Developing Strategies for the Future of Biodiversity Conservation in the UN Year of Biodiversity 2010

Third Sino-German Workshop on Biodiversity Conservation

BfN – Skripten 292

2011

Developing Strategies for the Future of Biodiversity Conservation in the UN Year of Biodiversity 2010

Results and Documentation of the `Third Sino-German Workshop on Biodiversity Conservation' June 21st – 23rd 2010

organised by
Chinese Research Academy of Environmental Sciences (CRAES)
German Federal Agency for Nature Conservation (BfN)
German Agency for Technical Cooperation (GTZ)[1]

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[1] Since the beginning of 2011 the GTZ is GIZ, as it merged with DED and Inwent.

Photocredits: Labagoumen Forest Park (Dr. S. Lehmann, June 2010)

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Supported by the German Federal Agency for Nature Conservation (BfN) with funds from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

This publication is included in the literature database "***DNL-online***" (www.dnl-online.de)

BfN-Skripten are not available in book trade but can be downloaded in a pdf version from the internet at: http://www.bfn.de/0502_skripten.html

Publisher: Bundesamt für Naturschutz (BfN)
Federal Agency for Nature Conservation
Konstantinstrasse 110
53179 Bonn, Germany
URL: http://www.bfn.de

Printed by the printing office of the Federal Ministry of Environment, Nature Conservation and Nuclear Safety.

Printed on 100% recycled paper.

ISBN 978-3-89624-027-9

Bonn, Germany 2011

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Part I: Introduction

`Third Sino-German Workshop on Biodiversity Conservation´ – Ecosystem Services and Management: Developing Strategies for the Future of Biodiversity Conservation in the UN Year of Biodiversity 2010

Opening Speech I

by Ms. Cai Lei, Vice Director, Department of Nature and Ecology Conservation, MEP

Respected Prof. Jessel, Mr. Bundscherer, Guests,
Ladies and Gentlemen,
Today, we are gathered here to attend the "Third Sino-German Workshop on Biodiversity Conservation, Ecosystem Services and Management". Assigned by Mr. Zhu Guangqing, Vice Director General, Department of Nature and Ecology Conservation of the Ministry of Environmental Protection, I would like to extend sincere congratulations to the holding of this workshop.
This year is the UN proclaimed 2010 International Year of Biodiversity. The Secretariat of the Convention on Biological Diversity, governments of contracting parties, relevant organizations and authorities carry out a series of activities focused on the theme of "Biodiversity is life. Biodiversity is our life.", aimed at publicizing the sense of biodiversity conservation and the concept of harmony between human and nature.
As one of the contracting parties of UN Convention on Biological Diversity, the Chinese government attaches great importance to the International Year of Biodiversity. To successfully host a series of activities for the whole year, China established a National Committee for the 2010 International Year of Biodiversity, which is chaired by Vice Premier Li Keqiang, member of the Standing Committee of the Political Bureau of the CPC Central Committee, with members including leaders of 25 ministries and agencies at the national level. It aims at promoting China's achievement in biodiversity conservation, at raising the public awareness, advancing public participation and confirming the determination of the Chinese government in the enhancement of harmony between humans and nature as well as the implementation of sustainable development.
China is one of the 12 countries with the richest biodiversity in the world. Being the origin centre of 8 main crops and one of the four main genetic resource centres, China has got every type of terrestrial ecosystem with abundant species resources. Being the biological gene bank of the Northern Hemisphere, the amount of species in China is listed as No.1 in the Northern Hemisphere. Conservation of biodiversity is not only significant for national interests and descendant welfare, but also for the promotion of sustainable development of human beings.
In recent years, under the great efforts of our Chinese government, with great supports from vast numbers of scientific researchers, active participation of all social sectors and great help by the international society, the capacity of biodiversity conservation in China has been greatly improved, establishing a preliminary system of laws and regulations for biodiversity conservation. Key ecological projects such as the conversion of cropland to forest, returning land for grazing to pasture, returning farmland to lake as well as protecting natural forest, wild plants and animals, natural reserves, etc., have been

implemented. With the promulgation and implementation of the “Outline of Action Plan for Aquatic Life Resources Protection in China” and the “Outline of National Plan for Biological Species Resources Conservation and Management”, 85% terrestrial natural ecosystem types, 47% natural wetlands, 20% natural forests, most natural relics, 65% higher plants community types, as well as most national protected rare and endangered wildlife species have been effectively protected. This has gained international recognition and appreciation.

As part of China’s activities in 2010 International Year of Biodiversity, this workshop will communicate and discuss biodiversity conservation from three angles:, how to elevate the role of biodiversity conservation in environmental policy, how to integrate the concept of biodiversity in ecosystem management, and how to promote the study of the economic value of biodiversity. Participants here will discuss about how to integrate biodiversity conservation better into social economical development policy, which would be a broader approach to promoting biodiversity conservation in China.

Dear guests and friends,

let us keep the theme of “Biodiversity is life. Biodiversity is our life.” always in mind, and make efforts together to make more contributions to biodiversity conservation throughout the world.

Thank you!

Opening Speech II

by Prof. Shu Jianmin, Vice President, CRAES

Respected Prof. Jessel, Mr. Bundscherer, Guests,

Ladies and Gentlemen,

Today, we are here for the "Third Sino-German Workshop on Biodiversity Conservation, Ecosystem Services and Management". On behalf of the Chinese Research Academy of Environmental Sciences, I would like to extend my sincere thanks and a warm welcome to the delegates from BfN, GTZ as well as our respected guests and experts from home and abroad.

As you know, this year is the UN declared International Year for Biodiversity. Biodiversity has become a common interest of governments and scientists throughout the world. We may notice that during international communication and domestic exchange, biodiversity is always the important issue for discussion, not only in the field of environmental protection, but also in other fields, which fully illustrates that biodiversity conservation has become a new hot spot of people's concern after issues of climate change.

Biodiversity is the basis for the survival and development of human beings. It is the key issue closely related not only to contemporary development, but also to descendant welfare, since biodiversity provides us healthy and comfortable ecological environment for our habitation, abundant bioproduct and varied ecosystem service for our daily life, as well as colourful aesthetic enjoyment and spiritual happiness for our spiritual life. All these are vivid presentations of the value of biodiversity and ecosystem service functions. Although certain services provided by biodiversity could not be measured by money, human beings enjoy and obtain these benefits all the time.

With the development of subjects on biodiversity conservation, people who are working in this field are doing their best to find new technologies and methods to measure the value of biodiversity accurately. They are dedicated to promoting their application in the decision making of governmental authorities. All their efforts have broadened the research area of biodiversity conservation and increased the role and importance of biodiversity in administration and management, providing significant tools for the promotion of biodiversity in the decision making of national economic and social development.

During recent years, the importance of biodiversity in governmental decision making and administration has been greatly improved, with more influence. Vast numbers of scientific researchers are paying great attention in their studies to biodiversity conservation. Being the research academy submitted to the Ministry of Environmental Protection of China, CRAES carries out varied research in the fields of the impact of climate change on biodiversity, the adaption of biodiversity to climate change, monitoring, assessment and protection of biodiversity, integration of biodiversity into environmental impact assessment, etc., and is gaining fruitful results. We will try our best to broaden the research area of biodiversity conservation, to provide more support for the integration of biodiversity into the national economic development.

This year, China established the National Committee for the 2010 International Year

of Biodiversity, which is chaired by Vice Premier Li Keqiang, member of the Standing Committee of the Political Bureau of the CPC Central Committee, with members including leaders of 25 ministries and agencies at the national level. This fully illustrates China's great attention to biodiversity conservation, which is also a great encouragement for scientific researchers, who work on biodiversity conservation. The scientific researchers in China would work together to explore and develop new technologies, to provide stronger technical support to promote the importance of biodiversity in administration and decision making as the mainstream force, to advance the transformation of economic growth pattern, and to realize scientific development and green growth.

Dear guests, ladies and gentlemen,

The aim of this workshop we organised is to enhance bilateral communication between China and Germany, to discuss issues with our international experts on how to promote harmonious development and how to realize ecological civilization through the enhancement of biodiversity conservation. In order to realize our expectations, let us collaborate and do our best. I wish you a successful workshop.

Thank you!

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Background and Tasks

Prof. Jianmin Shu, Vice President of the Chinese Research Academy of Environmental Science and recipient of the special allowance of the State Council of China, focuses his research on pollution ecology, ecological quality assessment and ecological restoration. He has directed and participated in more than 30 national/ provincial projects, most of which deal with issues in West China. He also serves as the governmental consultant of Qinghai Province and is a member of the Qualification Committee for Biosafety of Agricultural Products, and chairs the Qualification Committee for Environmental Management of New Chemicals affiliated to MEP as well.

Opening Speech III

by Prof. Beate Jessel, President, BfN

It is a great pleasure for me to welcome you on behalf of the German Federal Agency for Nature Conservation to the third Sino-German Workshop on Biodiversity titled: " Ecosystem Services and Management - Developing Strategies for the Future of Biodiversity Conservation in the UN Year of Biodiversity 2010"

First of all, I would like to express my sincerest gratitude to our Chinese partners from the Chinese Research Academy of Environmental Sciences (CRAES) and GTZ for hosting this event in the modern and exciting city of Beijing and for the excellent work done in organizing this workshop.

We are especially delighted to have the opportunity to cooperate with you on the important issue of ecosystems.

We can look back to a very fruitful and close cooperation between our organisations, which has been in place for over two years. This is the third workshop in a series of events taking place in an annual exchange between our organisations covering different subjects focusing on biodiversity and nature conservation. In March 2008 the first workshop on biodiversity conservation concepts and approaches in general took place here in Beijing. The second workshop, focussing on "Management of Ecosystems and Protected Areas – Facing Climate Change and Land Use" took place at BfN in Bonn in April last year.

Also in the context of cooperation an important project has started in 2009 entitled "German-Chinese Cooperation Platform for the Conservation of Species Rich, Highly Carbon-Sequestering Ecosystems". It 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. We will hear more details about the objectives and outcomes of the project tomorrow.

China is a very important partner for Germany. Since 1994, there has been a bilateral German-Chinese environmental agreement. In terms of renewable energies, and other aspects related to environmental protection, China and Germany cooperated intensively in the past. However, 'biodiversity and nature conservation' subjects have not been considered nearly as much in the cooperation, despite the fact that China is known as a megadiverse country and an important partner in international negotiations.

Meanwhile, an increasing exchange on issues concerning the conservation of biodiversity exists between Germany and China:

In January 2008, the environmental ministers of both states, Zhou and Gabriel agreed to strengthen the involvement and cooperation in the field of 'biodiversity.' And the last trip of our new Environmental Minister Röttgen in April 2010 confirmed again the importance of this issue.

Through our growing scientific and technical cooperation as well as the exchange of experience on a wide range of issues in the area of nature conservation, relevant findings are emerging and are increasingly being tapped. We strongly believe that it is critical for us to maximise our mutual learning efforts and to continue to cooperate in our activities. Therefore, the focus points 'biodiversity and nature conservation' were discussed at the first German-Chinese workshop, mentioned above, in March, 2008, in Peking. Through the exchange of different approaches, for example, in the subjects 'Biodiversity-Monitoring, protected area management, landscape planning etc.' important syner-

gies can be developed. Therefore, an intensive exchange is useful. The coordination of possible joint activities is important along with the exchange of experiences in order to avoid redundancy, to prevent contradictory project results and to learn from successes.

The purpose of this workshop is the scientific exchange of methodical approaches, research results, etc. as well as the exchange of current and planned programs and projects related to Ecosystem Services and Management. In addition, the workshop will give the opportunity to discuss the main focuses and action strategies of Germany's and China's engagements in the area of biodiversity and the possibilities of further cooperation and interlinking of German-Chinese organizations.

The role of the biodiversity - in particular in relation to climate change and the protection of ecosystem services – is of global importance and so the United Nations declared 2010 to be the International Year of Biodiversity. It is a celebration of life on earth and of the value of biodiversity for our lives.

Ecosystems are the life supporting system for human kind, providing critical services for human well-being. They are being degraded through a general lack of valuation, unsustainable resource utilisation, infrastructure development and pollution. This is associated with the loss of biodiversity and its resilience, the loss of a provision of goods and services and linked with actual and potential impacts on the sustainability of the economic and social development. Facing a declining ecosystem and a dramatic loss of biodiversity, countries have an essentially urgent need to improve their ecosystem management, including institutional arrangement, legislation, and policies to further provide services for future generations.

The aim of the workshop is to sharpen the awareness of the value of biodiversity and ecosystem services for human life, to develop solutions to diminish threats and to discuss the opportunities and challenges of the present situation, especially concerning different land use forms. The aim is also to enhance the development of effective and appropriate policy to stop further loss of biodiversity. These subjects will also come up during the workshop and I am looking forward to the contributions of Chinese and European colleagues on these matters.

The workshop is divided into two days with different thematic parts. During the first day the main focus points are a general introduction to ecosystems and their services, management and valuation and the existing policy frameworks and strategies to promote integrated ecosystem management. At the end of the day a final panel discussion on existing and possible policies will take place.

The second day will try to give an overview on some of the current knowledge on the complex, and in many cases still not fully understood interactions between ecosystems, land use patterns, biodiversity and human well-being based on case studies and scientific research. A look at some linking integrative processes like connecting ecosystems and at some methodological aspects like assessment and planning for sustainable ecosystem management and aspects of economic valuation of ecosystems will lead to a final discussion on the possibilities of how to integrate scientific knowledge successfully into concrete implementation and how to shape the bilateral cooperation on biodiversity conservation between our organisations.

