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DAAD International Alumni Autumn School  
"Establishment of innovative, multi-state and  
multi-national networks"

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## PREFACE

The DAAD Alumni Seminar "Establishment of innovative, multi-state and multi-national networks" coordinated by the Centre of Biodiversity and Sustainable Land Use - Section for Tropical and Subtropical Agriculture and Forestry (SeSTAF), was one of two Alumni Seminars accompanying the 1st International BION Conference "Biodiversity today for tomorrow" in Bonn. It reflects the 'internationalisation' strategy of the University of Göttingen in practice. Through sharing our expertise, experiences, and perspectives we enrich the possibilities for providing quality education and undertaking relevant, applicable and collaborative research in agricultural and forest systems. We focused on biodiversity assessment, conservation, and a sustainable utilization of resources to support the functioning of ecosystems. We discussed land use conflicts along environmental, social, and economic scales and present manifold methods and study results of interdisciplinary research. We believe that this Alumni Seminar and the visit to the BION conference was an unforgettable experience for all participants, both in scientific-technical terms and also in terms of international networking.

Organization and implementation of this Autumn School was only possible through the active and comprehensive support by many. First of all, we thank DAAD, in particular Mrs. Vera Engels and Mrs. Maren Drossart for their work. We are furthermore grateful to Mrs. Ayla Banha for her preparation and to Victor Figueroa for assisting in many organizational matters.

Of course, great thanks go to all participants of this workshop who contributed through their active participation to making this event a success. Thank you all for making the big effort to travel to Göttingen from your warm homelands. We are sure you left Göttingen enriched and enthusiastic about the future possibilities in biodiversity research and education - having found partners for collaborative work in Germany.

## ON THIS VOLUME

This proceedings volume contains the abstracts as presented at the DAAD funded BION International German Alumni Autumn School "Establishment of innovative, multi-state and multi-national networks". These manuscripts were formatted but did not undergo a scientific review. For reference, we also include, as Annex, the declaration of the 1st International BION conference which we consider very relevant for the upcoming discussions on Biodiversity networking. Attendance to the BION conference was part of the DAAD funded Alumni Seminar and the programme of the conference is also given in the Annex.

Great thanks to all who provided their manuscript!

Simone Pfeiffer

Antje Henkelmann

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## SOIL SALINITY AND SODICITY: MONITORING, EVALUATION AND RECLAMATION IN SOBA SCHEME, KHARTOUM STATE

**Sahar Abdallah**

*Agricultural Research Corporation, Sudan*

Contact: sahar\_babiker@yahoo.com

The worldwide occurrence of saline sodic soils is 560 million ha emphasizes the need for efficient, inexpensive and environmentally acceptable management. Sudan is dominated by arid and semi arid tropical climates that favor the formation of salt affected soil with low N content (0.01 to 0.02%). Saline- sodic soils occur in Khartoum state, Northern state, River Nile state, south of Khartoum between the Blue and White Nile and on both banks along the White Nile north of Kosti (Mustafa 1986). The establishment of several private and cooperative farms, irrigated with deep or surface borehole water, along the bank of the Nile, has caused secondary salinization or alkalinization of these areas (Mustafa 1983).

The study will be conducted in Soba west agricultural scheme, 15 km south of Khartoum state, covered a total of 11.125 ha. It was established in 1971 to provide the city people with vegetable and fodder crops. The soil of the scheme is heavily affected by salinity and sodicity which restrict crop productivity.

Organic amendment such as farm yard manure, chicken manure and inorganic amendments such gypsum and chemical fertilizers are used to reclaim salt affected soils in Sudan. However most of these studies are for shorter period of time (2-3 years). There is no information about sustainability and durability of the reclamation methods.

The main objectives of this study are to introduce, sustainable and environment safe methods for reclamation of salt affected soil in Khartoum state.

Specific objectives

- (1) To provide information about the farmer perceptions and local knowledge on soil fertility management under saline sodic soils.
- (2) Establish soil sodicity and salinity map for the area under study
- (3) Improve soil productivity through on-farm trails using organic amendments.

The purpose of this project first is to identify the area affected by salinity and sodicity. Secondly, define the sources of salinity (natural or due management). Finally, the project by introducing pilot farms want to demonstrate the beneficial effect of amendments on improving salt affected soil. The expected output is to establish on farm trail demonstrating the reclamation method valid for each group. Provide soil characteristic map for a comprehensive overview of soil degradation. The project will serve as baseline for monitoring and evaluating the project impact in the long term.

**Keywords:** salinity, sodicity, organic amendments, Khartoum

## EXPLORING EARTH OBSERVATION FOR MAPPING BIODIVERSITY HOTSPOTS: SAVING THE REMAINS OF TROPICAL RAIN FOREST ECOSYSTEM FOR BIODIVERSITY CONSERVATION AND ECOSYSTEM SERVICES

**Olusola Adefurin**

*Africa Rice, Benin*

Contact: olusola.ma@yahoo.com

Tropical rain forest ecosystem represents one of the richest zones of biodiversity because the space harbors diverse tree species, plants, shrubs, and wild animals. Tropical rain forest ecosystem serves as primary zone/source of livelihood for the surrounding rural communities as they depend mainly on the forest for food, fuel wood, fishing, agriculture, and wild hunting, etc. In other words, the forest ecosystem provides environmental benefits and ecosystem services to human and the environment alike. With the rise in population and the sole dependence of the rural community on the forest ecosystem, higher pressure is exerted on the forest ecosystem. As such, the supply potentials of forest ecosystem for ecosystem goods and services are diminishing while demand for them is increasing.

Furthermore, land-use change, chiefly caused by human interventions and processes, is one of the major threats that affect the forest ecosystems as a result of forest degradation and deforestation. Land-use changes are gradually wiping out the tropical rain forest ecosystem. The most obvious land-use change act is the conversion of forest space to agricultural lands i.e. villagers going straight into the forest, clearing and burning the forest to make way for agriculture land. With the tropical rain forest ecosystem shrinking, appropriate actions are required to reduce the threat to forest ecosystems and prevent the condition of the forest ecosystems from deteriorating any further.

Earth observation is a potent option for monitoring land-use changes from time to time and over periods of time to understand and track forest changes as they occur on the ground. The first step to undertake in any conservation program is to assess and identify the zones within the forest ecosystem that are still rich with significant pool of biodiversity. Earth observation data, together with field data and Geographic Information System (GIS) can be applied as an appropriate method to identify and map the hotspot zones within the forest ecosystem. This will provide policy makers with relevant information that will enable them to prioritize areas in the tropical rain forest ecosystems suitable for biodiversity conservation to ensure continued supply of ecosystem services.

**Keywords:** *Biodiversity hotspots, Earth observation, Land-use changes, ecosystem services.*

## MEDICINAL PLANTS, FOREST COVER CHANGE AND NEW FORESTS IN NW PAKISTAN - A SUMMARY AND A CONCEPT FOR A WAY FORWARD

Muhammad Adnan<sup>1</sup> and Abdul Aziz<sup>1</sup>

*Department of Botany, Kohat University of Science and Technology, 26000 Kohat, Pakistan*

Contact: ghurzang@hotmail.com

In the Pakistani Himalaya, medicinal plants play an important role for health care and income generation for local people. Below the timberline, the medicinal plants were usually collected in near natural old-growth forests. However, these forests have disappeared at a high rate and little is left, which today is usually protected as National Parks. Besides degraded forest remnants, replacing tree-based land use systems include agroforest, reforestation, and natural re-growth. All contain different abundances of medicinal plants, as has been shown before in other studies. Here we bring together formerly distributed results, some new results and present a conceptual framework of understanding the changes in medicinal plants as related to forest cover change. A highest mean tree canopy cover of 76% was observed under old-growth forest, however in the degraded forests it comes to the lowest value of 4%. In the restored forests, highest tree canopy cover was observed under re-growth forest (56%) followed by reforested sites (36%) and agroforest (33%). Similarly, mean density of *Viola canescens* under old-growth forest ( $4.3 \text{ m}^{-2}$ ) was significantly highest under old-growth forest, while under degraded sites ( $0.02 \text{ m}^{-2}$ ) was lowest. However, increased more under re-growth forest ( $1.8 \text{ m}^{-2}$ ) compared to reforestation sites ( $0.2 \text{ m}^{-2}$ ) and agroforest ( $0.2 \text{ m}^{-2}$ ). *Viola canescens* is a highly valuable species for the locals with the current price of 12.4 US dollars  $\text{Kg}^{-1}$ . In contrast, *Plantago lanceolata* had minimum occurrence under old-growth forest. In conclusions, forest restoration can pay a way forward towards the recovery of medicinal plants. Among the new forests, naturally re-growth conditions are best suited to higher medicinal plants abundance followed by reforestation of fast growing tree species. Agroforest could also serve as alternate in harvesting some valuable medicinal plants. Moreover, proper management of the new forests such as agroforests and reforestations might increase the recovery and abundance of medicinal plants. Hence, this concept can be replicated in other areas having vast degraded and agricultural lands. This can provide an opportunity for higher production of medicinal herbs, ecological restoration, rural livelihood enhancement and forest expansion in the region.

**Keywords:** *non timber forest products, density, forest-use types, livelihood*

## SPATIAL PATTERNS AND INTRA-SPECIFIC COMPETITION OF CHESTNUT LEAF OAK (*QUERCUS CASTANEIFOLIA*) USING O- RING STATISTIC IN THE CASPIAN FORESTS OF IRAN

Reza Akhavan<sup>1</sup> & Farideh Omidvar Hosseini<sup>2</sup>

<sup>1</sup>Corresponding author, Assistant Professor, Research Institute of forests and Rangelands. Tehran, I.R. Iran.

