Category II National Park'. Main objective is a percentage of at least 75 % of land cover without economical usage and under free natural development without active human interference within 30 years after foundation.

NPE is part of a network of nature conservation areas dedicated to the protection of last relics of formerly widespread types of central-European deciduous forests with common beech (*Fagus sylvatica* L., Rotbuche) as predominant species.

The zonation map for the NPE defines a so called 'nature zone' (no active management, free development) with three time frames (2007: 40%, 2034: 75%, final status: 87 % of total area). NPE's nature zone is almost totally covered by forests. As in other so called 'target' or 'development National Parks' the park administration Eifel is requested to carry out measurements of renaturation within the above named time frames, e.g. eradication of non native invasive species.

For 13 % of the total area a zonation map of the NPE defines a 'management zone'. The main goal for this zone is the conservation of endangered types of anthropogenic grasslands by sheep-grazing and / or mowing without any kind of fertilization.

SELECTED TOPICS OF THE FIELD TRIP

research project Wüstebach (CO₂, hydrology, N-balances, open research-platform, as part of the TERENO (TERrestrial ENVironmental Observatories) network of Helmholtz-Gemeinschaft (see summary by Dr. Heye Bogen)

development of man-made spruce-forests (*Picea abies*) to deciduous forests in southern parts of NPE

management zone (grazing, mowing management)

natural beech forest

invasive species (example Douglas Fir = *Pseudotsuga menziesii*)

Urft Dam, water management Eifel-Aachen area important historic forest usages (charcoal burning, oak-coppice)

legal specifications and practice of game regulation (only Red Deer *Cervus elaphus*, Roe Deer *Capreolus capreolus*, Wild Pig *Sus scrofa* and Moufflon *Ovis orientalis musimon*)

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BACKGROUND AND TASKS

I am head of National Park Eifel (NPE) Department of Research and Documentation since 2003 and I am responsible for the coordination of scientific research and monitoring in NPE. Further activities are the development National Park Plan and concepts for forest management of stands with non native species.

From 1979 to 1984 I studied forestry at the Universities of Göttingen and Vienna and

completed my studies with the degree 'Diplom-Forstwirt' at Göttingen. Afterwards I finished a two-year traineeship at the Forest Service of the Federal State of NRW with the State Exam for candidates of Higher Forest Service at Hanover / Lower Saxony in 1986. During an employment as research and teaching assistant at the Institute for Forest Planning and Yield Science from 1986 to 1990 I received a PhD (Dr. forest) from the University of Göttingen (title of thesis: "Growth and yield of wild cherry (*Prunus avium* L.) in North-Western Germany"). In 1990 I joined the Environmental Agency of NRW and worked as Head of Regional Office for Forest Planning Eifel (1991 – 1995) and at the Forest Data Office NRW (1995 – 2003).



Michael Rööß explains the concepts behind the 'development National Park' Eifel



Heye Bogena presents the ideas of TERENO on posters in the National Park Eifel

Part IV: Excursions

4 TERENO (Terrestrial Environmental Observatories)

by Heye Bogena

The main goal of the infrastructure measure TERENO will be to create observation platforms on the basis of an interdisciplinary and long-term aimed research program with a close cooperation between several facilities of the Helmholtz-Gemeinschaft for the investigation of consequences of Global Change for terrestrial ecosystems and the socioeconomic implications (Bogena et al., 2006). TERENO will provide long-term statistical series of system variables for the analysis and prognosis of Global Change consequences using integrated model systems,

which will be used to derive efficient prevention, mitigation and adaptation strategies. Four Terrestrial Observatories have been selected in Germany (Fig. 1). Since 2008 the instrumentation has started with a budget of 12 Mio.

The central monitoring site of the Eifel/Lower Rhine valley Observatory of Forschungszentrum Jülich (FZJ) is the catchment area of the River Rur (Fig. 2). It covers a total area of 2354 km² and exhibits a distinct land use gradient: The lowland region in the northern part is characterised by urbanisation and intensive agriculture whereas the low mountain range in the southern part is sparsely populated and includes several drinking water reservoirs. Furthermore, the Eifel National Park is situated in the southern part of the Rur catchment serving as a reference site.