This workshop pursues the overall goal to provide a platform for the scientific exchange on methodical approaches, research results as well as ongoing and future initiatives in the field of the maintenance of ecosystem services and conservation and sustainable use of biodiversity.

Besides the technical debate, the workshop is also an excellent opportunity to strengthen the exchange between Chinese and German scientists and to explore priority areas for the future Sino-German collaboration on conservation and sustainable use of natural resources.
We have also invited European and Chinese experts and partners to this third workshop with the intention of broadening our expertise and extending our networks. We are glad to have the opportunity with this workshop to strengthen the cooperation on biodiversity.
It is therefore a great pleasure for me to see that many experts show interest in the topic and I am looking forward to interesting presentations and fruitful discussions over the next two days. I am convinced that this workshop will only be the first step towards a fruitful Sino-German partnership in this field.
Let me close off by wishing us all a fruitful and successful workshop

Prof. Beate Jessel

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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, as well as 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: Selected Workshop Presentations

The role of biodiversity for the management of ecosystems and integrative environmental policies

Recognizing the economic value of ecosystems and biodiversity: TEEB and consequences for future policies

by Dr. Haripriya Gundimeda, Local and Regional Policymakers and Administrators Coordinator for the TEEB study. Associate Professor, Department of Humanities and Social Sciences, at the Indian Institute of Technology in Bombay, India.

Nature is the source of much value to us every day – this can be spiritually, culturally, health-wise or economically; and yet the benefits we receive from Nature mostly bypass markets, escape pricing and defy valuation. As a result, global ecological footprint through our natural resources consumption has doubled over the last 40 years to the point that, if the whole human population consumed at this rate, we would need 4-5 planet Earths just to keep up, just to sustain us. The lack of valuation has become an underlying cause for the observed degradation of ecosystems and the loss of biodiversity.

With this in mind, "The Economics of Ecosystems and Biodiversity TEEB " study was launched by Germany and the European Commission in response to a proposal by the G8+5 Environment Ministers (Potsdam, Germany 2007) to develop a global study on the economics of biodiversity loss. The goal of the study is to motivate actions to significantly reduce the loss of biodiversity by 2010. The objective of the study is to evaluate the costs of the loss of biodiversity and the associated decline in ecosystem services worldwide, and to compare them with the costs of effective conservation and sustainable use. The intent of the study is to sharpen awareness of the value of biodiversity and ecosystem services and facilitate the development of effective policy, as well as engaged business and citizen responses.

In this report we present some tools for the national and international policy makers, regional and local policy and businesses. They need to incorporate the true value of ecosystem services into their decisions. The report will showcase how decision makers at international, national, local and regional level can promote local development by explicitly considering nature and the services it provides to human well being. This report shows what nature provides us with, what we are at risk of loosing, and what can be done about this at various levels. It explains how ecosystems provide different types of services, what happens if development efforts only consider a few of them. In this report, we also explore how biodiversity and ecosystems are impacted by climate change, and how an intact environment can in turn help to adapt to this change.

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Background and Tasks

Haripriya Gundimeda is the Joint Local and Regional Policymakers and Administrators Coordinator for the TEEB study.

She holds a Ph.D. in Development Policy and works in various issues relating to environment and development economics. She is currently working as an Associate Professor, Department of Humanities and Social Sciences, at the Indian Institute of Technology in Bombay, India.

Before joining her current organization, Haripriya taught at the Madras School of Economics in Chennai. She was also a Visiting Scholar at the Institute of Behaviour Sciences, at the University of Colorado, Boulder, as well as a Ratan Tata Fellow at the Asia Research Centre, at the London School of Economics, and a Political Sciences and Visiting Researcher at the University of Gothenburg, Sweden.

Her main areas of research have been on green accounting, economics of biodiversity, mitigation aspects of climate change, energy demand and pricing, valuation of environmental resources, and issues relating to development in India. Haripriya is actively involved with the Green Indian States Trust (GIST) in India and has published widely in various journals.

Policy frameworks and the strategies to promote integrated ecosystem management

Markets for ecosystem services in China – an exploration of China´s eco-compensation and marked based environmental policies

by Michael T. Bennett, Research Fellow, College of Environmental Sciences, Peking University

This presentation documents recent policy innovations for the conservation and management of ecosystem services in China. Policymakers have become increasingly interested in developing new approaches to address China's multiplying conservation challenges and resource constraints in face of break-neck economic growth. This has led China's central and local governments to rapidly expand the range of policy and program innovations, many under the broad heading of "eco-compensation," that are laying the groundwork for the development of ecosystem services markets. In particular, local governments have been important contributors to this process, rapidly adapting centrally designed "eco-compensation" programs to their own needs, creating "hybrids" — programs that weave together and draw upon multiple central and provincial policies and funding sources — and creating their own distinct initiatives that often feed back into central government policy development. While not an exhaustive account of all payments (PES) and markets (MES) for ecosystem services in China, it provides an overview of a range of policy innovations for watershed ecosystem services, carbon markets, forest conservation, improving landscape amenities, biodiversity conservation and anti-desertification. The results of this report suggest that there are tremendous opportunities to draw lessons from the significant degree of local innovation that is occurring and to connect innovations from around the globe to inform developments in China.

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Background and Tasks
Michael T Bennett is a Senior Researcher at Forest Trends (www.forest-trends.org) and a visiting scholar at Peking University's School of Environmental Sciences and Engineering (a position wherein he is a research fellow for the Environment for Development Initiative, China office, under Dr. Jintao Xu). He has a PhD in Environmental and Resource Economics from the University of Wisconsin - Madison. His current areas of research and expertise include (1) the status of and developments in ecosystem services markets and payments in China, and (2) analysis of the impacts and implementation of China's major forest-based ecological programs, including the Sloping Land Conversion Pro-

gram (the largest payment for ecosystem services program in the developing world), the Natural Forest Protection Program, and the Forest Ecosystem Compensation Fund. He recently completed a report, available on Forest Trends' website, entitled Markets for Ecosystem Services in China: An Exploration of China's "Eco-compensation" and Other Market-Based Environmental Policies. Current projects include collaboration with the Asian Development Bank to provide policy support to China's National Development and Reform Commission to inform about its development of a national eco-compensation policy framework.

Governing farmland conversion: Comparing China with Germany

by Dr. Tan Rong, Zhejiang University, Lecturer and research fellow in land economics and international analysis

Farmland conversion has become an increasing concern in China and other parts of the world, including Europe. Be it for environmental or food security reasons, questions arise concerning how urbanization should be governed, i.e. what rules and regulations could enhance the efficiency and sustainability of land use. Taking a first step toward answering such questions, this presentation describes different governance structures for farmland conversion in Germany, and China. Secondly, it compares five identified differences between these countries in the realms of land property, land use planning, the role of the market, the role of government, and the performance of governance structures. The purpose of this presentation is to develop an approach for comparing governance structures for land conversion that a) offers some opportunities for exchange of experience between the three countries and b) provides a framework for further research on governance structures in farmland conversion.

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Background and Tasks

Dr. Tan Rong is a lecturer and research fellow in the department of Land Management, belonging to the College of Public Administration at Zhejiang University, Hangzhou, China. His recent research focuses on farmland conversion for urban development from an economic and institutional perspective. He has many publications on land use issues, such as a recent paper titled “Diversity of practical quota systems for farmland preservation: A multi-country comparison and analysis” on Environment and Planning C: Government and Policy, and a paper titled “Governing farmland conversion: Compare China with the Netherlands and Germany” on Land Use Policy.

The importance of payments for ecosystem services as drivers of land use change in Yunnan, China

by Dr. Zhanli Sun, Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO)

China's Sloping Land Conversion Program (SLCP), better known as the Grain-for-Green program, compensates farmers to change land use on their steeply sloping land by growing trees instead of crops. China launched the SLCP in 1999 directly in response to the severe drought in 1997 and the massive floods in 1998. Besides reducing environmental degradation, the SLCP envisages the alleviation of poverty. It is one of the largest programs of Payments for Ecosystem Services around the world in terms of the amount of people affected and capital invested. Although generally regarded as having positive social-economic impacts on farmers, questions remain about the environmental effects, such as the policy's impact on biodiversity. Here we combined an empirical study approach and an integrated simulating model to explore the implementation process and then assess the impacts of the SLCP policy. Based on survey data from 500 households in 17 villages of two counties of Yunnan, China, a preliminary agent-based model has been constructed and calibrated. Results suggest that the SLCP played a significant role in increasing tree cover. It is especially worth mentioning that the program also spurs significant economic trees plantation by non-participants. In some regions, however, the SLCP resulted primarily in monoculture plantations for tree-based cash cropping. Ecological restoration and biodiversity preservation should receive higher priority, coupled with compensation payments that are competitive with profits from tree plantations.

Dr. Zhanli Sun

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Background and Tasks

Dr. Zhanli Sun is a senior research associate at the Leibniz Institute of Agricultural Development in Central and Eastern Europe (IAMO). His research focuses on environmental and land use modelling with cellular automata, agent based models, system dynamics and GIS tools. His current research, funded by Germany government, is to study farmers' decision-making process regarding payment for ecosystem service policies in China using integrated modelling approach. He participated in a few state or Federal funded projects in China, U.S. and Germany, published a book, and several peer-reviewed papers in journals and international conferences.

Interactions between ecosystems, biodiversity, land use patterns and human well-being (Case studies in selected ecosystems and their services)

The role of forests and their sustainable management to main ecosystem services and biodiversity

by Marijke van Kuijk, Consultant at Aidenvironment

About 30% of the surface area of the world is forest. Forests provide raw materials, maintain biodiversity, protect land and water resources and play a role in climate change mitigation. Net forest area loss is 0.18% annually, with large scale deforestation in Indonesia and Brazil. Net forest area loss has been slightly declining over the last 5 years, due to plantings in countries like China and Vietnam. However, one must realize that a planted forest is not the same as a natural forest. Primary forest loss and global wood removal have not been declining; it has remained stable over the past 15 years.

Primary forests, especially in the tropics, are characterized by high biodiversity. A large part, 45%, is located in the Amazon. Biodiversity is needed for ecosystem processes, which are needed for ecosystem functioning. Without ecosystem functioning we would not have ecosystem services. More than 11% of the forest area has biodiversity conservation as a primary function. In forestry, the view of biodiversity has changed from a concern for future timber trees, towards a more holistic approach, including many more aspects of biodiversity (non-timber trees, threatened species etc.).

Sustainable forest management (SFM) is a way to achieve biodiversity conservation and thus the preservation of ecosystem services. Ways to achieve SFM include certification and REDD. It was shown that management practices associated with certification schemes can contribute to biodiversity conservation. But certification systems have different views on what exactly SFM and biodiversity are, resulting in varying extents of conservation. Moreover, the greatest threat for biodiversity is forest conversion, in which certification itself plays no role. Reducing Emissions from Deforestation and Degradation (REDD) is a relatively new concept to achieve SFM and thus, as was shown, can contribute to biodiversity conservation and preservation of ecosystem services. Both certification and REDD were not developed with the goal of conservation. However, since both lead to SFM, they may benefit biodiversity and ecosystem services.

Is the world making progress towards SFM to conserve biodiversity and ecosystem services? The primary forest area is still declining and so is forest health. On the other hand, there is an increase in forest area designated for conservation and an increase in plantation forests. The answer depends on the scale and location. Locally progress might be made, but this might not be nationally or regionally. Asia makes more progress than Africa with establishing plantation forests. In South America progress is made with more protected areas although large scale deforestation in the rich Amazon forests still continues.

Thus are we making progress? Yes, but not everywhere and not fast enough.

Marijke van Kuijk

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Background and Tasks
Marijke van Kuijk graduated from Radbound University in Nijmegen in 2002 with a Master's Degree in Biology. During her study she specialized in tropical forest ecology and conservation. She obtained a Doctor Degree from Utrecht University in the topic of tropical forest regeneration. Marijke subsequently worked on a number of national and international assignments both as a researcher and as a consultant. She has knowledge of forest certification, (sustainable) forest management, forest ecology, conservation and biodiversity. She also has experience in the field of REDD and carbon crediting. She acquired her knowledge and experience mostly in the tropics, in particular South East Asia and Guianas. Currently, she focuses on the role of forests and carbon in relation to climate change. As a consultant Ms. Marijke von Kuijk works on issues related to forests and climate and works in projects in several tropical countries.

The role of wetlands for the maintenance of ecosystem services

by Dr. Ma Chaode, Director of Freshwater Programme, WWF Beijing Office

Wetlands are one of the three ecosystems on the earth, with the functions of provision, regulating, culture and supporting. Wetlands have been called “the kidney of the Earth” with the functions of water storage and purification, flooding control, climate regulating and biodiversity conservation.

Wetlands also face threats like pollution, reclamation, excessive use, soil erosion, sedimentation, wetland drainage, climate change and governance. Strategic approaches for wetlands conservation have been proposed. As a successful restoration case study, Lake Hong witnessed the process and multiple functions have been protected.

Dr. Ma Chaode

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Background and Tasks

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- Ph. D in Silviculture, Graduate School, Beijing Forestry University
- Guest Professor of Nature Conservation College, Beijing Forestry University
- Member of CCICED Task Force on Ecosystem Services and Management Strategy
- Particular expertise in the fields of wetland conservation, integrated river basin management, ecosystem services and management, rural development, etc.