<sup>2</sup>M.Sc. of Forestry, Forestry Department, Science and Research Branch, Islamic Azad University, Tehran, I.R. Iran

Contact: akhavan@rifr-ac.ir, Tel: +982144580282, Fax: +982144196575

### Abstract

One of the most visible aspects of a forest stand structure is the spatial patterns of trees. Competition affects on forest structure, and its understanding is important when the purpose of forest management is to imitate the dynamics of natural ecosystems. For this purpose, an unmanaged intact forest with 13 hectares area was selected. All Chestnut leaf Oak (*Quercus castaneifolia*) trees with a diameter at breast height (dbh) greater than 7.5 cm were measured and their Cartesian coordinates were determined. Then the measured trees were divided into four classes based on their dbh as small timber ( $dbh \leq 32.5$  cm), medium timber ( $32.5 < dbh \leq 52.5$ ), large timber ( $52.5 < dbh \leq 72.5$ ) and extra large timber ( $dbh > 72.5$  cm). To investigate the spatial patterns of oak trees in the region and in each size class individually, as well as to examine the intra-specific competition, the univariate and bivariate O- ring statistic were used, respectively. Results showed that the spatial patterns of oak trees was clustered in short distances due to heavy seed and high frequency of young trees and then shifted to random distribution as distance increased. Moreover, interactions between diameter size classes showed that oak trees with different sizes had different positive (attraction) and negative (repulsion) competitive effects which occurred at different scales based on the size of trees, influenced by light-demanding, limited seed dispersal and intra-specific competition of oaks with various sizes. Since the Chestnut leaf Oak trees showed random distribution, the silvicultural interventions should be based on individuals and random single selection to create random spatial patterns in the stand.

**Key words:** *Spatial patterns, Intra-specific competition, O- ring statistic, Chestnut leaf Oak.*

### 1. Introduction:

One of the most visible aspects of a forest stand structure is the spatial patterns of trees. There are three basic spatial patterns in forest as random, clumped (clustered) and regular (uniform). Competition affects on trees spatial patterns, and its understanding is important when the purpose of forest management is to imitate the dynamics of natural ecosystems. Competition can be divided



into intra and inter specific and each one more divided to attraction (positive interaction), repulsion (negative interaction) and independence. The objectives of this study were: 1- Determination the spatial patterns of untouched oak stands in different diameter classes, using univariate O-ring statistic; 2- Examine the intra-specific competition among different size classes (small, medium, large and extra large timber), using bivariate O-ring statistic.

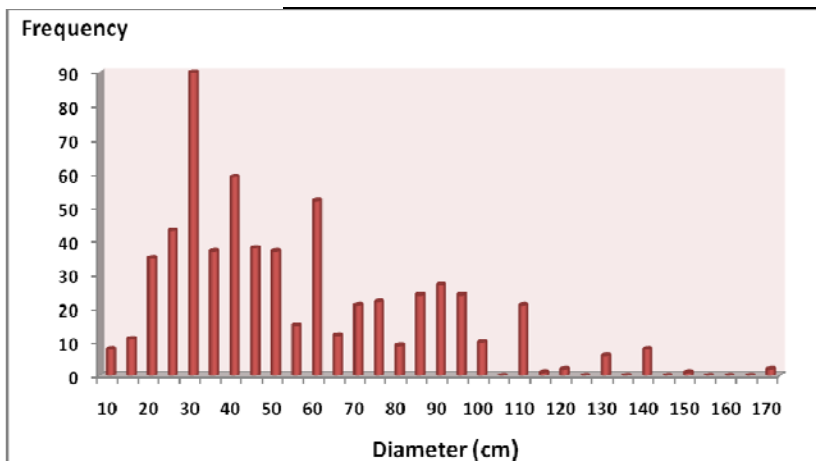
**2. Materials and methods:**

This study was conducted in a 13 ha, Untouched, unmanaged and uneven-aged oak- hornbeam forest (75% oak) in the Caspian forest, north of Iran (36° 36' N, 53° 35' E). Average annual temperature and precipitation are 15.5 °C and 618 mm, respectively. The Average Elevation is 500 m above sea level. All oak trees with d.b.h (diameter 1.3 m above the ground) greater than 7.5 cm were recorded for diameter and X,Y coordinates determined by Azimuth- Distance method. Then measured trees were assigned to one of four diameter size classes: Small size (dbh≤32.5 cm), Medium size (32.5<dbh≤52.5), Large size (52.5<dbh≤72.5) and Extra large size (dbh>72.5 cm). For Spatial point pattern analysis we used O-ring statistic; both univariate and bivariate (Wiegand & Moloney, 2004). Monte Carlo simulation was used to generate a 95% confidence envelopes.

**3. Results:**

**Table 1 Frequency of oak trees in diameter classes**

| Diameter class | Small | Medium | Large | Extra large | Total |
|----------------|-------|--------|-------|-------------|-------|
| Frequency      | 187   | 166    | 100   | 157         | 610   |



**Fig. 1. Diameter distribution of Oak trees**

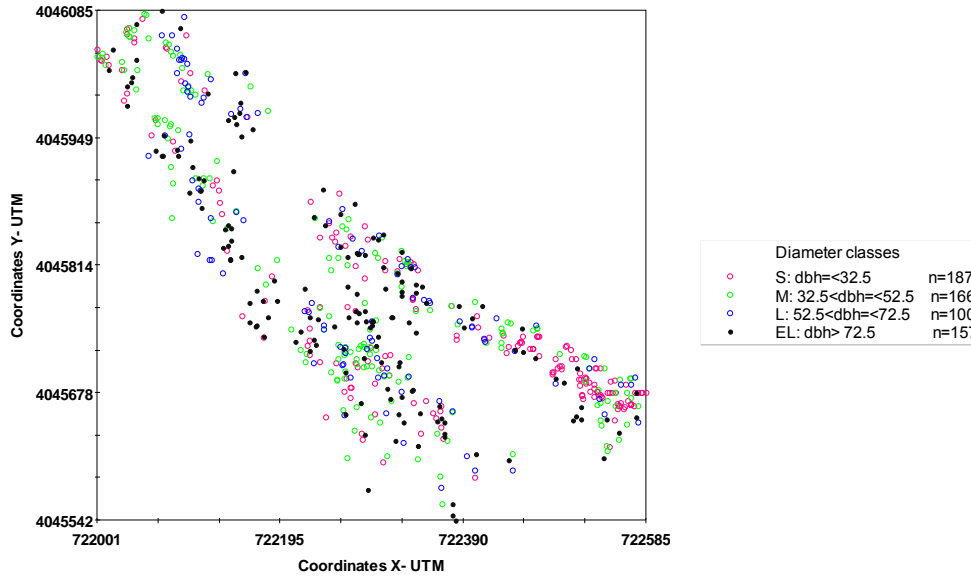
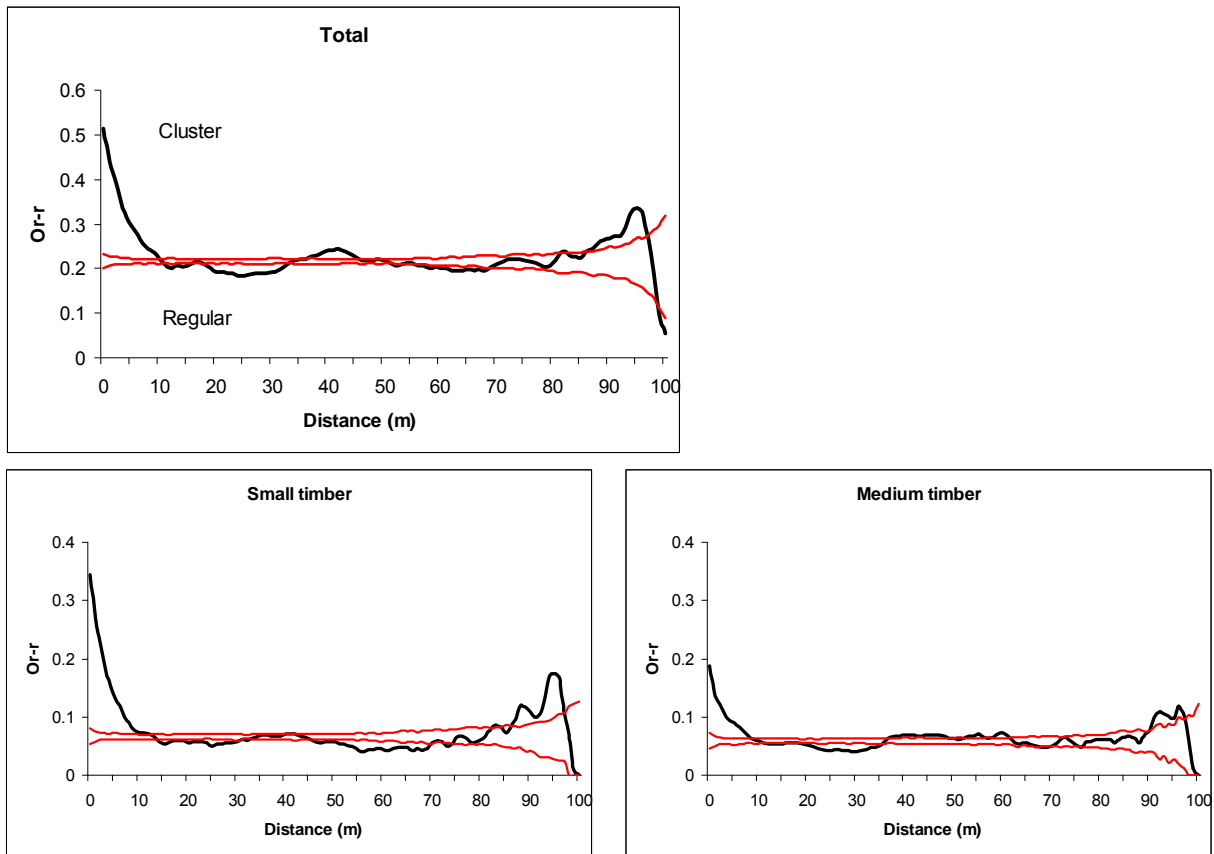