Intensive soil moisture monitoring sites are collocated to climate towers for coordinated observation of micrometeorological parameters (Fig. 2). Soil measurements will be made at several depths with TDR, FD, and pF sensors into the soil profile, where feasible as far as the water table. In addition to the multi-depth soil moisture monitoring sites, wireless sensor networks are established at the sub-catchment scale reveal dynamic changes in soil moisture with a high spatial-temporal resolution. Wireless sensor network (WSN) technology allows near real-time monitoring of soil properties with a high spatial and temporal resolution for observing hydrological processes in small watersheds.

We developed the WSN SoilNet that uses the low-cost ZigBee radio network for communication and a hybrid topology with a mixture of underground

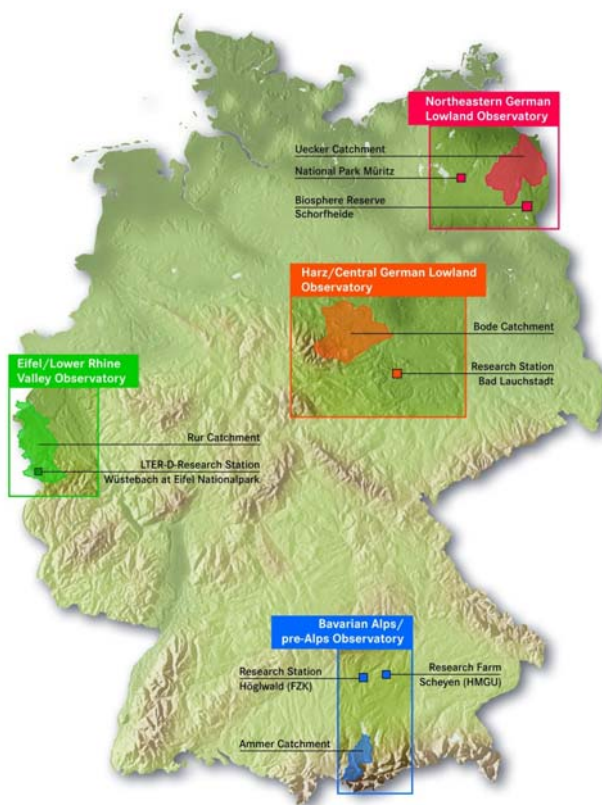


Fig. 1: The TERENO network

end devices each wired to several soil sensors and aboveground router devices (Bogena et al. 2007; Bogena et al. 2008). The SoilNet sensor network consists of soil water content, salinity and temperature sensors attached to end devices by cables, router devices and a coordinator device. The end devices are buried in the soil and linked wirelessly with nearby aboveground router devices. Recently, a small forest catchment Wüstebach (~27 ha) was instrumented with 150 end devices and 900 soil sensors.

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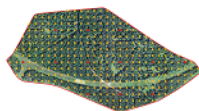
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Test site „Rollesbroich“

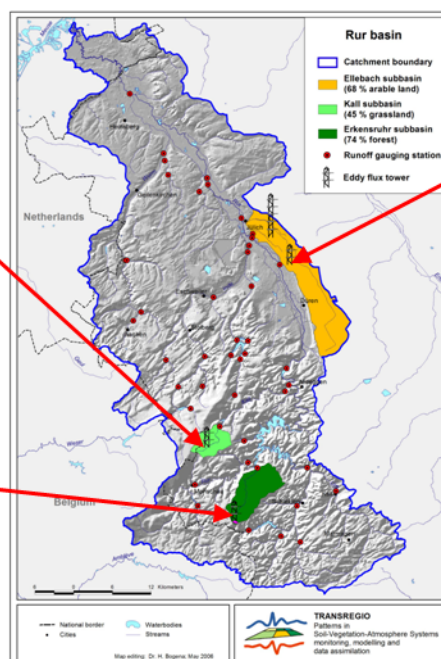


- Bowen ratio station
- Groundwater monitoring
- Runoff and solute monitoring
- Soil moisture sensor network

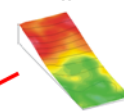
Test site „Wüstebach“



- Eddy Correlation station
- Soil moisture sensor network
- Groundwater monitoring
- Runoff and solute monitoring
- Soil CO₂ Flux measurements
- Biodiversity assessment



Test site „Selhausen“



- Aircraft
 - MetAir Dimona
 - small automated aircrafts
- Tethered balloons
- Ground-based remote sensing
 - passive microwaves
 - scintillometers etc.
- Eddy correl. & profiling stations
- Soil CO₂ flux measurements
- Soil moisture measurements