Current position:

As the Director of the Freshwater Programme in WWF Beijing Office, he is responsible for the five-year and annual Strategic Planning. His task is also to promote high level partnership at a national like MWR and MEP and at river basin levels like CWRC and YRCC, water policies advocacy based on pilot and opportunities, to promote IRBM and to provide technical support to field offices and the communication for Freshwater Programmes.

Agricultural Biodiversity and Climate Change

by Li Qingsong, Technical Advisor, Sustainable Agro-biodiversity management in the Mountain Areas of Southern China, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

Abstract
Climate change is affecting biodiversity and disrupting the function of most ecosystems. China´s mean annual air temperature will increase by 1.3-2.1ºC by 2020 and 2.3-3.3ºC by 2050 as compared to 2000. It has recently been established that 20-30% of all species will be at risk of extinction if there is a 1.5-2.5 ºC rise in temperature (IPCC, 2007). Agricultural genetic resources are not only a victim of climate change; they are of fundamental importance for the adaptation to this change and the problems it poses. Genetic diversity within crop and livestock species are an invaluable resource for breeding to enable adaptation to changing conditions.
The paper introduces the adaptation and mitigation strategy implemented by the Project "Sustainable Management of Agrobiodiversity in the Provinces of Hainan and Hunan, P.R. China".

Introduction
According to the assessment report from the Intergovernmental Panel on Climate Change (IPCC, 2007), the main impacts of climate change in China will be as follows: 1) increased frequency of heat waves, 2) stronger cyclones, 3) a seven-fold increase in floods since the 1950s 4) about 22-33% increase in rainfall in NW China and 5) more than 6 million hectares area increase affected by droughts since 2000.
In China, the annual average air temperature has increased by 0.5-0.8ºC during the past 100 years, which is slightly higher than the global temperature rise. Most of the temperature rise was observed over the past 50 years. Due to climate change, the nationwide mean annual air temperature will increase by 1.3-2.1 ºC by 2020 and 2.3-3.3 ºC by 2050 as compared to 2000. (China National Climate Change Program, 2007)

Scientists also observed that China's glaciers are melting quickly. According to Dr. Barry Baker from Nature Conservancy, the main glacier on the Meili Xueshan in NW Yunan has retreated 350 m in 10 years. Another Chinese Academy of Siences study quoted by Xinhua News (25.6.2007) estimates that glacier coverage in Xinjiang high mountain area has declined by 20% in 40 years. Glaciers on the Qinghai-Tibetan plateau are shrinking by 7% per year.

Melting glaciers cause floods, landslides and loss of important water resources. In addition, the shift of vegetation zones to higher altitudes may pose threats to species that depend on certain climatic and ecologic conditions and that cannot cope with such fast changes (e.g. old trees).
How are climate change and biodiversity linked? Climate change affects biodiversity and agrobiodiversity and disrupts the function of most ecosystems. It has recently been assessed that 20-30% of all species will be at risk of extinction if there is a 1.5-2.5 ºC rise in temperature (IPCC assessment report, 2007).

Agriculture and Biodiversity
Climate change also poses a serious challenge to agriculture and it is expected to affect agricultural activities through a number of factors, e.g. changes in water availability, an increase in the exposure to heat stress and greater leaching of nutrients from the soil during intense rains.
Agricultural productivity in some regions of China (e.g. southwest, areas of Xinjiang,

central China) is also at risk. Productivity will suffer because of high temperatures, droughts and floods. It is estimated that a 2 ºC increase in temperature could reduce rice yields by 12% in China.
Local agricultural genetic resources are not only affected by climate change, they also provide an essential breeding stock for the adaptation to this change. In some tropical areas, farmers have restarted to cultivate drought-tolerant plant varieties, for example up-land rice in Hainan Island. However, up to now, this subject has received little attention in the international debate on adaptation to climate change.

Agriculture is not only suffering from climate change, it is also contributing to green house gas emissions. Global agriculture is estimated to account for about 14% of the total anthropogenic emissions of greenhouse gases (GHG) (IPCC, 2007). Global Agriculture accounts for 44 % of anthropogenic methane (CH_4) emissions and about 70% of nitrous oxide gases, mainly from the conversion of land to agriculture and nitrogen fertilizer use (Millennium Ecosystem Assessment 2005). In China, the percentage is 50% and 92% respectively (Dong HongMin, 2008). The most important categories of agriculture emissions are:

1) Increasing land under cultivation by decreasing carbon sinks, including deforestation and the conversion of wetlands, especially peatlands;
2) Carbon dioxide (CO_2) emissions from burning forests, crop residues and land;
3) Use of nitrogen fertilizers that release nitrous oxide (N_2O) and
4) CO_2 emissions from farm machinery, facilities, processing and transport.
5) Methane (CH_4) emissions from rice cultivation.

Permanently flooded rice fields emit the largest amount of CH_4 in China. A 6-year long research (1995-2000) on a permanently flooded rice field in Chongqing, China (C. Zucong et al, 2003) showed that draining floodwater in winter and planting upland crops, either winter wheat or rape, instead of fallow under flooded conditions not only stopped CH_4 emission during the winter season, but also mitigated CH_4 emission during following rice growing period.
The German Agency for Technical Cooperation (GTZ), on behalf of German Ministry for Economic Development and Cooperation (BMZ) together with Chinese Ministry of Agriculture initiated a project on Sustainable Management on Agrobiodiversity in the Mountains Areas of Southern China. The project, co-financed by the European Commission and implemented through the UNDP, selected 28 pilot villages from 5 provinces to develop and test the following activities for the adaptation to climate change:

- Promotion of local landraces that are adapted to different climatic conditions
- Seed exchange between farmer groups
- On-farm experimentation by farmer groups
- Improvement of local cropping systems
- Biodiversity/agrobiodiversity planning (improve micro climate)
- Organic farming (increased soil fertility and water holding capacity)

As for the mitigation of green house gases in agriculture, the following measures have been carried out at village level:

- Controlled application and use of fertilizer (especially nitrogen)
- Promotion of biogas (in connection with the national biogas programme)
- Improved management of rice cultivation
- Promotion of organic farming (increased humus content- CO_2 sequestration)

Rodale Institute's Farming Systems Trial® (FST) is the longest-running side-by-side comparison of organic and conventional farming systems in the U.S. It has documented the benefits of an integrated systems approach to farming using organic practices. These include agroforestry measures, composting and crop rotation to sequester atmospheric carbon dioxide by storing it in the soil as organic carbon.

Conclusion:
The impact of climate change is different from region to region. Therefore, an adaptation strategy in agriculture should take the local situation (e.g. climate, soil, existing practices) into account and apply adaptation measures accordingly. More attention should be paid to local traditional practices for adaptation.
Maintaining and promoting biodiversity/agrobiodiversity in agricultural landscapes is fundamentally important for adaptation to climate change in agriculture and is crucial to coping with the problems it poses. However this subject has not received enough attention in the international debate on adaptation to climate change.
Organic farming can contribute to climate change adaptation and mitigation.

Dr. Li Qingsong

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Background and Tasks

- PhD in Biodiversity Economics, Haian University, P.R. China
- MSc in Appropriate Technology and Extension Skills, International Institute of Management, University of Flensburg, Germany.
- Bachelor in Agricultural Science, University of Hainan, P.R. China

Particular expertise in the fields of sustainable management of Agrobiodiversity (especially elated to biodiversity planning and monitoring); agro-ecological diversification of rubber-dominated land use systems.

Current position
As a technical advisor of the GTZ Sustainable Management of Agrobiodiversity Project, Mr. Li Qingsong's tasks mainly cover the following three areas:

1. Providing advice on ABD management concept and approaches; ABD planning and monitoring; and participatory approach;
2. Coordination and supervision of the implementation of project plans and activities;
3. Responsible for project results based monitoring.

Adapting Protected Areas Management Strategies to Climate Change in Jiangxi Province

by Dr. Wang Yunsheng

With the increase in population, the growing demand on natural resources and the accelerating industrialization, stresses on the ecosystems are raising rapidly due to overexploitation and pollution. Changes in biodiversity are inevitable and ecosystems services, such as carbon storage and sequestration will decline even more drastically with changes in climate, forming an impact cycle between ecosystem degradation and climate change.

To enhance the resilience of ecosystem service capacity and biodiversity to climate change, adaptive and sustainable strategies are necessary for the conservation and management of the ecosystems. The GTZ project "Sino-German Cooperation Platform for the Conservation of Species Rich and Highly Carbon-Storing Ecosystems" is highly focused on this area.

In this presentation, strategy and core processes are briefly introduced to explain the methodology of the project to help to achieve co-benefits between carbon, biodiversity and human well-being in the protected areas in China. Related efforts and outputs in the pilot provinces Jiangxi, especially Yuliangwan's small nature protected area, are demonstrated for a better understanding of the project.

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Background and Tasks

- B.Sc. in Information Management, Beijing Forestry University, China
- MSc. in Remote Sensing, Chinese Academy of Forestry, China
- Ph.D in Remote Sensing and Landscape Information, University of Freiburg, Germany
- Chinese Government Award for Outstanding Self-Financed Students Abroad for year 2008
- Best paper of Youth Forum at ISPRS (International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences) 2008 Congress

Current Position

Dr. Wang Yunsheng currently works as a technical advisor for the GTZ project "Sino-Germany Cooperation Platform for the Conservation of Species-rich and highly Carbon-Storing Ecosystems" in Beijing.

The role of various instruments to maintain ecosystem services

Environmental challenges of urbanization and the construction of ecological cities in China

by Dr. Zhang Linbo

With accelerated development of urbanization and industrialization in China, tremendous pressure on resources and environment will be faced by Chinese cities. All aspects of environmental issues, such as sizes, extents, scopes and hazards, will exceed those in developed countries, and show the characteristics of regional and composite. Eco-city construction becomes an important measure to deal with the challenges of environmental resources for Chinese cities, and has played an important role in achieving sustainable development and improving the environment. The theoretical framework and practice method of eco-city construction with Chinese characteristics were proposed based on the review of the practice and explore eco-city construction in the past two decades in China. The core theory of it being that eco-city construction is an ideal model of urban development instructed by the philosophy of ecosystem ecology. The goals of sustained and stable development of the urban economy, resource efficient energy use, virtuous circle in eco-environment and highly developed social civilization can be achieved through the integrated harmonization of the relationships between human activities, including economic and social and natural attributes that comprise resources and the environment. The objectives and tasks covered four levels, which are strategic, planning, action, and guarantee. The main contents include the building of an eco-environmental system, ecological economic system, the sustainable use system of resources and the building of eco-cultural system. The problems existing in Chinese eco-city construction included an emphasis on economic development, need for management system improvement and a lack of strong scientific and technological support. In the next study, the theoretical research needs to be improved, the indicator system of eco-city needs to be perfected, and supervision has to be strengthened in order to improve eco-city construction and increase its vitality.

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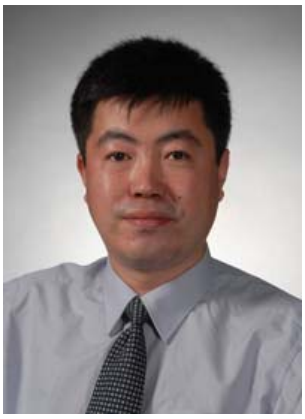

Background and Tasks

- B. S. Nanjing University, July 1992
- M. S. Chinese Research Academy of Environmental Sciences, July 1996
- Ph. D. Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, July 2007

Current position

Dr. Zhang Linbo has served as Vice Director of the Institute of Ecology, CRAES since April 2009, and takes full charge of activities in the Institute of Ecology. Research interests lie mainly in urban ecology, regional ecology, ecosystem services, ecological effects of climate change, ecological design and evaluation and ecological application of remote sensing and GIS Technology. Research projects mainly include 'The Remote Sensing Investigation on the Eco-environment Status in Western China', 'Ecological Environment Quality Assessment and Typical Area Application', 'Research on Evolution Drives and Control Measures in Source Regions of the Yellow River' and 'Investigation on Eco-environment in Mid-eastern China'.

Valuation of ecosystem services

by Dr. Ing. Burkhard Schweppe-Kraft

- The idea of monetary/economic evaluation of ecosystem-services (raising welfare; conflicts between provisioning services and regulation / cultural services
- Case studies
  - Regaining natural flood plains by dike shifting
  - (recreational and nature conservation value – contingent valuation; water purification – alternative cost approach; reduced damage costs)
  - Mitigation of climate-gas emissions and carbon sequestration by peatland restoration
  - (alternative cost approach, damage cost approach)
  - Ecosystem-services of high-nature-value meadows and pastures
  - (valuation of differences in the use of provisioning services; groundwater protection)
  - Cost-benefit-analysis of land use scenarios for Germany
  - (provisioning services; willingness to pay for different conservation programmes – choice analysis; valuation of the recreational function of different kinds of landscapes on the basis of an extended travel-cost approach)
- Limits of common neo-classical, welfare orientated monetary calculations for ecosystem-services
- The need for physical ecosystem accounting
- The restoration cost approach to value high-nature-value ecosystems – results from Germany

Dr. Ing. Burkhard Schweppe-Kraft

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Background and Tasks

- Diploma in Economics, University of Münster, Germany
- Ph.D. in Landscape Economics, Technical University of Berlin (Department for Landscape Development), Germany
- Particular expertise in the fields of resource economics, environmental planning and evaluation, environmental impact assessment, transfer of ecological know-how from industrialized to developing countries assessment and evaluation methodology for the mitigation and compensation of impacts on nature including fees.