Fig 2. Spatial patterns of oak trees in the study area based on diameter classes



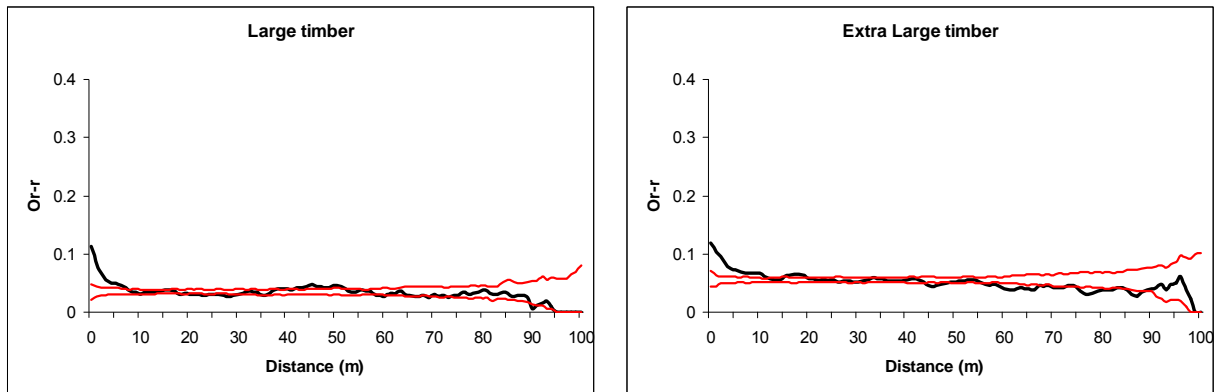


Fig 3. Univariate analyses of O-ring

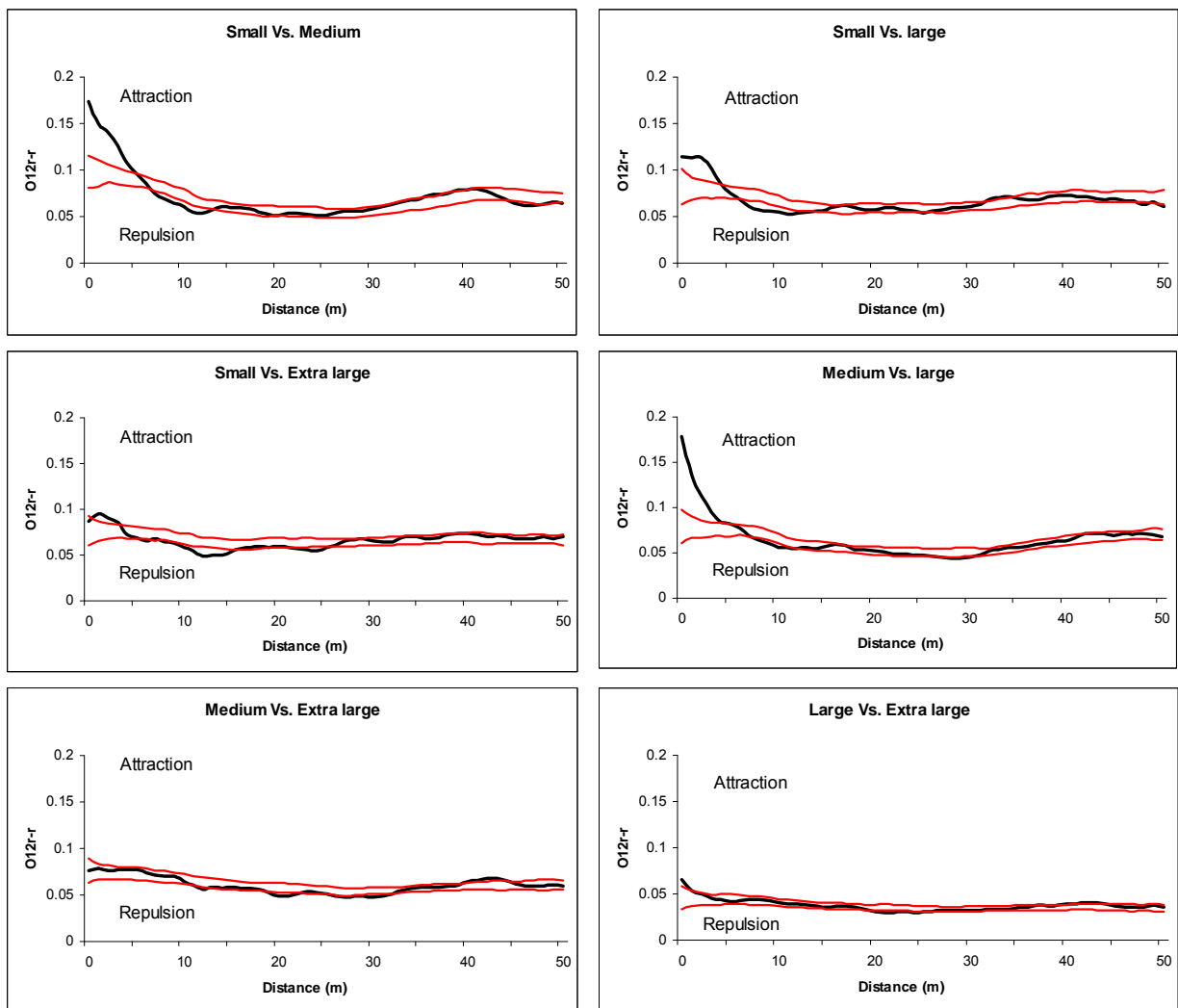


Fig 4. Bivariate analyses of O-ring

#### 4. Discussion:

##### Univariate analyses:

In general, the spatial patterns of trees in entire area and each diameter classes were cluster in short distances (up to 10m) and then random in larger distances. However, the intensity of clustering decreases from small timber towards extra large timber. The cluster pattern in short distances is due to the high density of small timber and medium timber, heavy seed species of oak and its dispersal limitation. Random distribution of trees in large distances is due to competition for resources (light, water, nutrients).

##### Bivariate analyses:

The general pattern of bivariate analyses is independence or slightly repulsion at all distances between all pairs of diameter classes; except between Small- Medium, Small- Large and Medium-large timbers which are attraction at short distances (below 10 m). Attraction between Small and Medium timbers in short distances confirms the cluster spatial patterns of them in short distances.

#### 5. Conclusion and Recommendations:

This kind of information from untouched stands could be used as a key reference in developing of management programs, silvicultural intervention, plantation and reforestation programs by mimicking natural spatial patterns and forest dynamics. In addition, information on spatial patterns is useful to improve and development of growth model as well as can give us insight of competitive processes to better modeling of forest dynamics. In any management in Oak stands (harvesting or afforestation) we should consider overall random spatial pattern of Quercus trees. Having knowledge of spatial pattern over the time, we need to consider this kind of stands as permanent plots for future studies

#### 6. References:

- Wiegand, T. and Moloney, K.A., 2004. Rings, circles, and null-models for point pattern analysis in ecology. OIKOS, 104: 209-229.

## STIMULATING EFFECT OF CO<sub>2</sub> ENRICHMENT ON PHOTOSYNTHESIS AND GROWTH OF WHITE BIRCH IS UNAFFECTED BY MILD MOISTURE STRESS IN WARM SOIL

Titus Fondo Ambebe<sup>1</sup> and Qing-Lai Dang<sup>2</sup>

<sup>1</sup>*Department of Botany and Plant Physiology, Faculty of Science, University of Buea, P.O. Box 63 Buea, South West Region, Cameroon*

<sup>2</sup>*Faculty of Natural Resources Management, Lakehead University, Thunder Bay, Ontario P7B 5E1, Canada*

Contact: [ambtitus@yahoo.com](mailto:ambtitus@yahoo.com)

Experimental increases in CO<sub>2</sub> partial pressure have a beneficial effect on physiological processes and growth of C<sub>3</sub> plants. However, predicting the impact of future high atmospheric CO<sub>2</sub> on forest trees is complicated by interactions of CO<sub>2</sub> with other ecosystem conditions. Reducing effects of cold soil temperature and low moisture availability on plant responses to CO<sub>2</sub> elevation have been reported. Noteworthy is that these factors change concurrently in the physical environment and may interact with each other in affecting plants. The interactive effect may not equal the sum of individual effects. The purpose of this study was to investigate the interactive effects of soil temperature and moisture availability on photosynthetic and growth responses of white birch to elevated CO<sub>2</sub>. Seedlings were raised under two CO<sub>2</sub> levels (ambient, twice ambient), three soil temperatures (low, intermediate, high), and three moisture regimes (low, intermediate, high) for four months in environment-controlled greenhouses. Photosynthesis and growth were measured. Elevated CO<sub>2</sub> significantly increased net photosynthetic rate, shoot height, root-collar diameter, and biomass accumulation. There were significant two-factor interactions suggesting that increases in net photosynthetic rate due to soil warming were limited to seedlings grown under the intermediate and high moisture conditions. Furthermore, the magnitudes of increase in height, root-collar diameter, and biomass from the low to the intermediate and high soil temperature treatments were greater under the intermediate and high than the low moisture regime. Stem volume showed a positive response to soil warming only at the intermediate and high moisture regimes, but not at the low moisture level where the effect of soil temperature was statistically insignificant. No significant three-factor interaction was observed, indicating that the effect of CO<sub>2</sub> elevation on photosynthesis and growth was unaffected by the interactions between soil temperature and moisture availability. Since the stress level due to the low moisture treatment was mild, it is important to further examine responses of photosynthesis and growth to CO<sub>2</sub> enrichment under warm soil temperature and severe moisture conditions.

**Keywords:** CO<sub>2</sub> x environment, elevated CO<sub>2</sub>, global change, forest trees

## ECONOMIC IMPACTS AND SOCIAL PERCEPTION OF INVASIVE ALIEN PLANTS: THE CASE OF EL-OMAYED BIOSPHERE RESERVE – EGYPT

Mohamed Awad<sup>1</sup>, Manal Fawzy<sup>1</sup>, Nouran Rostom<sup>1</sup>, Dalia Ahmed<sup>2</sup>

<sup>1</sup>*Environmental Sciences Department, Faculty of Science, Alexandria University*

<sup>2</sup>*Botany Department, Faculty of Science, Tanta University*

Contact: M.Awad@hbmsu.ac.ae

Exotic invasive species are believed to be the second largest cause of biodiversity loss after habitat destruction. The globalization of trade, travel, and transport is greatly increasing the rate at which alien species are moving around the world. At the same time, changes in land use and climate are rendering some habitats more susceptible to biological invasions. There are very limited studies dealing with the invasive alien plants and their socioeconomic impacts.