Fig. 2: TERENO sites within the Eifel / Lower Rhine valley Observatory

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BACKGROUND AND TASKS

Between 1991 and 1997, I studied geography at the University of Münster and the University of Bonn. For my diploma thesis I was awarded the Heinrich Hörlein Prize. From 1998 to 2001, I worked as a research assistant at the University of Bonn. In 2001, I was awarded my PhD with Summa cum laude by the Faculty of Mathematics and Natural Sciences at the University of Bonn. The title of my PhD thesis was: "Analyzing and modelling solute and sediment transport at different spatial and temporal scales - A case study of the catchment of the Wahnbach River, Germany". This thesis was awarded the Albert Steeger Bursary by the Rhineland Regional Council. From 2001 to 2005, I worked as a research scientist in the Programme Group "Systems

Analysis and Technology Evaluation" at Research Centre Jülich. My thematic focus has been on the area-differentiated modelling of groundwater recharge on a macroscale with GIS-based models, the analysis and modelling of runoff and its components as well as pollutant transport into the fluvial system. Since 2005, I am coordinating the TERENO Initiative at the Institute of Chemistry and Dynamics of the Geosphere, ICG-4: Agrosphere at Research Centre Jülich. Since 2007, I am also member of the Transregional Collaborative Research Centre 32 (TR32) "Pattern in Soil-Vegetation-Atmosphere Systems: Monitoring, Modelling, and Data Assimilation", in which I am responsible scientist of the subproject "Spatio-temporal variability of catchment properties and their effect on water, solute, and CO₂ fluxes from the micro to the mesoscale" and for the Working Group "Field Measurement". Furthermore, I am coordinating a research project related to the validation of the SMOS (Soil Moisture Ocean Salinity) satellite mission of the European Space Agency (ESA), which is granted by the Federal Ministry of Economics and Technology.

Part V: Outlook

Where are we going? Perspectives of future Sino-German cooperation

The ‘Second Sino-German Workshop on Biodiversity Conservation’ strengthened the partnership between Germany and China in the field of Biodiversity Conservation and Ecosystem Management. Current problems and scientific approaches on the management of ecosystems and protected areas have been debated.

During the workshop’s presentations and working group sessions manifold insights into the most prevailing debates on climatic and land-use change of the respective partner could be gained. Some possible solutions were presented and discussed. New ideas for future cooperation were determined and left space for deepened scientific and technical collaboration. Future exchange of experts, new projects and workshops will hopefully enlighten some aspects of the most challenging questions on how to sustain ecosystem services and ecosystem functions facing climatic and land-use change.

MONITORING SCHEMES AND INDICATOR SETS

Adaptation to climatic change should be based on scenario-building that takes societal, but also biophysical changes into account. But biophysical models depend on broad data supply. The following aspects could be deepened during the next steps of cooperation: legal aspects of access to existing information; technical aspects of the development of reasonable indicator sets; measurement stations that integrate carbon fluxes to understand the ecosystems processes and feedbacks with regard to climatic change; and an improved comparability of data.

KNOWLEDGE TRANSFER AND TRANSDISCIPLINARY RESEARCH

In most cases current protected area governance and management does not use all existing knowledge on the protected ecosystems to a satisfying extent. This is very often due to disuse of unconsidered, but precious knowledge systems.

But the comparably low transfer costs are worth to pay, especially if one views the possible benefits.

Climate change and continually intensified land use leaves science with many uncertainties. In Germany different think tanks start to interlink natural and social science and include communities with local knowledge in this dialogue. Decision-makers profit to a large extent from this new design of applied and decentralized science.

PROTECTED AREA MANAGEMENT

Manifold protected areas with different criteria and implementation strategies leave the involved actors in the dark and partly prevent a successful realisation. An upcoming workshop could advance knowledge on criteria and implementation strategies. And the production of handbooks with a clear outline and best practices for remote managers on different administrative levels would be an important step to transfer knowledge into practice. Co-management approaches could be integrated in this discussion to bridge the gap between the local communities and the administration on different levels.

COOPERATION ON MULTIPLE LEVELS

Sino-German cooperation between CRAES and BfN focuses on knowledge transfer related to biodiversity conservation on the national level. But as one can observe in the ‘German-Chinese Cooperation Platform for the Conservation of Species-Rich, Highly Carbon-Sequestering Ecosystems’ the cooperation starts to downscale and to involve other administrative levels. This kind of involvement could be transferred to other subjects to better understand the multilevel governance and management of issues like protected areas. This allows to benefit from the insights that sub-national levels have into the implementation of guidelines—both in China and in Germany.

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