Current position

As deputy head and scientific advisor in the department of legal affairs, economics and ecological sound regional development of the Federal Agency for Nature Conservation (BfN), Mr. Schweppe-Kraft is in charge of the field of costs and benefits of nature conservation, economic instruments for nature conservation, biodiversity and business. He also lectures on nature conservation economy at the applied University of Bernburg, Germany.

The importance of ecological networks for the maintenance of ecosystem services

by Dr. Bettina Hedden-Dunkhorst

Ecosystems provide essential services for human beings, in terms of food and shelter, water and air purification, carbon sequestration, etc. These services can only be supplied in a sustainable manner, if the interactions between physical factors and living organisms are maintained in stable systems. Yet, in many areas, particularly those that are strongly influenced by human activities, ecosystems are shaped by the interrelations between each other or maintained by facilitating the exchange among clusters. For example, forests and arable land boundaries allow for the development of a specific fauna. And a mosaic of ecosystems in a landscape - if individual ecosystem clusters are connected – can contribute to the maintenance of clusters through the exchange of individuals and their gene pools from different populations.

This illustrates the importance of ecological networks, specifically in diverse landscapes that feature a number of ecosystems within a specific territory. Ecological networks are understood as "systems of representative core areas, corridors, stepping stones and buffer zones designed and managed in such a way as to preserve biodiversity, maintain or restore ecosystem services and allow a suitable and sustainable use of natural resources through interconnectivity of its physical elements with the landscape and existing social/institutional structures" (Bonnin et al, 2007).

In times of climate change, ecosystems are especially vulnerable. In some instances habitats might be completely lost. In order to adapt, species need to migrate to relocate their habitats. Ecological networks can support migration and avoid the loss of biodiversity. Hence, in order to guarantee the establishment of ecological networks in Germany the Federal Nature Conservation Act (in its 2002 amendment) demands that Federal States establish a network of core zones, corridors and stepping stones on at least ten percent of their territory.

This presentation discusses the broader context of ecological networks, describes conditions for application and illustrates its implementation based on three European examples: the NATURA 2000 network, the European "Green Belt" and the Ecological Network supported by the Alpine Convention.

Dr. Bettina Hedden-Dunkhorst

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Background and Tasks

- B.Sc. in Agriculture, University of Paderborn, Germany
- M.Sc. in International Agricultural Development, Technical University of Berlin, Germany
- Ph.D. in Agricultural Economics, University of Hohenheim, (Department of Agricultural Economics in the Tropics/Sub-Tropics), Germany
- Particular expertise in the fields of sustainable natural resource management (especially related to water and land use), nature conservation, poverty reduction and rural development.

Current position

As Head of the Division "International Nature Conservation", Ms. Hedden-Dunkhorst is in charge of coordinating the activities of the Federal Agency for Nature Conservation (BfN) in relation to multinational environmental agreements and bi- and multilateral projects. She further represents the BfN in numerous international processes and policy meetings. As part of her work, she is in charge of a "Centre of Excellence" on international conservation within the BfN.

Other Participants and Speakers

Stefan Bundscherer

Programme Director, Environmental Policy Programme, Climate Change Programme
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Background

Mr. Stefan Bundscherer, engineer in landscape planning, started his career in 1990 with BUND. As a special commissioner he was responsible for the establishment of numerous environmental institutions in the former German Democratic Republic. In 1992 to 1994, he rose to the position of policy director and in 1994 to 2004 to the position of managing director of the capital branch. Between 2005 and 2007 he was the managing director of a Berlin-based environmental policy think-tank and environmental policy consultancy. The think-tank aims at enhancing cooperation between key governmental institutions, Federal Parliament, profiled business companies and environment-related associations as well as at preparing new environmental legislation, policy strategies and promoting innovative technologies. In the 1990s he was appointed advisor to the capital's government as member of the senate's council on Energy Politics and, later on, as member of the senate's Expert Council on Nature Protection. He was board member of several associations in the field of environmental policy and sustainable development. He is the founder of the private consultancy firm "ecooperations".

Currently he is the Programme Director of the GIZ Environmental Policy Programme in China.

Dr. Susanne Lehmann

Coordination of international cooperation activities, especially with China, for the German Federal Agency for Nature Conservation (BfN)

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Background

- B.Sc in Zoology, Ecology and Physiology, University of Cologne (Germany)
- MSc in Ornithology and Nature Conservation, Universities of Cologne (Germany) and Salamanca (Spain)
- Ph. D in Biology, Universities of Cologne (Germany) and Salamanca (Spain)
- International Project Management for OroVerde, Foundation for the Conservation of Tropical Forests, Frankfurt
- Project Management, Study on Environmental Impacts of WTO Decisions in Developing and Low Developed Countries for the Forum on Environment and Development, Bonn
- Scientific Advisor for Forest Conservation and Sustainable Use at National and International Level for the Federal Agency for Nature Conservation (BfN), Bonn
- German Delegation Member at several COPs (Conference of the Parties) for CBD, UNFCCC, WTO etc.
- Particular expertise in the fields of forest conservation, integrated nature conservation, management of protected areas, climate change, ecosystem services and management, etc.

Current position

As the coordinator for the cooperation activities of the German Federal Agency for Nature Conservation (BfN) in China, she is responsible for several bilateral core activities concerning nature conservation in Germany and China, especially for the scientific exchange, the organisation of a series of workshops on biodiversity conservation, the support of the GTZ in managing the German Environment Ministry's International Climate Initiative (IKI) Project in China, the coordination of German organisations and projects involved in China, capacity building etc.
For more details:
http://www.bfn.de/0310_steckbrief_china+M52087573ab0.htm

Dr. Jungsheng Li

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Background and Tasks

As Chief Expert of Innovative Base on Ecosystem Effects in Environmental Changes, Dr. Jungsheng Li has directed a series of major projects funded by National Key Technology Research and Development Program of China during the 11th Five-Year Plan Period, National Natural Science Foundation of China, and Key Program of Ministry of Environmental Protection. He was also involved in international cooperation programs with Germany, Italy and New Zealand focusing on the protection of ecosystems with high carbon stock, climate change and invasive species. He also serves as the member of Qualification Committee of National Natural Reserves in China, and as the expert of CBD (Convention of Biological Diversity) Implementation Technical Group for the Ministry of Environmental Protection (MEP) as well. In addition, he takes part in the drafting of the Strategy and Action Plan of National Biodiversity Conservation and provides technical support for CBD Implementation led by MEP.

Dr. Jungsheng Li holds a B.Sc. in Biology as well as a MSc. and Ph.D. in Ecology and has particular expertise in the assessment of ecological effects of global change, biodiversity conservation and management, and ecological risk assessment.

Dr. Zhang Yuan

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Background and Tasks

- B.Sc. in Ecology, Nanjiing University, China
- M.Sc. in Environment Science, Beijing Normal University China
- Ph.D. in Environmental Plan and Environmental Management, Beijing Normal University, China
- Postdoc in River and Coastal Environment Research Center, Chinese Research Academy of Environmental Science, China
- Particular expertise in the field of river ecosystem health and ecological capacity of rivers, as well as river-basin environmental management

Dr. Yu Xiubo

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Background and tasks

- B.Sc. Department of Geography, Nanjing University, China
- M.Sc. Nanjing Institute of Geography and Limnology, CAS
- Ph. D. Nanjing Institute of Geography and Limnology, CAS
- Post-doctor, Institute of Geographic Science and Natural Resources Research, CAS
- Particular field of interests: Site-based Ecosystem Assessment, Integrated Ecosystem Management, Wetland Conservation and Restoration, Ecological Economics and Policy.

Mr. Xiubo Yu has been working in CERN since 2000 with diverse experiences as LTER site manager and secretary general of CERN. Thus he has a good understanding of long term ecological research and the capacity of organization development.

As CERN secretary general, he is responsible for the facilitation of the scientific activities at network level, and he has successfully initiated and developed Chinese Ecological Forum, the CERN Annual Report, the CERN Strategic Development Plan (2008-2020) and the Policy Brief on Ecosystem Research and Development, which helped to improve the CERN profile in CAS and in the ecological field in China.

He was Freshwater and Marine Programme Director of WWF China and coordinator of Integrated River Basin Management Task Force (IRBM) (2003-2005), China Council of International Cooperation on Environment and Development (CCICED), and a member of the Task Force on Ecosystem Services and Management strategy (2008-2010), CCICED. He successfully provided consultant services to international organizations, including WWF, World Bank, ADB, UNEP/GEF, GTZ. He has special expertise in wetland conservation and wise in Central Yangtze. He is the author of 30 papers and 5 books.

Part III: Excursions – Insights from the field

Wednesday, 23 June 2010

Nandagang Wetland Natural Reserve of Cangzhou, Hebei (Tianjin Municipality)

Nandagang Wetland Natural Reserve consists of semi-natural coastal, meadow and bog landscapes, which are an important habitat for migrant birds (Foto: Dr. S. Lehmann)

Thursday, 24 June 2010

Labagoumen Forest Park (Huairou District, Beijing)

Labagoumen consists of natural secondary oak forests (*Quercus mongolicus Fisch. ex Turoz*.), man-made forests at lower latitude area, and shrubs. Agriculture and forestry landscapes in low mountainous area could be found in this area.

Biodiversity is rich in the area and there is a high amount of endemic species with a variety of plants and animals (Foto. Limentis spec; Dr. S. Lehmann)

Part IV - Poster Session (Selection)

- Exploring Co-benefits of Carbon, Biodiversity and Ecosystem Services - a Case Study in Jiangxi province, China
  by LI Guo et al (CRAES – Chinese Research Academy of Environmental Sciences)

- Impacts of Climate Change on the Distribution of *Larix chinensis*
  By HU Lile (CRAES – Chinese Research Academy of Environmental Sciences)

- Challenges and Suggestions for Giant Panda Protection
  by FAN Juntao & LI Junsheng (CRAES – Chinese Research Academy of Environmental Sciences)

- CGCIA, Chinese German Centre for Impact Assessment – General Introduction
  by CGCIA (Chinese German Centre for Impact Assessment)

- Spatial Characterization of Land Use Functions in the Jinghe Watershed
  by KÖNIG Hannes et al (CGCIA - Chinese German Centre for Impact Assessment)

- Payments for Grassland Ecosystem Services in China and the European Union – Differences in existing programs and challenges ahead
  by UHTES Sandra et al (CGCIA - Chinese German Centre for Impact Assessment)

- Environmental Impacts of Conventional Intergated Rice-Fish AgriculturePayments for Grassland Ecosystem Services in China and the European Union
  by YANG Hailong et al (CGCIA - Chinese German Centre for Impact Assessment)

- Impact of Land Use Change on Ecosystem Services and Human Well-Being in the Yellow River Basin
  by ZHEN Lin et al (CGCIA - Chinese German Centre for Impact Assessment)

- Study on Economic Value of Ecological Services of Chang Tang Grassland
  by IGSNRR (Institute of Geographic Sciences and Natural Resources Research), CAS (Chinese Academy of Sciences) & WCS (Wildlife Conservation Society)

- Biodiversity Conservation in Jiangxi
  by YAN Bangyou & ADAMEIT Mechthild (MRLDO – Office of the Mountain River Lake Development Committee of Jiangxi Province)

- Assessing Ecosystem Services under Changing Conditions
  by HOMM Sebastian et al (University Bonn & Kunming Institute of Botany)

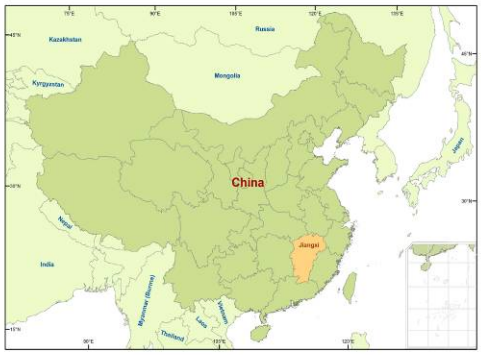
中国环境科学研究院
Chinese Research Academy of Environmental Sciences

Exploring the Co-benefits of Carbon, Biodiversity and Ecosystem Services – a Case Study in Jiangxi Province, China

Guo Li[1], Xin Lin[1], Corinna Ravilious[2], Valerie Kapos[2], Monika Bertzky[2], Jörn Scharlemann[2], Barney Dickson[2], LileHu[1], Xiaopu Wu[1], Junsheng Li[1]

Background

A large amount of carbon is stored in ecosystems and its states are diverse. Degradation of ecosystems could significantly reduce the capacity of carbon storage and sequestration and increase the emission of greenhouse gas and biodiversity loss. Conversely, biodiversity loss will affect ecosystem processes and functions and reduce ecosystem goods and services. Thus, mapping and quantifying carbon, biodiversity and ecosystem services are the first and the most important step to explore the co-benefits and guide decision making about mitigation and adaptation.



Study Area

Jiangxi Province is located in southeast of China, with an area of about 167 000 km2. From the South to the North, the land gets lower. While the country's largest freshwater lake, Poyang Lake, is located in the North. The climate is mid-subtropical monsoon. Large parts of the province are forested and its ecosystem types are of broad diversity.

Data and Methods

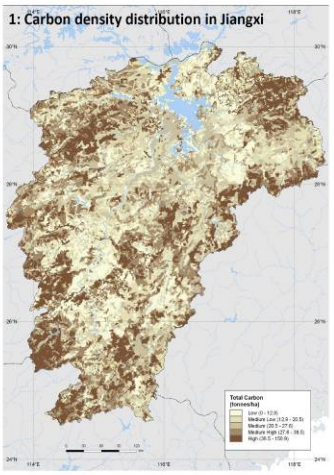
The best available spatially referenced data on carbon, species richness and protected areas were mapped and overlaid. The total carbon was calculated as the sum of the biomass carbon and the soil carbon. Most of the datasets were on a county level. Overlay analyses were carried out in a Geographic Information System.