El-Omayed biosphere reserve was chosen as the study area because it has been subjected to large scale touristic and agricultural development activities. These activities resulted in habitat destruction of many ecosystems of the reserves and allowed for introduction and establishment of many alien plant species. A survey was conducted between 2010 and 2011 to collect primary data from the different stakeholders of the reserves. Three types of stakeholders were identified, namely local inhabitants, researchers and management authorities. Three structured questionnaires, one for each stakeholder group, were developed and tested. Face-to-face interviews were used to collect the data from the sampled individuals of each group.

The results showed that most of the local inhabitants are farmers. More than 50% of the interviewed local inhabitants were illiterate with low income. The researcher groups included academics with relevant research experience in the area. The manager group was composed of all the management team of the reserve and their administrative superiors. The three groups differed in their knowledge and perception of the alien invasive plant species in the area as measured by their definition of the alien species, the number of species identified by each group and the impacts of the identified species. However, they all generally indicated that these plants cause serious problems. The three groups collectively identified 25 alien plant species in the area. The reserve lacked formal and structured management plan related to invasive alien plant species. The farmers have to depend on their own financial and technical resources to handle the impacts of these species on their crops. They mostly use manual and chemical methods to combat spread of alien plants into their lands. Accordingly, the willingness to pay was very high in term of number of inhabitants, as 75% of the people are willing to pay for eradication of invasive plant species.

The different perceptions, knowledge and attitudes of the three stakeholders call for multi-stakeholder management plan to ensure effective combat of invasive alien plants in the study area. Awareness programs should be conducted with to enhance stakeholder's knowledge and perception towards the problem of invasive alien plants and the methods of their control. A study should be conducted to complete the list of plant species in the area. Continuous monitoring is also recommended to allow for early detection of the number and coverage of new plant species.

**Key words:** *Invasive species, Socio-economic impacts, Alien plant species, Biosphere reserves*

## DEVELOPMENT AND INNOVATION PROJECTS FOR SMALL BUSINESS, A STEP FOR BIODIVERSITY

**Romina Canales Arenas**

*Copeval Co., Chile*

Contact: r.canales.arenas@gmail.com

What is biodiversity? Why do we have to take care of? Ethical reason why people should be interested in understanding the ecosystem? If indeed we need more technology such questions are those that usually appear when a subject speaks projects seeking use of renewable energies to use minimal natural resources.

In Chile, the degradation of biodiversity and other environmental problems are closely related to socio-economic problems we face. Therefore, any strategy which is to successfully address the loss of biological diversity must be accompanied by guidelines that advance the improvement of socio-economic problems.

Currently, the area of development and innovation projects of small businesses supported by the government in the region of Maule (located in central Chile), have their main focus on agriculture and forest area, as they are the main areas of economic income. As the government has taken more serious about energy conservation, has amassed the issue of natural resources and the necessary savings. However, still persists in the collective thinking that education and action on biodiversity is a theme tied to "green" to the "construction of parks" and the relationship of this with the only "biological and scientific" research. Expected in the process of creating projects business development and innovation, generate projects for small businesses and organizations, which can grow and also insert a renewable energy component, which entrepreneurs can grow economically while they save natural resources.

As Non-Governmental Organization (as AAID) is necessary participate from the perspective of education, for this there is a great challenge, create awareness and promote (social, environmental and economic) sustainable development of Chilean society, working with colleges and universities based on the experiences and actions of other realities. It should work with young people, as these are the main social actors generate consciousness today and in the future are those who carry out the policies.

**Keywords:** *Innovation, development, biodiversity, projects*

## COMPOST PRODUCTION IN COLOMBIA: OPPORTUNITIES FOR TECHNOLOGY TRANSFER OR RISK REMAIN UNCHANGED

**Diana Cristina Cardona Jaramillo**

*Kontrolgrün SAS, Colombia*

Contact: [gerencia@kontrolgrun.com](mailto:gerencia@kontrolgrun.com)

Colombian territory is located in the inter tropical zone of our planet enjoys constant brightness throughout the year, Colombia does not have the four seasons. It has a strategic geographical position, with coasts on the Atlantic and Pacific oceans and is a liaison between the North and South in the hemisphere.

In the last three presidential administrations have had negotiations with various armed groups, the use and distribution of land one of the key points. Colombia currently uses 5 million hectares for cultivation in the coming years may increase to 25-28 million hectares.<sup>1</sup>

The restitution of land to displaced by violence, land reform, the highest in a watershed discharges, odors and waste trade agreements and environmental laws are creating the conditions that Colombia has to be more competitive and productive without neglecting respect to biodiversity, sustainability and well-being of the most vulnerable population.

Kontrolgrün was created in 2009 with an environmental focus and in its five years of existence complemented its scope was both familiar agriculture scale as an agroindustrial and rural-urban connectivity.

One of the critical elements for tropical conditions is the soil degradation. We work closely with a German company to implement techniques of use and processing of organic waste on an industrial scale to reduce environmental impacts by transforming into quality compost reliably. Today, there is not a law governing the Colombia compost maturity.

The non-regulation and lack of knowledge have a negative impact on productivity, environmental and sustainability. Both composting processes and the final product are likely to improve dramatically and that affects agricultural production.

So far we have advised both public entities and private and conducted studies applied to different types of organic waste generated by agribusiness. The conference would impart to share some experiences within the Colombian context, in which we have participated and set out the main challenges ahead.

**Key words:** *Compost, organic waste, organic agricultural, degradation*

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<sup>1</sup> Fuente: PROEXPORT COLOMBIA



## STATUS REASSESSMENT OF ENDANGERED CONIFERS IN EASTERN ASIA

**Zhang Deshun**

*Department of Landscape Study  
Tongji University, Shanghai 200092, China*

Contact: zds@tongji.edu.cn

On the basis of introduction of evaluation category, criteria and application scope, the endangered status of 191 conifers were reassessed in eastern Asia. The IUCN Red list was innovated by this assessment. For the conservation of endangered conifers, several conservation strategies and action plan were proposed as strengthen research on field survey and documentation, full consider the local climate factors for landscaping, enhanced cooperation among disciplines, regions and sections., improve the ex situ conservation capacity and information networks, and improve the awareness of engendered plant conservation.

Taking *Picea neoveitchii* as case study, the conservation status and conservation strategy were formulated. The research result contributes to perfect the scientific connotation to IUCN Red List.

**Keywords:** *East Asia; conifer; endangered status; reassessment*

## BUSINESS AND BIODIVERSITY INITIATIVE- EXAMPLE FROM INDIA

**Piyush Dhawan**

*German Technical Cooperation (GIZ), India*

Contact: piyushdhawan12@gmail.com

India with just 2.4% of the world's land area accounts for nearly 7% of globally recorded species while supporting 18% of global human population<sup>2</sup>. The rapidly growing trajectory of Indian economy has often led to its inefficient use and exploitation of biodiversity. For India, conservation and sustainable use of biodiversity is crucial for providing livelihoods and improving socio-economic conditions of millions of people. Thus to synergise sustainable development in India it is more important than ever to have business willingly involved in environmental protection and the sustainable use of nature.

On invitation by the Ministry of Environment, Forests and Climate Change (MoEF&CC), Confederation of Indian Industry (CII) is hosting the India Business and Biodiversity Initiative (IBBI) with the support of the German International Cooperation (GIZ). The IBBI serves as a national platform of business and its stakeholders for dialogue, sharing and learning, ultimately leading to mainstreaming sustainable management of biological diversity into businesses.

The Ministry of Corporate Affairs, Government of India has notified with Section 135 and Schedule VII of the Companies Act 2013 that all companies, including foreign firms, private limited or public limited with a minimum net worth of Rs 500 crore (\$ 83 million), turnover of Rs 1,000 crore (\$166 million) and net profit of at least Rs 5 crore (\$ 800,000), spend at least two percent of their profit on CSR. With the implementation of the new company law from April 1, 2014 India has become the only country in the world with legislated corporate social responsibility (CSR) and a spending threshold of up to \$2.5 billion (Rs 15,000 crore).

With India holding the presidency of the Conference of Parties (COP) to the UN Convention on Biological Diversity (CBD) till October 2014 and with the establishment of IBBI it would be interesting to notice the next steps the companies take to address the environmental issues of our generation.

**Keywords:** *Business and Biodiversity, Global Platform, Natural Capital, India*

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<sup>2</sup> Ministry of Environment and Forest (MoEF), Ministry of Corporate Affairs (MoCA) and GIZ GmbH

## COMMUNITY LEARNING AND ACTIONS FOR BIODIVERSITY CONSERVATION

**Dev Raj Gautam & Umesh Shrestha**

*Hariyo Ban Program, CARE, Nepal*

Contact: devraj@np.care.org

Hariyo Ban Program has been supporting Community Forest User Groups to establish community learning and actions centers (CLACs) in selected landscapes in Nepal. CLACs are community level informal platforms where the majority of participants come from marginalized segments of the community focusing on women and poor. These participants are brought together to identify, analyze and take actions on issues that directly affect them. Local resource persons (LRPs) facilitate these centers and help aware the local community on different issues that are directly concerned with biodiversity conservation, drivers of deforestation and forest degradation, climate change adaptation social inclusion, internal governance practices of community organizations, participatory planning processes and so on. Hariyo Ban Program has supported 345 Centers till the end of second year where more than 9107 user members (97% women) participated and benefitted in many ways. Hariyo Ban Program undertook an assessment of 140 CLACs in order to document the outcomes, successes and challenges and suggest appropriate strategies for self-sustained social mobilization in biodiversity conservation and effective manage of natural resources. The assessment applied desk review, consultations with range of individuals and stakeholders, focus group discussions, documentation of personal experiences using moon shape tool, and questionnaire survey. The assessment report shows that level of awareness among user members on biodiversity conservation has been increased to the larger extent. CLAC members carried out number of activities pertaining to biodiversity conservation, sustainable management of forests, women's empowerment, and advocacy on pertinent issues.

They started forest patrolling regularly to control the forest fire, illegal collection of forest products, poaching, open and free grazing. They also planted number of seedlings of native species in the barren public and private land, cleared invasive species in the forest and controlled forest encroachment. All these actions have been directly contributing biodiversity conservation. Community learning and their social actions largely contributing to reduce multiple threats to biodiversity conservation and drivers of deforestation and forest degradation. In nut shell, CLACs are playing pivotal role in women's empowerment, more effective management of natural resources and biodiversity conservation. The CLACs have also been well recognized as actors of social change for improved governance of local NRM groups.