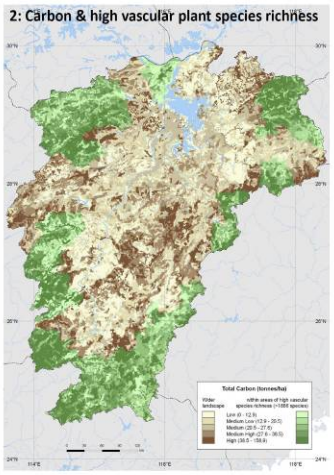
Results

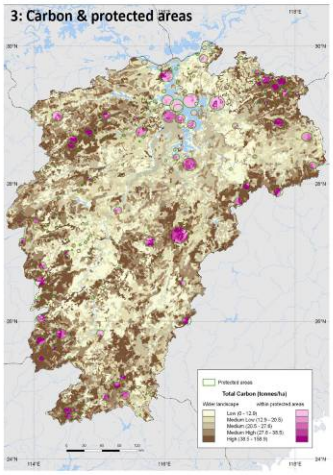
1.CARBON: The total carbon stock in biomass and soil of Jiangxi Province is 0.42 Gt. The average carbon density is 25 t/ha, but the variation in carbon density is large (Map 1).

2.CARBON AND BIODIVERSITY: The areas of highest vascular plant richness occur in mountainous areas adjacent to the borders of the province. 32% of the total carbon is stored in areas of both high carbon and high vascular plant species richness (Map 2).

3.CARBON AND PROTECTED AREAS: The 174 protected areas recorded in Jiangxi as the end of 2008 cover about 6.6% of the area of the province and contain 7% of its total carbon (Map 3).







Conclusions and Outlook

This work shows that in Jiangxi Province areas with high carbon density and those of importance for biodiversity do not always coincide. Such information is crucial for guiding decision making about climate change mitigation and biodiversity conservation. The actions taken to conserve biodiversity could reduce the carbon emission. On the other hand, carbon management could help safeguard biodiversity to some degree. So where both values are high, it is critical to choose conservation actions carefully. To plan more effectively for carbon management and its co-benefits in Jiangxi Province, these initial analyses need to be expanded to include spatially-explicit data on other ecosystem services.

Data sources: Department of Nature and Ecology Conservation of the Ministry of Environmental Protection of the People's Republic of China (2009). Checklist of Chinese Nature Reserves 2008. China Environmental Science Press: Beijing, China. Editorial Board of Vegetation Map of China (EBVMC) (2001). Vegetation Atlas of China. Editorial Board of Vegetation Map of China, Chinese Academy of Sciences, Science Press: Beijing, China. Jiangxi Academy of Environmental Sciences (2008). Report on Investigation and Assessment of Biodiversity in Jiangxi Province (unpublished material). Environmental Protection Department of Jiangxi Province and Jiangxi Academy of Environmental Sciences: Nanchang, China.

References: IPCC 2007. Climate Change 2007: Synthesis Report. IPCC Secretariat: Geneva, Switzerland. 73 pp

Acknowledgements:
We would like to thank BMU, GTZ, BfN and HIS for financial support; and especially the Key Projects of Basic Scientific Research Business for National Welfare Institutes (No:2009KYYW12).

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Impacts of Climate Change on the Distribution of *Larix chinensis*

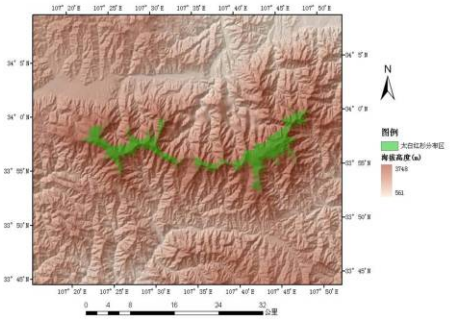
Lile Hu[1]

Background

The Taibai Mountain (3767 meters) is a major summit in the Qinling Mountain Range, which is about 100 kilometers west of Xi'an, Shaanxi Province, China. Vegetation of the Taibai Mountain is very sensitive to climate change. *Larix chinensis* is a woody timberline species on the Taibai Mountain and an ideal study object to explore climate change impacts.

Study Area

Larix chinensis is a wild endemic plant under second-class protection of China, restrictedly distributed in the Qinling Mountains, Shaanxi Province. Its main distribution areas are located in Taibai Mountain (33˚49' ~ 34˚08' E, 107˚41' ~ 107˚52' N), with an altitude range from 2900 m to 3500 m. Annual mean temperature in the study area is 5.9 ~ 7.5℃, annual mean precipitation is 500 ~ 956mm, the main soil type is dark brown earth, and the layer thickness of the soil near the timberline is thinner than 30 cm.



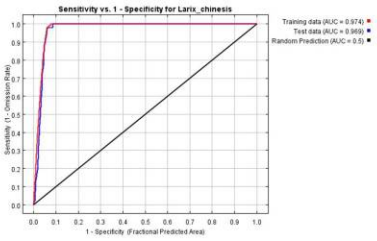
Data and Methods

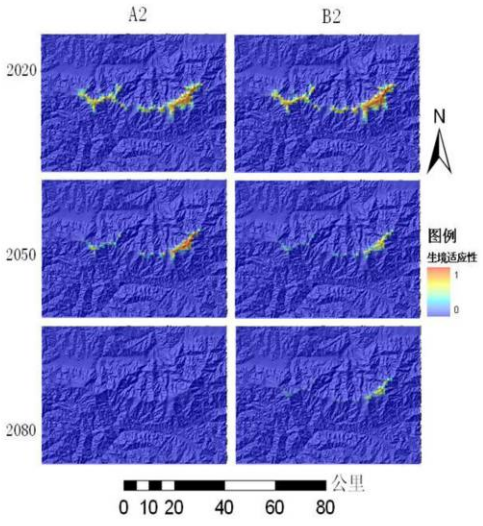
The spatial distribution of *Larix chinensis* was obtained from remote sensing images combined with field investigation. Climate data were obtained from the Worldclim dataset (www.worldclim.org). Analyses were carried out using Maxent v3.3.2 software. Spatial distribution patterns of *Larix chinensis* for years 2020, 2050 and 2080 were predicted under climate change scenarios IPCC A2 and B2.

Results

1.Annual temperature on the south slope of the study area is lower than that on the north slope, and its annual temperature range is smaller too. But annual precipitation on the south slope is more than that on the north slope.

2.By the year 2020, the distribution area of Larix chinensis would decrease about 34.45% under scenario A2 and 31.10% under scenarioB2. By the year 2080, this species would become extinct under scenario A2, while only 9.57% left under scenario B2.





Conclusions

This work analyzed the relationship between spatial distribution of Larix chinensis and several environmental factors and predicted its distribution changes in the next one hundred years. *Larix chinensis* is very sensitive to climate change. Temperature is the major environmental factor limiting its distribution. Due to the impacts of climate warming, distribution area of this species will gradually decrease.

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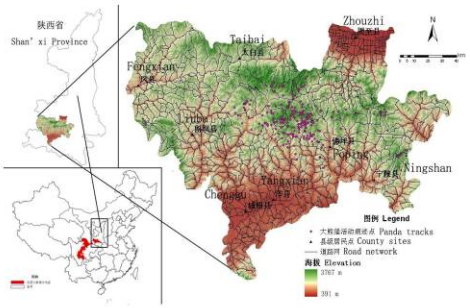
Challenges and Suggestions for Giant Panda Protection

Juntao Fan[1], Junsheng Li[1]

Introduction

The Qinling Mountains are a major mountain range located mainly in Shaanxi Province, China, covering a total area of 55 000 square kilometers. It is one of the most important biodiversity hotspots and is also the main distribution areas of panda. The Qinling panda population density is the highest in China. Nonetheless, habitat loss and fragmentation become more and more serious due to climate change and land resources development, biodiversity conservation in this area faces big challenge.



Methods

The purpose of this work is to assess the state and trends of panda habitats and identify main threats. Models were created using scenarios IPCC SRES A2 and B2 to predict the trends of panda habitats. Habitat suitability for panda was analyzed, based on a GIS database including spatial data on road network and patch density. GAP-Analyses were conducted to evaluate the effect of existing nature reserve network in the study area.

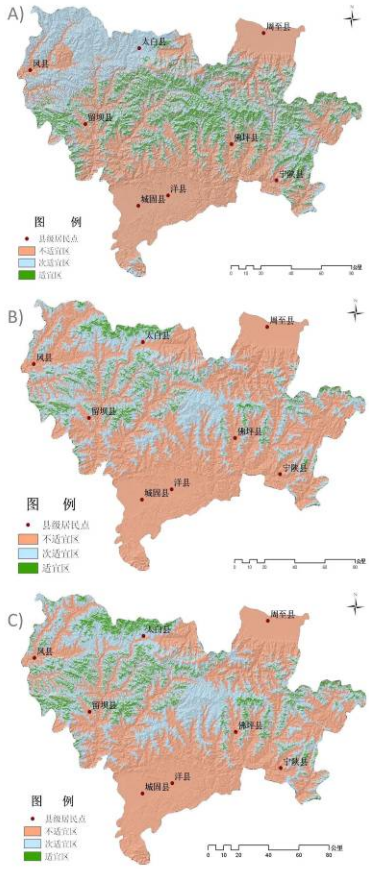


Fig. 1 The Spatial Distribution of Suitable Habitats. A) 1990 – 2007, B) 2071 – 2100, under scenario A2, C) 2071 – 2100, under scenario B2.

Results

1.By the years 2071 – 2100, the area of suitable habitats for panda would decrease about 62% for scenario A2, most becoming second-most suitable habitats, and 37% for scenario B2. Panda to be influenced by future climate change would migrate gradually toward the northwest or to higher altitudes. (Fig. 1)

2.Influence of road construction on habitat often occurs at high altitudes (> 1500 m). Existing roads in protected areas have significant impact on panda habitats. (Fig. 2)

3.The results of the GAP-Analysis showed that there are still some important distribution areas that have not been protected yet. The old nature reserve network only protects 23% ~ 26% most suitable habitats and 30% ~ 32% second-most suitable habitats.

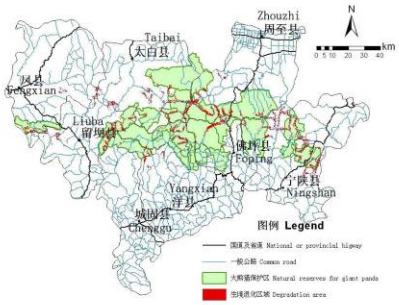


Fig. 2 Road Network

Protection Suggestions

To strength the long-term monitoring of the influences of existing roads and activit ies of the giant panda; to strictly prohibit road construction at high altitudes or in the protected areas; to pay more attention to the field investigation, especially in the potential panda migration direction; to give priority to the restoration of the giant panda habitats and corridors; to optimize of existing conservation network and broaden protected areas.

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MISSION AND STRATEGY

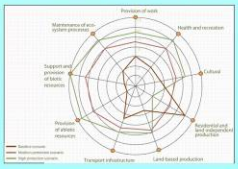
The mission of the CGCIA is to provide a platform for facilitating collaboration, communication, and coordination among scientists who have been engaged in studies on impact assessment, and in particular the impact of changing land use and ecosystem services.

Inaugural meeting of the CGCIA at ZALF in Müncheberg, Germany (March, 2010)

IMPACT ASSESSMENT RESEARCH

- Sustainability impact assessment of multifunctional land use
- Interactions between ecosystem change and human well - being
- Collaboration and coordination among existing programs
- Quantitative and qualitative tools for impact assessment
- Methods for strengthening the science-policy interface
- Data management, monitoring systems and analytical methods for human-environment interactions

FoPIA stakeholder workshop in Guyuan (August 2009)



Scenario impact visualization of trade-offs between Land use functions

OBJECTIVES

1. to develop collaborative research programs on impact assessment of multifunctional land uses
2. to identify potential sponsorship for joint research programs
3. to promote new techniques and dissemination of research results through joint publications, international symposia
4. to enhance institutional capacity building for sustainable management of land resources and ecosystems through academic exchanges, training and visiting
5. to develop and conduct joint taught modules on impact assessment for master and PhD students.

SELECTED PROJECTS

- Assessing ecosystem services
- Multifunctional land use and decision support system
- Impact of flood and drought on water and land resources
- Evaluating ecosystem services and payment schemes
- Consumption of ecosystem services in Jinghe watershed of western China
- Summer school supported by the Sino -German Centre for Research Promotion
- Land Use Policies and Sustainable Development in Developing Countries (LUPIS www.lupis.eu)
- Linking Impact Assessment Instruments to Sustainable Expertise (LIASE).

SELECTED PUBLICATIONS

- Zhen Lin, Liu Xuelin, Li Fen, Wei Yunjie, Hannes König. Consumption of ecosystem services and eco-compensation mechanism in ecological sensitive regions: progress and challenges. Resources Science, 2010, 32(5):797-803 (in Chinese).
- Hannes König, Lin Zhen, Katharina Helming, Sandra Uthes, Yang Li, Yunjie Wei, Li Fen, Hubert Wiggering. Assessing the impacts of land conversions on rural sustainability in the drought-stricken Guyuan district of Western China (submitted)
- Wiggering H, Dalchow C, Glemnitz M, Helming K, Müller K, Schultz A, Stachow U, Zander P (2006) Indicators for multifunctional land use - Linking socio-economic requirements with landscape potentials. Ecological Indicators 6: 238-249.

ZALF: is a national research facility with about 300 employees dedicated to the integrated analysis of agricultural landscape systems for sustainable management of natural and cultural resources, and sustainable development of rural areas. ZALF is a member of the German Leibniz association and located in the state of Brandenburg east of Berlin. Methods and tools are developed to anticipate policy impacts on land use changes, and to assess the impact of on environmental, social and economic sustainability.

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IGSNRR: The institute was established in 1999; now, there are 579 staff members, including 8 academicians and 119 professors. Currently, the research gets high priority on physical geography and global change, human geography and regional development, natural resources and environmental security, geo-information mechanism and system simulation, water cycle and rebted land surface processes, ecosystem network observation and modeling, and agricultural policies.

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Spatial characterization of Land Use Functions in the Jinghe Watershed

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[1]ZALF, Leibniz-Centre for Agricultural Landscape Research, Germany; [2]IGSNRR, Chinese Academy of Sciences, China **Contact: *hkoenig@zalf.de; weiyj.07s@igsnrr.ac.cn**

Introduction

Rural development in Western China faces several challenges due to human-environmental interactions and conflicting goals between social, economic and environmental sustainability targets. The objective of this study was to investigate regional changes of land use functions (LUFs) in the Jinghe Watershed, focusing on (i) remote headwater catchments which are considered of low economic development and (ii) the entire basin. Participatory approaches and spatial analysis were combined to perform an integrated assessment of land use changes in the light of rural sustainability.

Methods

The Framework for Participatory Impact Assessment (FoPIA) was applied to define a set of 9 regional LUFs and associated indicators (tab 1). An estimate for the regional importance of sustainability is based on stakeholders' preferences on LUFs. To account for the spatial variability of LUFs, weights of contributions were assign between land use types and LUFs (tab 2). Indicator values were calculated using interpolations of available quantitative data. This allowed us to generate spatially explicit projections for LUFs and indicators and its spatial heterogeneity that was used to illustrate and assess the development potentials of regional sustainability (fig 1.-3.).

Tab 1: LUFs, LUF-indicators and their importance (headwater catchment)

Land use function	LUF-indicator	Importance
So1: Provision of work	Rural employment rate (%)	6,1
So2: Quality of life	GDP per capita (Yuan)	7,0
So3: Food security	Grain yield per capita (kg)	7,1
Ec1:Industry and services	Built-up area (%)	6,0
Ec2: Land based production	Net primary production (Yuan)	8,5
Ec3: Infrastructure	Road density (km length per km²)	6,1
En1: Abiotic resources	Water resources (m³ per capita)	6,5
En2: Biotic resources	Forest and grassland (share %)	7,6
En3: Ecosystem processes	Fertilizer input (kg per ha)	7,5

Tab 2: Land use depended sustainability contributions of land use types to individual LUFs

Land use type	Economic			Social			Environmental		
	Ec1	Ec2	Ec3	So1	So2	So3	En1	En2	En3
Arable land	5	100	30	100	60	100	50	70	80
Forest land	5	60	30	50	40	30	100	100	100
Grass land	5	60	20	50	50	30	100	80	90
Water body	0	0	0	20	30	5	60	70	50
Built-up area	100	0	100	80	80	30	0	0	0
Unused land	0	5	20	0	5	0	50	50	100

Results & Discussion

Experts' perceptions of LUFs (tab 1) revealed that land-based production (8.5), biotic resources (7.6), and ecosystem processes (7.5) appeared to be most important in the headwaters. The spatial analysis at basin level showed that the performance of aggregated LUFs was low for economic LUFs, moderate-high for social LUFs, and moderate for environmental LUFs. Spatial projections for social and economic indicators were moderate-high, particularly in downstream areas while environmental indicators performed moderate-high, particularly in the headwaters. Spatial heterogeneity appeared to be high in all cases, indicating high differences between LUFs and LUF-indicator performances. A complementary analysis of qualitative LUFs and quantitative LUF-indicators should help closing knowledge gaps but a careful interpretation of results remains crucial.

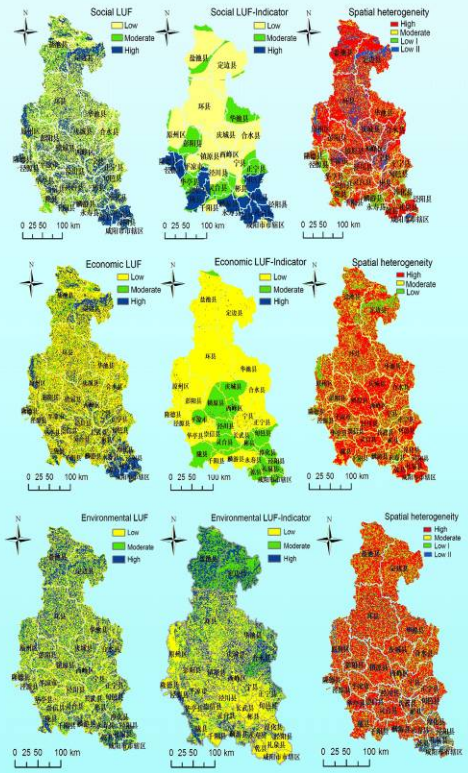

Fig 1-3: Spatial projections of LUFs, LUF-indictors and its relative heterogeneity in Jinghe Watershed

Future Perspectives

We will continue working on integrated impact assessment and scenario analysis by combining qualitative and quantitative research methods. A particular focus will be on spatial projections to assess sustainability risks and potentials at regional level.

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Payments for grassland ecosystem services in China and in the European Union:

Differences in existing programs and challenges ahead

UTHES Sandra[1] LI Fen[2] ZHEN Lin[2] HELMING Katharina[1] KOENIG Hannes[1] WEI Yunjie[2] YANG Li[2]

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Research question

Grass-dominated ecosystems cover approximately 25 percent of the Earth's surface. The degradation of grass-dominated ecosystems due to **overuse** has become a serious problem in poorer arid or semi-arid areas in China. Grassland **abandonment** has become a widely spread phenomenon in the European Union (EU) and causes avian and mammal diversity decline and increased soil erosion and landslides in mountainous areas.

Payment for environmental services (PES) are seen as an innovative approach to stop grassland degradation or abandonment by making payments to land users in return for adopting practices that secure ecosystem conservation and restoration. Designing efficient PES requires that possible challenges are effectively managed, such as the lack in linearity and immediacy of environmental effects (monitoring, evaluation), unexpected monitoring and enforcement costs (budget calculation) and possible socio-economic objectives (adequate compensation, equity principles).

This aim of this work is to compare government-financed PES for grassland ecosystem services in China and the EU in order to facilitate knowledge exchange on PES design and implementation and the transfer of best practices. Our particular interest is in how different PES mechanisms work, which actors are involved and what characterizes success and failure cases.

Methods

- Literature survey
- Evaluation of monitoring data
- Stakeholder surveys
- Model-based analyses (land-use modeling, farm modeling)

Farm survey in Xilingol League

Model-based analyses in Brandenburg

Case study areas

Xilingol League in Inner Mongolia (China)

Brandenburg (Germany)

Inner Mongolian rangeland is the largest one in acreage in China. The rangeland along both banks of the Yellow River plays an important role on preventing wind and stabilizing sand, conserving water and soil, preserving bio-diversity. Rapid economic development and population growth triggered land degradation and desertification and led to a reduction of grassland productivity.

Brandenburg provides poor conditions for crop production (sandy soils, low precipitation). Large parts are therefore grasslands and forests. Decreasing economic importance of agriculture and rural-urban migration cause grassland abandonment, which reduces landscape diversity and attractiveness (open space) and has negative impacts on biodiversity (dominated by synanthropic species).

Further information:

Li F, Zhen L, Huang H, Uthes S, Yang L, Wei Y. Eco-compensation for grassland restoration: A case study of the Xilingol pasture in Inner Mongolia, China. Proceedings of the 5th International Conference of Natural Resources and Sustainable Development in Surrounding Regions of the Mongolian Plateau, Inner Mongolia, 2009.

Uthes S, Sattler C, Zander P, Piorr A, Matzdorf B, Damgaard M, Sahrbacher A, Schuler J, Kjeldsen C, Heinrich U, Fischer H (2010) Modeling a farm population to estimate on-farm compliance costs and environmental effects of a grassland extensification scheme at the regional scale. Agricultural Systems 103:282-293.

Results (examples)

Criterion	Chinese Example (Xilingol League in China)	European example (Region Brandenburg in Germany)
Content of the PES	Grazing prohibition project (GPP), includes grazing prohibition, seasonal gazing, land resting and rotational grazing.	Grassland extensification, prohibition of synthetical N-fertilizers, minimum of one use per year, reduction of livestock density
Environmental services (ES) covered and actors involved	ES: grassland maintenance, anti-sand storm To mediate grassland degradation by stopping non-sustainable use, Actors: Farmers, local governments	ES: N-pollution reduction, increase in diversity and quality of the landscape through open space created, maintenance of extensive grazing livestock farms Actors: Farmers, agricultural authorities
Program evolution, spatial and temporal scale, transaction costs	Since 2002, around 10,351,000 hectares covered. About 60% farmers/herders satisfied with the project, control difficult (occasional infringements against regulations, e.g. night-grazing)	Since 1992, around 125,000 hectares enrolled; 1250 farmers (= 35 % of the entire grassland area, 45% of eligible farmers) High acceptance of farmers, low administration effort, management prescriptions easy to monitor, 5% of all farms controlled every year
Additionality and baseline establishment	Overuse is stopped thus potential recovery of grassland ecosystems Reference: control areas, stakeholder analysis, simulation models, farm/expert surveys	Many farms meet the program conditions anyway (low additional effects), possible farm exits without the measure difficult to estimate Reference: control groups, simulation models, farm surveys
Permanence, accounting	Mandatory, managed through the ecological instruction office in the local government	Five-year contracts (voluntary), monitored through the Integrated Administration and Control System (IACS)
Payment structure and targeting	73.5 Yuan/hectare/year Annual budget: around 3.17 million Yuan Funding from two sources: Central government, local governments Eligible area: badly degraded areas	130 Euro/hectare/year Annual budget: around 16 million Euro Funding from three sources: EU, Germany (national), Brandenburg (regional) Eligible area: entire grassland area
Distributional effects	The coverage rate of grass increased from 45% to 70%. Payment rate too low to compensate losses from the decrease in pasture-based activities.	Grazing livestock farms receive additional support, which are usually less competitive than other farm types.
Future plans and challenges	Program causes dependency on subsidies (low efficiency). The key issue is to develop alternative income sources for specialized grazing livestock farms.	Spatial targeting of N-pollution vulnerable areas Mediate socio-economic and environmental objectives Bringing the measure in line with the EU water framework directive

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Environmental Impacts of Conventional Integrated Rice-Fish Agriculture

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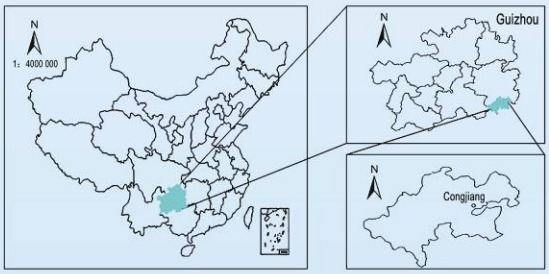
Introduction

Conventional integrated rice-fish agriculture which combines creatively rice planting and fish pond culture together, utilizes paddy field three-dimensional space to make full use of light, heat, water and biological resources is an environmental friendly, efficient output cultivation pattern. Because of the mutually beneficial symbiotic relationship between rice and fish, conventional integrated rice-fish agriculture not only played a nice biological effect but also has high energy output. With the development of agricultural technology and improvement of breeding technique, this traditional rice planting pattern has been replacing gradually by high input-high output pattern. Modern high-input cropping pattern have higher food production and at the same time also cause serious environmental problem. Therefore, this paper comparatively analyses the incidence of disease, pest and weed based on four different rice planting patterns which are conventional glutinous rice-fish (GR-F), glutinous rice monoculture (GR), hybrid rice-fish (HR-F) and hybrid monoculture (HR) and try to give a comprehensive environmental impacts assessment.

Site of the project

This study takes the integrated rice-fish agriculture of Xiaohuang Village, Congjiang County, Guizhou Province as a case.



Location Map of Congjiang County, Guizhou Province

Objective and Method

Objective: observe the occurrence of disease, pest and weed of the given four experimental plots and give a comprehensive environmental impacts assessment.

Methods: field experiment

Time: The implementation of field observation is on 2008-7-17 2008-7-23, 2008-7-28, 2008-8-2 and 2008-8-7 respectively.

Quadrats: according to the diagonal principle 5 quadrats, 1m² (1m×1m) respectively

Recording: record the occurrence of disease, pest and weed.