<sup>1</sup> Hariyo Ban Program consortium partners comprise WWF, CARE, Federation of Community Forestry Users Groups in Nepal (FECOFUN) and National Trust for Nature Conservation (NTNC).

**EFFICACY OF UV-PIT-LIGHT TRAPS TRAPPING SYSTEM FOR COLLECTING BEETLE (COLEOPTERA) WITHIN DIFFERENT OIL PALM AGE STANDS FOR IMPROVED AND UNBIASED DIVERSITY AND ECOLOGY EVALUATIONS**

**Izfa Riza Hazmi, Ahmad Bukhary & Idris Abd. Ghani**

*Center for Insect Systematics, School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Malaysia.*

Contact: [izfahazmi@ukm.edu.my](mailto:izfahazmi@ukm.edu.my)

The result on the efficacy of a newly innovated UV-Pit-light trap for sampling beetle species within the different oil palm age stands are presented. Our result showed that there were no significant differences between the UV-Pit-light traps and the passive Pit-fall traps in trapping the beetle within oil palm plot of different ages stand. However, the UV-Pit-light traps sampled several new families and morphospecies as well the higher abundances of beetle sampled compared to the passive pit-fall traps. Specifically, the predatory, herbivorous, and mycetophage beetle species were found higher in terms of species diversity and abundances within the UV-Pit-light traps, while saproxylics/decomposer beetle species were found to be nearly consistent. In terms of different study year, the implementation of the UV-Pit-light trap has reduced the biases for sampling technique, hence making statistical evaluations to be significant for improved interpretations. Diversity indices showed nearly similar diversity, evenness, and richness between passive and uv-pit fall traps, revealing the later are able to sample beetle species that were previously caught only by canopy-height UV-Light traps and Malaise traps. In addition to refining the data for better statistical ecology analyses, like enabling the Two-Way Cluster Analysis done, clear specific Plot-factor weighing for Indicator Species Analysis, clear Plot-Separations for NMDS, and gave significant results for MRPP. This study suggests that the UV-Pit-light traps have the quality for satisfying the statistical data requirements and evaluations for beetle.

**Keywords:** *UV-Pit-light Trap, Beetles, Diversity, Ecology, Oil Palm, Age Stands.*

**SUSTAINABLE NATURAL RESOURCE MANAGEMENT: NATURAL RESOURCES MANAGEMENT  
BY THE PEOPLE: ZIMBABWE-CAMPFIRE PROGRAMME- MANAGING WILDLIFE AND  
WILDLIFE HABITAT IN THE COMMUNAL LANDS OF ZIMBABWE**

**Gladys Huchu**

*Department of Urban and Regional Planning, Harare, Zimbabwe*

Contact: [huchugladys@yahoo.com](mailto:huchugladys@yahoo.com)

**Motto: CAMPFIRE - raising awareness and raising money**

The CAMPFIRE [Communal Areas Management Program for Indigenous Resources] program designed by Department of National Parks and Wildlife Management (DNPWLM) and managed entirely by communal and rural areas of Zimbabwe, began in the mid 1980's. CAMPFIRE was developed largely around the concept of managing wildlife and wildlife habitat in the communal lands of Zimbabwe for the benefit of the people living in these areas. It encourages local communities to make their own decisions about wildlife management and control. The aim is to help people manage natural resources so that plants, animals and people - the whole ecosystem - all benefit. It helps provide legal ways for such communities to raise money by using local, natural resources in a sustainable way. As a result, many communities now actively protect local wildlife, seeing it as a valuable asset. (Frost P.G and Bond I, 2006).

CAMPFIRE program also seeks to empower rural communities for conservation and sustainable development through harvesting natural resources i.e. ostrich eggs. In terms of financial benefits, majority of CAMPFIRE profits come from leasing trophy hunting concessions to foreign hunters. Foreign hunters who come to Zimbabwe pay large fees to hunt elephants, buffaloes, giraffe, lion, kudu and other wild animals. According to Martin R.B, (1986), over 60% of profits from CAMPFIRE are derived from elephant hunts and the proceeds are distributed to participating communities.

**HOW CAMPFIRE OPERATES AND PLACES COVERED**

CAMPFIRE is operated in communal lands and rural areas of Zimbabwe. DNPWLM views CAMPFIRE as a programme for long-term development management and sustainable utilisation of natural resources, namely forests, grasslands, water and wildlife in the communal areas of Zimbabwe. The programme focuses on the remote communal lands in natural regions III, IV and V (hot and dry climate) around the periphery of the country (Martin R.B, 1986)<sup>2</sup>. Community participation would be voluntary, but custody and responsibility for natural Resource Management would be placed with participating communities. This is achieved through group ownership with defined rights of access to natural resources and appropriate institutions for the legitimate management, use and benefit of these resources. In the process of implementation, CAMPFIRE is strongly embedded in the following principles:

**Principle 1:** Allow benefits accruing from wildlife and other indigenous resources to be retained by communities as follows:

- Rural District Council (RDC) to retain no more than 15% of total income from the projects as a levy to cover overheads;
- Council to spend no more than 35 % of total revenue generated from wildlife and other natural resources;
- 3 percent of revenue to go to CAMPFIRE Association as levy; and
- The rest of the money to go to communities.

**Principle 2:** Producer communities must be given the full choice of how to spend their money, including both cash dividends and decision to embark on infrastructural development projects they see fit.

**Principle 3:** Producer communities should be small and homogeneous

**Principle 4:** Councils should involve community representatives on all key decisions about planning, project formulation, among others, and be accountable to national government, CAMPFIRE Association and the grassroots people on all financial, ecological and social issues surrounding CAMPFIRE.

**Principle 5:** Marketing and engagement of safari operators should be based on open competition through auctions or tenders, which must be advertised. (African Resource Trust, 2002)

## CONCLUSIONS

The CAMPFIRE program has achieved tremendous positive results since its inception as 49 out of a total of 52 Rural District Councils out of 68 are participating in the program. With the Motto "Raising awareness and raising money," the benefits of community based natural resources management have become apparent to all communities which are participating in the program as well as to the overseers of the program.

**Keywords:** CAMPFIRE , Sustainable, Wildlife Management, Zimbabwe

## THE ROLE OF TRADITIONAL INSTITUTIONS IN GOVERNANCE OF NATURAL RESOURCES: THE CASE OF THE OROMO GADAA SYSTEM<sup>3</sup>

**Denabo Billo Juju**

*Hawassa University-WGCFNRs, P.o.Box: 128, Shashemene, Ethiopia*

Contact: denabobillo@yahoo.com

Traditional institutions and indigenous knowledge often play indispensable roles in management and conservation of natural resources. Some of their contributions, in this regard, have been recognized and become subject of scientific researches. Oromo Gadaa system is one of such [traditional] institutions that has been guiding the social, political, economic and religious aspects of the Oromo people<sup>4</sup>. Several studies have been conducted on the nature of the Gadaa system itself and its potential roles. However, the existing information, with regard to its contributions in natural resource governance, appears scant and fragmented. Thus, the main aim of this research was to contribute to this gap by reviewing and analyzing the contents of selected sample articles. The target natural resources include forest, water, land and biodiversity. The sample articles were selected with purposive sampling, from a pool of articles, retrieved online via Google scholar search engine, using a couple of keywords (e.g. Gadaa “AND/OR” Forest). Then the contents of the sample articles were analyzed using inductive content analysis.

The result showed that the system has been playing indispensable roles in creating pro-nature culture & worldview of Oromos; defining access & property rights of various natural resources; mediating natural resource related conflicts; and establishing proper resource management practices. However, despite such acknowledged contributions, this prominent institution has been facing several internal and external challenges like expansion of alien religions, modernization, incompatibility with formal institutions, corruption, and poverty, among others. Nevertheless, there exist some opportunities that would help to revitalize its potential roles. These include some recognition from the State; and ongoing cultural revival & research. It can be concluded that, traditional institutions in general, and the Oromo Gadaa system in particular have much to contribute to the governance of NRs. Hence, concerned stakeholders should acknowledge its contributions, in this regard, and work together to tap its potential. Further research should also be done to democratize the system itself (internal factors like gender inequity and other discriminations within the society); find some synergies between it and formal institutions and; find ways to cope with external factors or minimize their adverse effects.

**Keywords:** *Gadaa system, Natural Resources, Governance, Institution, Oromo people*

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<sup>3</sup> It is an age grade based [democratic] system that has been governing every aspects of the Oromo people for more than five centuries

<sup>4</sup> The largest ethnic group in Ethiopia that belongs to the Cushitic (Kushitic) group and mainly lives in east Africa (Ethiopia & northern Kenya )

## DETERMINATION OF THE TAXONOMIC STATUS OF KAVA (*PIPER METHYSTICUM* AND *PIPER WICHIMANNII*) IN MERAUKE, SOUTH PAPUA USING ANATOMIC AND GENETIC MARKERS

Konstantina M.B Kameubun<sup>1</sup>, Deonisia M.P Kameubun<sup>2</sup>, Oliva M.A Kameubun<sup>3</sup>, Michael Muehlenberg<sup>4</sup>, Reiner Finkeldey<sup>5</sup>

<sup>1</sup>Biology Study Program, Faculty of Teacher Training and Education, University of Cenderawasih, Jayapura, Papua, Indonesia. <sup>2</sup>Senior High School of Unite, Jayapura, Papua. <sup>3</sup>Junior High School of Yoanes YPPK XXIII, Merauke, Papua., <sup>4</sup> Conservation Biology, Workgroup on Endangered Species, Faculty of Biology, Georg-August University Goettingen, Germany. <sup>5</sup> Forest Genetics and Forest Tree Breeding, Buesgen Institute, Georg-August University Goettingen, Germany.