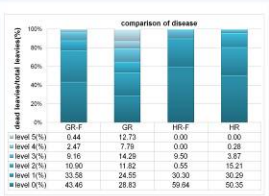
Results & Discussion

Sort ascending

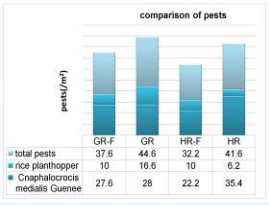
a. Disease level HR-F < HR < GR < GR-F

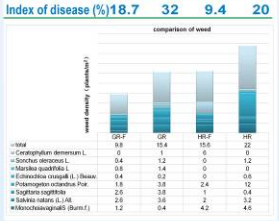
b. Pests level GR-F < HR-F < GR < HR

c. Weed level GR-F < GR < HR-F < HR



Experimental plots	GR-F	GR	HR-F	HR
Area of plots (m^2)	941	855	564	442
Level	Sick plants number			
0	878	0	5114	0
1	12996	3990	4474	7514
2	0	7182	0	0
3	0	798	0	0
4	0	0	0	0
5	0	0	0	0
Index of disease (%)	18.7	32	9.4	20





Performance and resistance of rice towards pests and disease

According to the pictures, hybrid rice has better performance of disease resistance, conventional integrated rice-fish agriculture contribute to reducing the incidence of disease; insect pest and weed of planting hybrid rice is more serious, but conventional integrated rice-fish agriculture is beneficial to reduce the occurrence of pest and weed.

Of course, the assessment result may be different with other s study because of different location, climate, precipitation and planting patterns, and much debate is ready to further research.

Conclusions and follow up activities

- Although the disease resistance of traditional glutinous rice is worse than hybrid rice, planting glutinous rice could reduce the incidence of pest and weed. Therefore, planting glutinous rice will save fertilizer input. Conventional integrated rice-fish agriculture can effectively reduce the incidence of weed, pests and diseases, and has good environmental benefits.
- Integrate rice-fish agriculture is one of excellent traditional land use patterns. However, the comparative benefit of integrated rice-fish agriculture is lower. So how to scientifically improve the quality and how to achieve a balance between economic benefits and environmental benefits is an important research topic needed further study.

Impact of land use change on ecosystem services and human well-being in the Yellow River Basin

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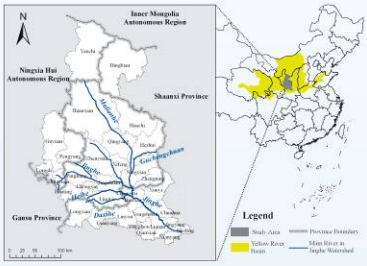
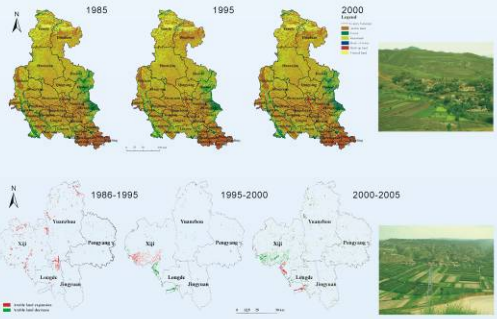
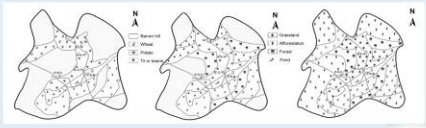


Landuse change at different scales of Jinghe Watershed





BACKGROUND

As an important direct driver, land use change resulting from human activities has clear and measurable impact on ecosystem services. Land use change could influence the patterns and magnitude of ecosystem services through changing its structure and processes. The Yellow River basin has complex and diverse ecosystem, the basic demand of farmers particularly rely on the ecosystem services in the upstream area; while in this area, the land use policies have been widely implemented. And human well-being has significantly affected by land use change.

METHODS

Data collecting
* Household questionnaire survey
* Institue survey
* PRA
* FoPIA

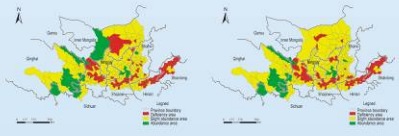
Data analysis
* Multivariate linear modeling
* Utility modeling
* Multi-indicator evaluation
* Scenario analysis

The importance rank and change of ecosystem services in Guyuan

	Provisioning services						Regulating services			Cultural services	Supporting services
	Fresh water	Food	Fresh air	Fuel-wood	Oil plant	Vegetation	Storm regulation	Climate regulation	Water conservation	View	On-land work opportunity
Recognition rate(%)	94.44	83.33	66.67	5.56	22.22	11.11	44.44	33.33	27.78	5.56	100.00
Change	--	---	++	---	---	++	--	++	++	++	---

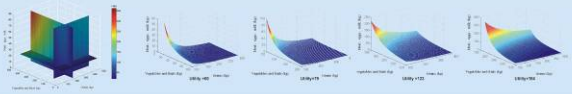
Food security in Yellow River basin

Fuelwood security in Yellow River basin



Water security in Jinghe watershed

Utility function of consumption in Jinghe watershed



MAIN RESULTS

Driving by climate change and Grain for Green Policy, key ecosystem services, such as food, fuelwood and on-land work opportunity have dropped significantly. In the recent years, the human well-being has been improved, but still at a low level with regional variations. The change of provisioning services is a considerable reason for the temporal and spatial differences of well-being in the study area.

Human well-being change from 1999 to 2009 in Jinghe watershed

	Weight	1999	2009
Net income per capita (*yuan*)	25	345.43	1047.96
Cultivated land satisfaction	3	0.983	0.39
Livestock satisfaction	3	0.45	0.37
Resources accessibility	-1	0.21	0.25
Vegetable consumption satisfaction	13	0.47	0.63
Meat consumption satisfaction	13	0.26	0.38
Food security	26	1.48	2.62
Injurant exposure	-1	37.20	25.45
Living area per capita (m^2)	4	16.49	27.10
Family status	15	1.82	1.49
Well-being		31.50	48.60

FUTURE PERSPECTIVES

Next step, we will focus on the mechanism of relationship between changing ecosystem services and human well-being, reveal the impact of activities, such as policy, consumption pattern, and land use on ecosystem services and establish the interaction models.

Robert Bosch Stiftung

CGCIA, Chinese-German Centre for Impact Assessment
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CGCIA Chinese-German Centre for Impact Assessment

Study on the Economic Value of Ecological Services of Chang Tang Grassland

Institute of Geographic Sciences and Natural Resources Research， China Academy of Sciences
& Wildlife Conservation Society

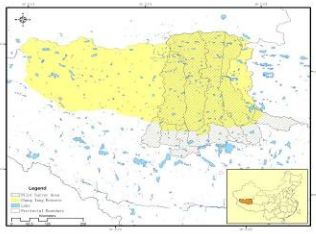
Introduction

Without quantitative measurements, the concept of ecological services cannot provide detailed guidelines for political decision makers and land managers. This is especially true in a fast-developing country like China, where the demand for economic growth can derail sustainable development initiatives. Chang Tang National Nature Reserve preserves a pristine ecosystem with vast intact grasslands, glaciers and abundant free-ranging wildlife due to its harshness and remoteness from the rest of modern China. In order to maintain such a special ecosystem, it is important to embed the economic incentives of grassland conservation in local development planning. Therefore, our study aimed to assess the economic value of the ecological service functions of the Chang Tang grassland ecosystem (both the grassland and wildlife). Furthermore, we provided suggestions to initiate eco-compensation studies in this area.

Project Site

Chang Tang National Nature Reserve, located in Western China on the Qinghai-Tibetan Plateau, is the second largest terrestrial nature reserve in the world. Chang Tang is representative of an alpine ecosystem, with not only vast grasslands mostly above 4,000 meters, snow-capped mountains and glaciers, but also unique wild animals including kiang, wild yak, Tibetan gazelle, Tibetan brown bear, black-necked crane, snow leopard, and Tibetan antelope.

In terms of administrative boundaries, Chang Tang National Nature Reserve covers 6 counties in the Tibet Autonomous Region, China. Our on-ground surveys and community interviews were conducted primarily in 2 counties. The results from those two counties were used to predict the condition in other areas of the reserve.



Objectives and Methodology

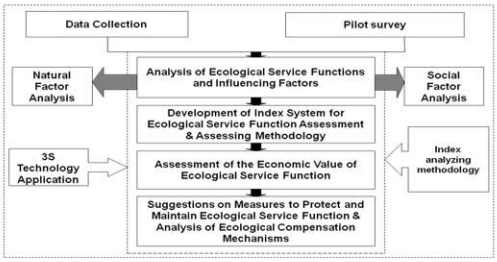
Our study follows 4 steps:

1) to set up an evaluating framework

2) to develop an index system and technical methodology of assessing economic value for both ecological service functions of the grassland and wild animals.

3) to compare the total value to the direct production value from grasslands. Results of this economic assessment for our study area were then applied to the whole Chang Tang Reserve.

4) to analyze the factors that may change or impact on ecological services provided by the Chang Tang and the cost to preserve this ecosystem.



Service Type	Function Type	Evaluating Index			
Production function	Primary Animal Products	Yield of various animal products	Use Value	Direct Use Value	Commercial Value
	Plant Resources	Yield of products made from edible and medicinal plant resources			Recreation & Entertainment Value
Ecological Function	Regulation of Atmospheric Composition	Fixation of Carbon Dioxide (CO_2)		Indirect Use Value	Ecological Value
		Oxygen Release (O_2)			Culture & Education Value, and Aesthetics Value
	Hydrological Regulation	Precipitation Interception			Scientific Research Value
		Water Conservation	Non-use Value		Existence Value
	Soil Solidification to Preserve Nutrients	Quantity Maintenance			Bequest Value
		Nutrient (N, P, K) Preservation			Option Value
	Biodiversity Maintenance	Habitat Function	Negative Value		Direct Economic Damage Value
Cultural/ Leisure Function	Culture and Aesthetics	Tibetan Culture, Tibetan Buddhist and Architecture			Ecological Function Damage Value
	Leisure and Tourism	Marketing Willing			

Results

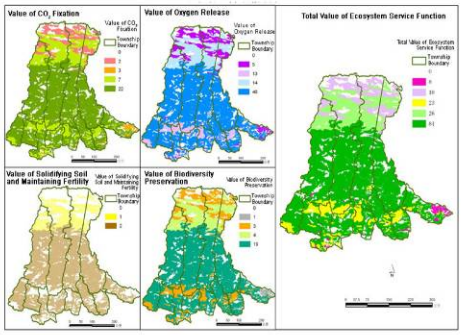
1. A total value of the grassland ecosystem services in the study area was determined by the sum of its production value and ecosystem value, or approximately 15 billion RMB per year. Total eco-economic value of the Tibetan antelope of Chang Tang Nature Reserve was estimated to be approximately 1.01 billion RMB. These two together amount to 16 billion RMB, accounting for 41% of Tibet's GDP in 2008.

2. The total eco-economic value of the grassland ecosystem and all wild animals in Chang Tang Nature Reserve is estimated as 21 billion RMB per year.

3. Major factors influencing the economic value of the Chang Tang ecosystem to be: 1) climate change; 2) erosion from freeze-thaw action and wind; 3) habitat degradation due to changes of land use, especially in wetland and water sourced areas, and 4) over-grazing.

4. The ecological value of the grassland was larger than the direct production value in the Chang Tang. At present, the nature reserve receives 4 million RMB every year for management, which is 0.2 RMB/ ha, far lower than our estimation of 1,200 RMB/ha production of economic value from ecosystem services.

Spatial Distribution of Economic Value of Grassland Ecosystem Services



Suggestions for Future Work

We concerned that the current policy over-emphasizes the direct production value of grassland and ignores the long-term value that should be represented by the economic value of eco-services. **Few current eco-compensation policies and related researches have not included Wildlife, esp. wild animal roles.** We also concerned about the disproportion of input and output on the grasslands. Therefore, we suggest:

1. To develop standard and criteria for eco-compensation based on the direct cost of all inputted conservation efforts.
2. To guarantee the basic livelihood of herders and develop alternative livelihood.
3. To introduce market mechanism to expand the sources of eco-compensation funding.

Future research will focus on:

1. Identification of compensation areas, types and levels, stakeholders and sources in the Chang Tang grassland.
2. Identification of the relationship between compensation and ecological services, identification of a compensation index and standard, as well as an investment level.
3. Study on the eco-compensation mechanism for the Chang Tang grassland and design suitable compensation implementation methods and processes, as well as a monitoring system for compensation.

Organization

Wildlife Conservation Society:
The Wildlife Conservation Society (WCS) was founded in 1895, and its headquarters is in New York. Its mission is to save wildlife and their habitats worldwide. At present, WCS carries out conservation in 64 countries in Asia, Africa, Latin America and North America.

Institute of Geographic Sciences and Natural Resources Research，CAS
IGSNRR was established in 1999 and currently gives high priority to research focused on physical geography and global change, human geography and regional development, natural resources and environmental security, geo-information mechanism and system simulation, water cycle and related land surface processes, ecosystem network observation and modeling, and agricultural policies.

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BIODIVERSITY CONSERVATION IN JIANGXI

Office of the Mountain-River-Lake Development Committee of Jiangxi Province (MRLDO)

Wetland Restoration

The project *"Research on Wetland Restoration in the Complete Restored Polder of Poyang Lake"* is carried out under the responsibility of MRLDO – in cooperation with Nanchang University and Jiangxi Normal University. It is important to mention that this project is part of a bigger national program of the Ministry of Science and Technology (Research on ecological protection and utilization of resources in Poyang Lake, 2007BAC23B00).

Project site:
Dubao Town, Duchang County,
covering an area of about 10 hectare (150 mu).

Duration of the Project:
October 2008 - October 2010

Research questions and methodology:
Based on the current ecological environmental problems and status of wetland vegetation, the reasons of vegetation degradation were identified and classified. Secondly, according to the principles of restoration ecology and specific environmental requirements of wetland ecosystem, a restoration project was designed & implemented consisting of three different ecological zones:
1.) shoal vegetation restoration zone,
2.) aquatic vegetation zone and
3.) vegetation communities reconstruction zone.
To measure impacts that project is using 3S-techonologies, biological and physical engineering measures.