Contact: brigitabio@yahoo.co.id

The results of ethno-botanical research show that Wati is considered as sacred and the species is included in every ritual ceremony. Procedures of processing rituals and cultivation of the Wati plant among the three groups of the Marind tribe (Marind Beach, Marind Land and Marind Swamp) differ but the purpose of utilization is the same throughout the groups. The knowledge of the Marind tribe how to use it as a beverage, for ritual ceremonies and how to cultivate it is similar to the knowledge of other people in the South Pacific region. In general, there is a different practice for utilization, identification and classification, cultivation and handling practice of the Wati plant among the three groups of the Marind tribe. *Piper methysticum* and *Piper wichimannii* are widely used in Papua especially in Marind tribe as beverage, medicine and during ritual ceremonies (e.g. (1). dowry (2). wedding ceremony, (3). death ceremony, (4). Conclusion of peace after fights between the people, (5). Pig party (6) as a reward). Hence, it is important for social interaction between individuals and community groups. In addition, Wati growing in the region of the Marind tribe shows a high diversity in morphology. The two species called "Wati" or Kava by the Marind tribes are difficult to differentiate in the field. Here we used anatomic and genetic markers to clarify the taxonomic status of the two species.

The morphological (root, stem, leaves and inflorescence) differentiate the two species with 5 cultivars. The five cultivars of *Piper methysticum* in Merauke recognized on the basis of morphology of the plants such as habitus (life form) (shrub tall of the plant  $\pm$  1 m, 2 m, to *P. wichimannii* with 4 m like a small tree), stem color (green, brownish – red color), length of stem internode (1-2 cm, 2-11 cm 4-14 cm, to *P. wichimannii* >15cm ), thickness of leaves (rather thick, thick and *P. wichimannii* with thin leaves), leaf softness (rather soft, rather stiff, to *P. wichimannii* as soft).

Anatomical characters (cross-sections of root, stem, leaves and paradermal incision of leaves) as tissue structure between cultivars *Piper methysticum* and *Piper wichimannii* failed to discriminate the two species because the anatomical characters showed no differences the tissue structure of *P. wichimannii* and *P. methysticum* with cultivars. In addition, the anatomical form of the trichoma from *P. wichimannii* and *P. methysticum* differs from that of *Piper gibilimum*. The differences are also confirmed by genetics.



Genetic diversity did not reveal any variation in the allelic richness between cultivars of *Piper methysticum* species in Merauke area, as no different alleles could be found, only outside of *Piper methysticum* species. The following alleles could be found in cultivars of *Piper methysticum*: (Cultivar Babid: 7 alleles of nSSRs and 1 allele of cpSSRs), (Cultivar Safurawe: 8 alleles of nSSRs and 1 allele of cpSSRs), (Cultivar Munana: 8 alleles of nSSRs and 1 allele of cpSSRs), (Cultivar Wati Kuning: 7 alleles of nSSRs and 1 allele of cpSSRs), *Piper wichimannii* (11 alleles of nSSRs and 1 allele of cpSSRs), *Piper betle* (17 alleles of nSSRs and 2 alleles of cpSSRs). The differences show a clear separation at species level *methysticum-wichimannii-betle*. Within population diversity, the three polymorphic nuclear microsatellite markers generated a total of 20 alleles for the 3 species. The number of alleles per locus ranged from 2 for PN G11 to 11 for PN D10. The highest polymorphic level found in *Piper methysticum* species on PN D10 locus are 9 alleles, *Piper betle* and *Piper wichimannii* on PN D10 and PN G11 locus are 7 alleles, *Piper methysticum* on PN G11 locus are 5 alleles. In genetic diversity among population the highest number of alleles per species per population were: *Piper methysticum* in Marind Swamp with 9 alleles, Marind Beach and Marind Land populations with 8 alleles, *Piper wichimannii* only in Marind Land with 11 alleles and *Piper betle* in Marind Swamp with 13 alleles, Marind Land with 11 alleles and the last is Marind Beach with 10 alleles.

It resulted that morphological variations show no variations in genetics (no corresponding differences). Anatomically, there is no difference between *Piper wichimannii* and cultivars of *Piper methysticum*. In order to identify Wati plant variants and to clarify the status of Wati plant in Merauke area based on indigenous knowledge as well as on the morphological, anatomical and genetic character it was found that Wati plant comprises the species *Piper wichimannii* and *Piper methysticum*. *Piper methysticum* comprises five cultivars, namely Babid, Wati Kuning, Safurawe, Palima and Munana.

This Wati plant (*Piper methysticum* and *Piper wichimannii*) distribution is only found in Melanesia, Micronesia and Polynesia which are integral regions of Oceania.

To clarify the taxonomic status of the Wati plant (*Piper methysticum* and *Piper wichimannii*) in Merauke genetic investigations need to be carried out to discover new haplotypes that are to be expected in other Wati plant samples from Papua and other islands.

**Keywords:** *Microsatellite, taxonomy, Wati, cultivars or Kava (Piper methysticum), Merauke, South Papua*

## MAPPING THE POTENTIAL OF INDONESIAN INDIGENOUS SPECIES IN ORDER TO OVERCOME NATIONAL PROBLEMS OF VITAMIN A DEFICIENCY (VAD) AND IRON DEFICIENCY ANEMIA (IDA)

**Leenawaty Limantara**

*Ma Chung Research Center for Photosynthetic Pigments, Universitas Ma Chung,  
Villa Puncak Tidar N-01 Malang 65151 Indonesia*

Contact: leenawaty.limantara@machung.ac.id

As one of the seventeen mega biodiversity countries in the world, Indonesia has a rich abundant natural resources. On the other hand, it has a problem related to national fact of vitamin A deficiency (VAD) and Iron Deficiency Anemia (IDA). With a total population of  $\pm 248\,422\,956$  inhabitants, in which there are 23,700,676 infants and 4,975,636 puerperal women (Ministry of Health Indonesia, 2013) considered as susceptible to VAD and IDA. In order to decrease the number of VAD and IDA suspects, it is required significant efforts in natural resource management, especially in indigenous natural resource of pro Vitamin A resource ( $\beta$  – carotene,  $\beta$ -criptoxanthin,  $\alpha$ -carotene) and a source of iron. Concrete input for the government strategies of conserving and monitoring biodiversity and assessing potential species need to be implemented soon. Therefore, the effort to fortify cooking oil with synthetic vitamin A can be diverted by the use of natural pro vitamin A of Indonesian natural resources.

So far as concerns, twenty five species of green leafy vegetables, both in indigenous form, endemic, and as a result of cultivation are consumed by mothers and children in Indonesia. The chlorophyll and carotenoid dominance composition and content of these were analyzed *in vivo* and *in vitro*. The analysis included total chlorophyll, total carotenoid, provitaminA content, chlorophyll and carotenoid composition and content, mainly using chlorophyll meter, nitrogen meter (*in vivo* measurements) and UV-VIS Spectrophotometer, high performance liquid chromatography (HPLC) equipped with photodiode array detector system and mass spectrophotometry (LC/MS) for *in vitro* measurements. The research result was mapped to find out the source of chlorophyll and carotenoid potential as provitamin A and the disease prevention in rectifying the case of Vitamin A Deficiency (VAD) and Iron Deficiency Anemia (IDA) prevalence in Indonesian society.

**Keywords:** *Vitamin A Deficiency (VAD),  $\beta$ -carotene,  $\beta$ -criptoxanthin,  $\alpha$ -carotene, Iron deficiency Anemia (IDA)*

## PREDICTIONS OF STAND VOLUME OF TROPICAL FOREST USING SPOT 5 DATA

**Thi Thanh Huong Nguyen**

*Department of Forest resource and Environment Management, Tay Nguyen University, Vietnam*

Contact: huongthanh.frem@gmail.com

Quantitative assessment of forests is important at a variety of scales for forest planning and management. Wood volume is of fundamental importance to forestry, and consequently foresters have developed a variety of methods for estimating it. Traditionally, forest variables including stand volume are defined based on field plot sampling which is both ineffective cost and time. It is now relatively easy to estimate the forest variables by combining ground inventory with remote sensing data. They can be estimated by modeling relationship between digital number of image and volume inventoried on the ground. Nonspatial modeling and spatial modeling are common method to estimate the stand volume.

The study was conducted at a site on the Central Highland of Vietnam where much natural forest remains. The equation of stand volume was defined in the first process based on field data. The forest stands were stratified using image classification techniques and field surveys. The methods of regression, k-Nearest neighbor, and regression-kriging were applied to estimate the stand volume using satellite image. The combination of 4 bands SPOT 5 along with normalized difference vegetation index (NDVI) and principal components (PCs) were used in these methods. Validation using independent data indicates that the regression-kriging is the best method for stand volume predictions, simultaneously, it is confirmed that the presence of all SPOT-5 bands improved the prediction result of stand volume. The results show that the more spectral bands included, the lower the root mean square error (RMSE) obtained for all these methods.

**Keywords:** *Stand volume, SPOT 5 image, regression-kriging, KNN*

## BIODIVERSITY CONSERVATION STATUS IN FIVE FOREST MANAGEMENT SYSTEMS IN TROPICAL RAINFOREST ECOSYSTEMS OF SOUTH-WESTERN NIGERIA

**Jonathan C. Onyekwelu**

*Department of Forestry and Wood Technology, Federal University of Technology, Akure  
P.M.B. 704, Akure, Nigeria*

Contact: onyekwelu@yaho.co.uk; +234-8034721633

Biodiversity provides goods and services for livelihood sustainability. The loss of biodiversity has human and non-human impacts as well as inter- and intra-generational impacts. The need for biodiversity conservation has become an important issue. Biodiversity conservation status in the understorey and overstorey of five forest management types (primary forest (PF), degraded forest (DF), enriched forest (EF), *Gmelina arborea* plantation (GP) and sacred grove (SG)) in south-western Nigeria were investigated. Overstorey trees were inventoried in eight 400m<sup>2</sup> temporary sample plots randomly laid across two hectare plots in each forest type. Understorey (seedlings) species were assessed in 25m<sup>2</sup> quadrats within each sample plot. In each 400m<sup>2</sup> plot, all trees with dbh  $\geq$  10cm were identified and their dbh measured while within the 25m<sup>2</sup> quadrats all trees with dbh < 10 cm were identified and their frequency recorded. Mean dbh of overstorey trees ranged from 29.5 – 33.3 cm, with EF and GP having statistically lower mean dbh than other forest types. Mean basal area (range 15.36 – 65.0 m<sup>2</sup>ha<sup>-1</sup>) was significantly higher in PF (65.0 m<sup>2</sup>ha<sup>-1</sup>) than other forest types, probably due to the large individual trees in it. Other forest types with high mean basal area are SG (42.5 m<sup>2</sup>ha<sup>-1</sup>) and DF (31.3 m<sup>2</sup>ha<sup>-1</sup>).

Overstorey species richness followed the order SG (61) > PF (51) > DF (45) > EF (33) > GP (8) while family richness followed the order PF (23) > DF (21) > SG (18) > EF (17) > GP (7). Apart from *Gmelina* plantations with very low Shannon-Wiener diversity index ( $H'$ ) of 0.26, other forest types had  $H'$  range of 3.09 to 3.54. Species evenness was highest in EP (0.88), comparable in SG, PF and DF (range: 0.59 – 0.66) and lowest in GP (0.13). Understorey species richness was 66, 49, 36, 34, and 28 in SG, PF, DF, GP and EF, respectively. Generally, biodiversity conservation is better in sacred grove, which is closely followed by primary and degraded forests. The high evenness in EP is attributed to the few number of species used during enrichment planting. Regeneration (seedlings) of *Carpolobia lutea*, *Diospyros* spp., *Cola gigantea*, *Funtumia elastica*, *Sterculia rhinopetala* and *Strombosia pustulata* was high in all forest types. In most cases, the overstorey and understorey presented comparable species richness, except in GP. Many overstorey species were also encountered in the understorey of most forest types, indicating good regeneration potentials. Some species in the understorey were not found in the overstorey, which may be new recruits. The high number of understory species in GP indicates that the understory of the plantation harbours high species richness.

**Keywords:** *Biodiversity conservation, understory tree, overstorey species, forest management type, regeneration, Nigeria*

## TRANSFORMING RURAL AGRICULTURAL COMMUNITIES THROUGH ORGANIC RE-ENGINEERING (TRACTOR)

**Bernard Osei Owusu**

*Health, Safety and Environmental Consultant, Ghana-West Africa*

Contact: bernardo\_owusu@yahoo.com

Sustainable agriculture is a major issue being discussed by the Ministry of Food and Agriculture (MOFA) in Ghana due to the bad agricultural practices of some farmers in Ghana. One company that has gained recognition both locally and internationally with an outstanding concept of promoting sustainable agriculture, wealth creation, poverty reduction and climate change mitigation is TRACTOR / B-BOVID limited. TRACTOR engages in a number of activities which are discussed in this paper to reduce the effects of bad agricultural practices and the creation of wealth for poor farmers. Among other activities engaged in by TRACTOR (an NGO) are; the development of agricultural communities through organic re-engineering, the development of high yielding pest resistant seedlings, supply of seedlings to small scale farmers and provision of mechanization and advisory services to farmers.

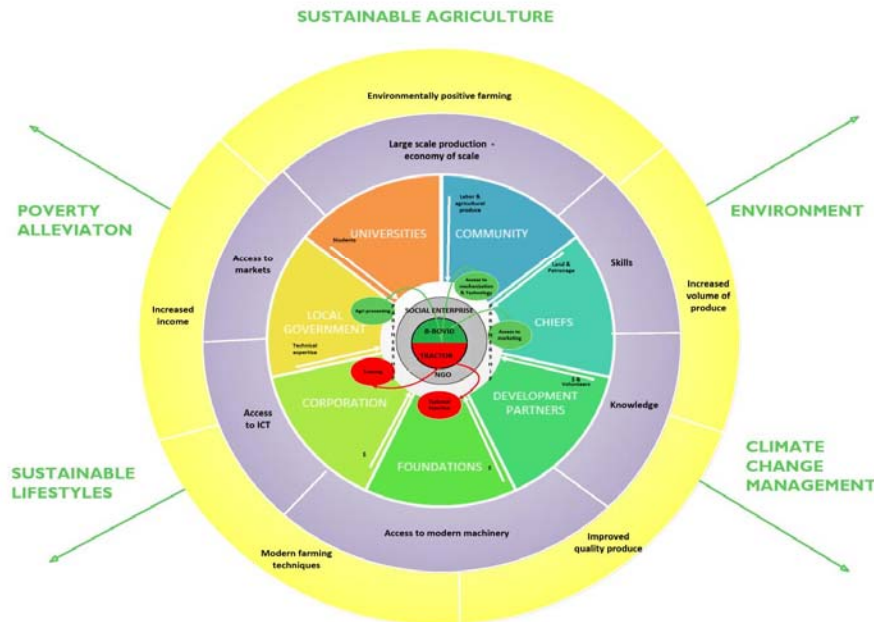
### 1.0 INTRODUCTION

Agriculture in Ghana consists of a variety of agricultural products and is an established economic sector, and provides employment on formal and informal basis. Ghana produces different kinds of crops in various climatic zones which range from dry savanna to wet forest and which run in eastwest bands across Ghana (Clark, 1994). Agricultural crops, including yams, grains, cocoa, oil palms, kola nuts and timber form the base of agriculture in Ghana's economy. Sustainable agriculture can be defined as an integrated system of plant and animal production practices having a site-specific application that will last over the long term of satisfying human food and fiber needs, enhancing environmental quality and the natural resource base upon which the agricultural economy depends, making the most efficient use of non-renewable resources and on-farm resources to integrate where appropriate a natural biological cycles and controls, sustaining the economic viability of farm operations and enhancing the quality of life for farmers and the society as a whole (Gold, 2009).

### 2.0 TRACTOR / B-BOVID LIMITED'S SUSTAINABLE AGRICULTURE CONCEPT

In Ghana's western region where TRACTOR operates, most of the people depend on agriculture for their livelihoods (Garr, 2012). Given the increasing strain on resources, global food and financial crisis coupled with the challenges of climate change, the conventional mode of commercial agriculture is no longer sustainable. Local markets tend to be inefficient. Unemployment is common among women and the youth. There is a general lack of economic and social infrastructure. The natural environment, moreover, is deteriorating due to climate change and over-exploitation. In the face of this increasing challenges concerning agriculture in Ghana, TRACTOR / B-BOVID limited has come up with a model (figure 1) to address these challenges in the communities it operates.

Figure 1: TRACTOR / B-BOVID's sustainable agriculture concept



Source: B-BOVID Limited, 2010

Below are ongoing activities of TRACTOR which has gained recognition both locally and internationally by winning awards.

2.1 ORGANIC VEGETABLE DEMONSTRATION FARM

TRACTOR in connection with B-BOVID has a demonstration farm where organic vegetable seeds are nursed and planted. With advice from the Ministry Of Food and Agriculture (MOFA) and other private consultants, the best agricultural practices are done and taught. Farmers are mobilized from rural communities and given lectures about the best planting distances, organic pesticides and pre and post nursery activities to enhance high yields. The usage of chemical fertilizers is not encouraged on this demonstration farm. Complete organic farming is practiced. Organic manure from the droppings of the livestock on the demonstration farm is applied to the soil as fertilizer. The yields obtained during harvest are so encouraging and this is what TRACTOR wants farmers to emulate.

2.2 LIVESTOCK REARING / ANIMAL HUSBANDRY SECTOR

On the same demonstration site are ruminants and non-ruminants for educational and training purposes. The ruminants include sheep, cattle and goats and the non-ruminants include pigs, grasscutters, rabbits, sea tortoise and poultry (fowls, turkeys, ducks and guinea fowls). One of the reasons behind setting up this sector is to encourage farmers in the promotion of alternative livelihood projects so as to reduce unemployment and create wealth. This also serves as a medium for farmers and the unemployed communities to acquire knowledge and realize the profitability of livestock rearing which the youth and the unemployed can tap into. This approach will not only promote food security but it will also reduce unemployment and the dependency of the youth on the oil and gas industry.

### 2.3 ICT AND MECHANIZATION CENTER

The potential for agriculture as a real means for food security remains largely untapped because most farmers do not have the expertise and resources needed. Although small scale rural farmers desire to use modern machines, they are constrained either by the non-availability of the machines in their locality or the non-affordability of the services of such machines. TRACTOR runs a well-equipped agricultural mechanization and ICT centre which is the first of its kind in the western region of Ghana. As part of TRACTOR's vision to contribute to food security and to improve the socio-economic wellbeing of small scale rural farmers, the mechanization centre supports small scale farmers with modern agricultural machines at subsidized rates.

### 3.0 CONCLUSION

TRACTOR / B-BOVID Limited's sustainable agriculture concept, although new in the region, has begun to make an impact in agriculture in Ghana. This can be seen through the number of farmers who come to the company's premises for training. Also this distinct sustainable agriculture model has won both local and international awards since its inception in 2010. Given the increasing strain on resources, global food and financial crisis coupled with the challenges of climate change, this concept of sustainable agriculture should be encouraged and replicated in other communities.

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**Keywords:** *sustainable agriculture, sustainability, organic farming, TRACTOR*

## THE ENVIRONMENTAL IMPACT OF CHANGING LAND USE: INTRODUCTION OF OIL PALM (*ELAEIS GUINEENSIS* JACQ.) IN THE SOUTH CENTRAL REGION OF COSTA RICA

**Olman Quiros\*, Nelson Ramírez<sup>2</sup>**

\* *Director, School of Agricultural Economics and Agribusiness. University of Costa Rica*

<sup>2</sup> *Lecturer. School of Agricultural Economics and Agribusiness. University of Costa Rica*

Contact: [olman.quiros@ucr.ac.cr](mailto:olman.quiros@ucr.ac.cr)

The oil palm is a very important economic crop for different Cantones of the country. According to CANAPALMA (National Chamber of Producers of Palma) in Costa Rica, there are about 60,000 ha cultivated, being a crop of significance to the economy in Costa Rica. Due to economic stability generated by the crop, the assurance of the product purchase and the lack of raw materials by processing plants, allows that many producers switch to engage in this business.