Results:
In each zone different varieties have been planted. The project's positive ecological impact visibly indicates: the stability and biodiversity of the wetland ecosystem in the study area have been reinforced; especially the water conservation and biological habitat functions have been improved significantly.
On the other hand, according to the ecological value of different ecological zones, some transferable modes have been designed. Successful modes for dissemination are the "lake shoal landscape restoration pattern", the "aquatic plants layer with recovery mode", the "economic crops cultivation mode" (to give local people an alternative livelihood and incentive to participate in wetland protection), the "vetiver grass mode" (to stop trends towards desertification and soil erosion).

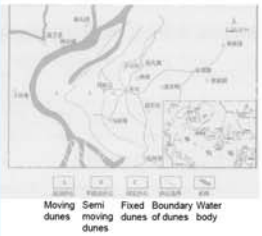
生活型	植物种类
湿生植物 Wet plants	南荻 *(Miscanthus sacchariflorus (Maxim.) Benth. et Hook .f.)*, 芦竹 *(Arundo donax L.)*, 华中苔草 *(Carex laticeps C. B. Clarke)*, 蒌蒿 *(Artemisia selengensis Turcz.)*, 水蓼 *(Polygonum hydropiper L.)*
挺水植物 Emergent aquatic plants	菖蒲 (Acorus calamus L.), 香蒲 *(Typha orientalis Presl.)*, 水芹 *(Oenanthe javanica (Bl.) D C.)*, 紫 *(Zizania latifolia (Griseb.) Turcz. ex Stapf)*, 华荸 *(Eleocharis dulcis (Burm.f.) Trin. ex Henschel)*, 蕹菜 *(Ipomoea aquatica Forsk.)*, 莲 *(Nelumbo nucifera Gaertn.)*
浮（叶）植物 Floating plants	苔菜 *(Nymphoides peltatum (Gmel.) O. Kuntze)*, 芡实 *(Euryale ferox Salisb. ex Konig et Sims)*, 野菱 *(Trapa bispinosa)*, 水鳖 *(Hydrocharis dubia (Bl.) Backer)*, 槐叶萍 *(Salvinia natans (L.) All.)*
沉水植物 Submerged plants	苦草 *(Vallisneria natans (Lour.) Maru)*, 菹草 *(Potamogeton crispus L.)*, 竹叶眼子菜 *(Potamogeton malaianus Miq.)*, 蓖齿眼子菜 *(Potamogeton pectinatus. L.)*, 大茨藻 *(Najas marina L.)*, 穗花狐尾藻 *(Myriophyllum spicatum L.)*, 金鱼藻 *(Cerahophyllum demersum L.)*, 小茨藻 *(Najas minorAll.)*

Desertification and Soil Erosion Control

The project *"Research on the Regulation of Desertification and Soil Erosion"* is carried out under the responsibility of MRLDO – in cooperation with the Institute of Geographic Sciences and Natural Resources Research, CAS; Jiangxi Normal University (Institute for Geography and Environmental Studies); and the Lushan Botanical Garden). It also belongs to the national program of MOST (2007BAC23B00).

Project site:
Duchang County
Area: 2700 km² size (4. 05 Mio. mu); altitude between10 m above sea level up to 647.3 m.

Duration of the Project:
October 2007 - October 2010



Research questions and methodology:
With regards to the topology of the area and the economic importance the project is subdivided into three different research and demonstration aspects:
1) soil erosion
2) desertification control and
3) a new model for farming in a fragile ecosystem.

Within the demonstration area a new model "grass-livestock-biogas-orchard" was successfully introduced. It is important to improve the livelihood of the local people to gain their support in protecting the environment. Accordingly elements of the project included infrastructure measurements (such as road construction, connection to electricity, cleaning of village ponds, and improvement of sanitation) and a subvention for construction of orchards.

Results:
The eco-environment has been improved significantly. **Soil erosion** has been reduced by at least 50% in the most vulnerable moving dunes zone.
The establishment of one "grass-livestock-biogas-orchard" resulted in the improvement of the local economic situation (benefit increase of 15%).
Three successful means for **desertification** control have been identified:
- First successful introduction of sea-buckthorn (hippophae rhamnoides) in the low sea level area of subtropics, south of Yangtze River;
- Significant increase of the survival rate of slash pines (pinus elliottii) by the implementation of deep hole planting technology;
- VTG (Vetiver Grass Technology) has been used for the first time for dune fixation and vegetation restoration in the shores of Poyang.

Outlook & Strategies

New Challenges – Eco-Economic Development
The *Poyang Lake Eco-Economic Zone* is located in the North of the province covering a total area of 51200 km² (app. 30 % of the province). The area covers three large cities and 38 counties with a population of more than 20 million inhabitant (app. half of the province's population).
MRLDO will put emphasis on the following *Technological Innovation Projects.*

A) Wetland Restoration:
- Integrate existing technologies to formulate new models for wetland vegetation restoration.
- Integrate existing technologies to formulate new models for restoration of structure and functions of migrant birds' habitat.
- Using 3S technologies to establish a new ecological environment monitoring system for Poyang Lake wetland.

B) Pollution control:
Nonferrous metal industry and aquiculture are mainstay industries in Jiangxi Province, but also key polluters. The prioritized development of CDM and Circular Economy industry (LED, photovoltaic) will play a remarkable role in this regard.
- To research on a higher & more eco-friendly extraction of nonferrous metal.
- To set up a demonstration site, to integrate technologies to restore soil polluted by the metal.
- Based on advanced aquaculture and existing waste water treatment technologies to formulate new models to reduce aquiculture-born pollution.
- To prepare the establishment of Poyang Lake Institute for Research on low carbon economy and ecology.

C) Integrated development and management of the lake catchment:
- Based on the concept of circular economy to optimize extraction technologies and improve wastewater treatment.
- To develop an entire waste management system including sewage and solid waste in rural areas.
- To do research on possible eco-compensation mechanisms for the whole catchment system (e.g. problem of downstream and upstream use of water).
- Using 3S technologies to establish an information-sharing platform for the management of the catchment.

D) Ecological civilization development:
Ecological civilization development is an imperative need for the rapid urbanization in China. Livable eco-city groups are one of the goals intended for Poyang Lake Eco-Economic Zone.
1. Eco-city Construction
Right now, governments of China and Finland agreed on the construction of a digital eco-city in Gongqing to provide a technology base & demonstration platform for ecological civilization development in Poyang Lake Eco-Economic Zone, and to serve as a new model for sustainable city development across China.
2. Socio-economic Development – treatment of endemic diseases
The Poyang Lake region is a serious schistosomiasis -stricken area (snail fever). Although the situation had been improved in last decades this disease is still hampering economic development. Based on existing technologies MRLDO plans to develop new integrated prevention and treatment models such as the construction of biogas septic tanks at household level. This will provide both, renewable energy for home consumption and a suitable mean to fight against schistosomiasis.

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Assessing Ecosystem Services under Changing Conditions

Towards a Sino-German research cooperation for sustainable land use management in NW-Yunnan, China.

universitätbonn Geographie

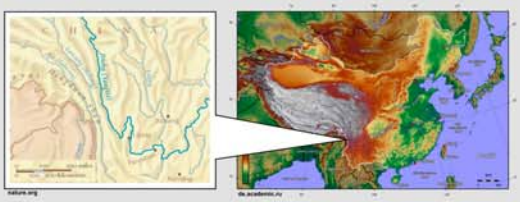
Sebastian Homm, Lennart Kümper-Schlake, Michael Nassl, Till Rockenbauch, Florian Sander

KUNMING INSTITUTE OF BOTANY CHINESE ACADEMY OF SCIENCES

Third Sino-German Workshop on Biodiversity Conservation: "Ecosystem Services and Management" June 21st - June 22rd 2010, Beijing, China.

Contrasted landscape supplying different Ecosystem Services in Kegong valley, Diqing Prefecture, Yunnan

Problem: The region of NW-Yunnan is located in the eastern Himalayas. Its fragile high mountain ecosystems are home to a rich cultural diversity and are a global hotspot of biodiversity. Dramatic landscape changes are a tangible expression of the interaction of global scale processes with the local scale. Demographic and economic development, changing lifestyles and climate change have fostered land degradation and thus conflicts about declining ecosystem services between different actors. Steps towards a sustainable management of complex socio-ecological interactions are of high demand and the orientation along Ecosystem Services seems to be promising.



Objectives: A Sino-German research project is jointly developed by the Kunming Institute of Botany (KIB/CAS) and the Department of Geography, University of Bonn (GIUB). The aim is to examine the dynamics of high mountain ecosystems and land use in NW-Yunnan including the increasing impact of climatic change and changing livelihoods. Assessing the ecosystem services is a basis for sustainable land use and adaptive livelihood transformation. This contributes to biodiversity conservation and societal development under changing conditions.

(A) Research for systemic understanding of socio-ecological interactions

Systemic understanding of complex socio-ecological interactions is prerequisite to the development of a sound research agenda on ecosystem services. In order to identify relevant research objectives in the field of sustainable land use management a conceptual model is needed. Therefore the sensitivity analysis toolkit developed by F.Vester was tested for it's applicability to the region of NW-Yunnan. Semi-quantitative data derived form expert interviews and participatory field research in a Tibetan village was explored by interpreting key variables roles and analyzing cause-effect-diagrams. While the case study stresses the influence of traditional livestock raising limited by the lack of labour, the expert interviews reveal the transitional character of land use under the growing influence of cash income, infrastructure development and national politics.

Methodology: As a first step a framework for the assessment of ecosystem services was developed (see Fig.1). An application and test of this framework was achieved in 2009 by conducting field work for five Diploma-theses in three different villages in Diqing Prefecture, NW--Yunnan. Case studies have tested steps A, B, C1 and C2 exemplarily using different sets of qualitative and quantitative methods. Step C3 is upcoming by the end of 2010 (see boxes A – C). Deepened research in the context of the Sino-German research project will contribute to a bridging synthesis including applicable development and management strategies.

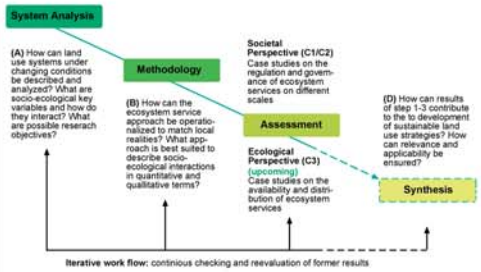


Fig.1: Framework for the assessment of ecosystem services in the context of sustainable land use management.

(C1) Case study on Governance of Ecosystem Services across Scales:

NW-Yunnans ecosystem services are highly demanded from local to global level. Similar to the demands, the governance of ecosystem services and the landscapes1 management is organized in a polycentric way and coordination is often lacking across scales. Knowledge in use (science and traditional ecological knowledge), administrations (local to national level) and institutions (national forest programs and local practices) and their interlinkage were examined. Scale mismatches and contradictions were observed, e.g. specific local knowledge, customary laws and livelihood needs are not adequately integrated in the top-down programs. To meet the observed challenges co-management regimes need to be strengthened and bridging organizations need to foster and mediate this processes to ensure the supply of different ecosystem services.

(B) Evaluation of Methods for Ecosystem Service Assessment:

For a successful implementation of a project based on the Ecosystem Service Approach the services need to be operationalized under the distinct socio-ecological system in the mountain areas. Participatory methods like transect walks and resource mapping are well suited to assess local demands of ecosystem services and the spatial extends of the land use systems. Qualitative results gained from exercise with local experts were taken as a 'georeference' for vegetation surveys followed by multivariate analysis. Spatial extensions of different ecosystems and the ecosystem services used by local people were explicitly identified.

Outlook: To better understand the Ecosystem Services demand and supply under changing conditions a Sino-German research project is jointly developed by the Kunming Institute of Botany (KIB/CAS) and the Department of Geography, University of Bonn (GIUB). In winter 2010/2011, a workshop will help to develop a shared research agenda focusing on the linkage between Ecosystem Services and climate change research. Further partners are highly welcomed.

Fig.2: Timeline including research activities and proposed future steps on towards a Sino-German research project.

Project Partner:

Department of Geography, University of Bonn: It is the largest and most distinguished Department in Germany with a focus on interdisciplinary and applied studies. There is a long tradition in high mountain research with experience an long-term projects in the Scandes, the European Alps the Karakoram and others.

Kunming Institute of Botany (CAS): The KIB has a long tradition in plant science, biodiversity conservation and sustainable utilization of biological resources in China. In cooperation with ICRAF the KIB recently founded the Centre for Mountain Ecosystem Studies (CMES), which is promoting sustainable highland development and ecological integrity while raising farmer's incomes.

(C2) Case Study on Regulation of Ecosystem Services by local Institutions:

People living in rural villages depend on local ecosystem services for their livelihoods. For effective management hey develop various institutions and organizations that are embedded in the local culture and informed by traditional ecological knowledge. Institutions include rules for harvesting mushrooms or Sacred Nature Sites. These local institutions ensure productivity and sustainability of the local ecosystems. They are a crucial complement to state driven nature protection. Functioning local institutions can serve as best practices in community based natural resources management, promote village development and ecosystem services protection at the local level.

Team members:
Sebastian Homm, Lennart Kümper-Schlake, Michael Nassl, Till Rockenbauch, Florian Sander, Prof. Dr. Jörg Löffler , PD Dr. C. Dittrich

Contact:
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