Due to market conditions the introduction of oil palm in different agro-ecological conditions the different firms has been promoting this expanding process in order to ensure its supply of raw materials. In the South Central Region of Costa Rica has experienced the increase in planting areas from 61 ha in 2005 up to 697 ha by 2013. The introduction of this monoculture is been doing by the change in the use of the soil from silvopastoral systems and secondary forests to oil palm planting. A research was conducted in a first stage in the sown areas in Chires District in Canton of Puriscal and Carara District in Canton of Turruabares with 55 producers with the aim of assessing the environmental impact of the change of the use of the soil on farms that have been planted oil palm.

Three aspects are relevant as a result of the first phase of the research: 1 - the introduction of palm oil has become a threat to biodiversity since the use of the soil is been changing into a monocultur; 2. on the predominant slopes in the study area the soil conservation process is negatively impacted due to the opening of roads to transport the inputs to the farms and the harvest to the processing plant; 3. the conditions of the market favor the change in the land use activities because the high economic value of the harvested product but of great impact to the environment.



## POTENTIAL CONTRIBUTION OF ECOSYSTEM SERVICES FOR LOCAL AND REGIONAL SUSTAINABLE DEVELOPMENT IN THE NORTHERN AREA OF AMAPA STATE, AMAZON

**Eleneide D. Sotta**

*Empresa Brasileira de Pesquisa Agropecuária – Embrapa, Macapá, AP, Brazil*

Contact: [esotta@gmail.com](mailto:esotta@gmail.com)

Forests are vital to life on Earth at all scales, including for the development of economic activities. However, they have a limited capacity for the production of renewable resources (eg. fiber and fruits) and ecosystem services (eg. water and air purification), which have only recently begun to receive attention by governments and scientists. The ecosystem services provided by forests are important for ecosystem maintenance, and support, protect or affect the activities and human well-being. Much of the forests in the north region of Eastern Amazon, especially in the State of Amapá, are under some type of protection, being one of the most pristine areas of the Amazon. These forests may be threatened by being in an area of the border with French Guiana, where the current political development of the State is being targeted, resulting in actions that modify the current scenario and pressure on natural resources in the region. The main threats are the paving of the highway BR-156, the implementation of the binational bridge over the river Oyapock, and the expansion of agriculture, livestock and gold mining activities. In this sense, this study assessed how the provision and maintenance of ecosystem services such as carbon stocks, pure water supply and biodiversity can contribute to local and regional sustainable development aimed at improving the quality of life in the northern area of Amapá State border with French Guiana.

This study allowed to: a) make a picture of the social, economic and environmental aspects; b) establish the current state of land use and analyze the dynamics of changes in forest cover in the last 23 years; c) estimate the amount of carbon emissions into the atmosphere over this period; d) develop a model for determining areas most at risk of deforestation based on socio-economic dynamics of land use; e) identify priority areas for programs of Payment for Environmental Services (PSA); and f) create development scenarios for the northern region of Amapá to 2030. These results contribute to the discussion of a policy to subsidize programs aiming at reduction of emissions from deforestation and degradation (REDD) and PSA implementation, by defining priority areas in the border region between Amapá and French Guiana.

## ENHANCEMENT OF SPECIES AS UNDERUTILIZED OCA (*OXALIS TUBEROSA* MOL.) THROUGH THE VARIETY IDENTIFICATION USING MICROSATELLITE MARKERS

\*Abel Turumaya Andia<sup>1</sup>; Jorge rojas Beltrán<sup>2</sup>; Gabriela Bottani; Juan Herbas<sup>2</sup>.

<sup>1</sup> Master student "Conservación y Manejo de Recursos Fitogenéticos y Biotecnología Vegetal Aplicada", CIUF-UMSS.

<sup>2</sup> Universidad Mayor de San Simón (UMSS). Faculty of Agricultural Sciences, Livestock, Forestry and Veterinary Dr. "Martin Cardenas" (FCAPyV-UMSS).

Contact: abel\_t\_a@hotmail.com

Over time were discovered, collecting and taxonomically characterize many species endemic to the Andes. Few of these are used as the basis of world food, compared with corn, potatoes, beans, peanuts, peppers. Research in abeyance most of our cultivated and wild plants of economic value, calls to ensure an important role in the future development of Bolivia. The revaluation of endemic species, to be underutilized and unknown time of great importance for scientific study and for the alternative use of the same medicinal properties in its industrial, food, pharmaceutical and others. The oca is a species that was recognized in ancient times as a food source, demonstrating its ancestral consumption recorded its representation in pre-Columbian ceramics. The cultivated oca (*Oxalis tuberosa* Mol.), Native to the Andean region has been underutilized, ignoring their high nutritional value and economic importance, it is a species that reproduces vegetatively using tubers. Understand and determine their taxonomic origin so far is very complicated, because it has a great diversity within varieties that are not yet fully studied. So with molecular biology techniques such as using microsatellite markers can afford to have a clear idea of the great diversity present in oca, this information will allow the development of conservation programs, upgrading and use of different varieties of oca are identified. The main objective of this work was to select a set of reproducible polymorphic microsatellite markers information for use in studies of genetic diversity in oca (*Oxalis tuberosa* Mol.).

**Keywords:** Oca (*Oxalis tuberosa* Mol.), genetic diversity, microsatellites

## THE INTEGRATED NARANJILLA ROUND TABLE (*SOLANUM QUITOENSE*)

### Christian Velasco

*Rainforest Alliance Inc., Ecuador*

das\_cvelasco@hotmail.com

The spaces for horizontal dialogue which deals with the cases or subjects which concerns a group of producers for the benefit of its social, cultural and natural state constitutes as an alternative for good governance. These spaces for dialogue possess a distinct quality with the active participation of producers, public and private organizations, non-governmental organizations, etc. to deal with problems, share knowledge or take decisions which tend to improve definite situations.

With the leadership of the Decentralized Autonomous Government of the Napo Province, the Integrated Naranjilla Round Table was launched to support the strengthening of the organizations and improve the production of naranjilla in the Hatun Sumaku Parish of Canton Archidona. This parish consists of seven indigenous Kichwan communities which is the major producer of the naranjilla (*Solanum quitoense*).

The development of this species demands high quantities of organic materials and due to its monoculture character it is vulnerable to attacks by plagues and diseases, a situation which obliges the producers to widen the agricultural frontier which threatens the high biodiversity of this territory which merited the pronouncement by UNESCO declaring it as the Sumaco Biosphere Reserve and the indiscriminate use of agricultural chemicals; in addition, the instability of the Price of the fruit and the low prices which the intermediaries pay do not contribute in improving the producers' economy. As a consequence, the change in the use of the soil, harvested fruits with high indices of chemical residues which makes them not apt for human consumption, the lower state of health of the producers and non-sustainable agricultural practices are the threats which demand intervention in order to change these negative effects.

Due to these, the articulated actors through the spaces of dialogue formulated a strategy to search the production of integrated naranjilla and in associated manner protect the biodiversity of this important biosphere reserve.

The process of formulation and implementation of the strategy has been very participative which led to the empowerment of the process by its actors and in each area of competence impulse the realization of the objectives of this strategy:

1. By 2014, the Integrated Naranjilla Round Table constitute a space for legitimate dialogue for the concerted, coordination and the exposition of the accounts and promote the sustainable development of the naranjilla producers and the conservation of the natural resources.

2. By 2015, the naranjilla producers has consolidated their organizational process and has identified their products with aggregated value to offer as a market potential at the national level and the strategies of penetrating markets.
3. By 2014, the public organizations responsible for local agricultural development has developed and executed a technical assistance program specialized in promoting the adaption and application of Good Practices in the cultivation of naranjilla.
4. By 2016, the naranjilla producers of Hatun Sumaku Parish are producing integrated naranjilla and have positioned their primary products with aggregated value in the principal local, regional and national markets.

## IMPACT OF PASTORALIST'S SEDENTARISATION AND EFFECTS OF LIVESTOCK GRAZING ON THE VEGETATION OF PROTECTED AREAS IN BURKINA FASO, WEST AFRICA

**Nouhoun Zampaligré**

*Institut de l'Environnement et des Recherches Agricoles (INERA), Département Production Animale, 04 BP: 8645 Ouagadougou 04, Burkina Faso*

Contact: nouhoun@gmail.com

In Sahelian countries such Mali, Burkina Faso and Niger, transhumant pastoralism is the dominant livestock husbandry system; it involves 70% - 90% of the cattle and 30% - 40% of the goats and sheep, supplying about 65% of cattle and 40% of small ruminant meat. Since the severe droughts, this livestock system faced challenges due to climate change, increased population growth and socio economic transformations that have occurred in the region. As adaptation strategy, in Burkina Faso, most of pastoral livestock keepers have migrated and settled in the defined pastoral zones around national parks, where dry season forage and water resources are relatively abundant. In the frame of the Volkswagen foundation postdoctoral programs, a postdoctoral projected is granted to investigate the livestock and protected areas interactions between the newly settled pastoral communities' and the National parks, as well the pastoralists' livelihood strategies in these areas. The selected study sites are the sylvo pastoral zones created around the Park Kaboré Tambi (national park) and the protected forest of Dinderesso, in Burkina Faso. On-going research activities are i) the characterization of pastoral livelihood strategies and changes, and current livestock husbandry systems, ii) land use mapping and pasture resources evaluation and assessment ; iii) and the tracking of livestock grazing routes and assessment of pasture areas use. Background of the project and the methodological approaches adopted will be presented. And the preliminary results on the impacts of pastoralist sedentarisation on their livelihoods strategies as well the effects of controlled livestock grazing on the productivity and species composition of the vegetation of the selected sites are presented.

**Keywords:** *Burkina Faso, livestock, protected forests, transhumant pastoralism.*

**Acknowledgement:** We are grateful to the **Volkswagen foundation** for funding the postdoctoral project (**Ref: 91 763**) within it Postdoctoral Fellowships Program "*Livelihood, Management, Reforms and Processes of Structural Change*".

# *Biodiversity Today for Tomorrow – 1<sup>st</sup> International BION Conference*

## **CONFERENCE DECLARATION**

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### ***Preamble***

The international conference ‘Biodiversity Today for Tomorrow’ was convened by BION, the Bonn Biodiversity Network, and was held in Bonn, Germany, during 17-19 September 2014. The conference brought together more than 250 experts, representing over 100 organizations and institutions from around 40 countries.

BION is built upon a unique range of local, federal state, national, and international stakeholders that are based in or near Bonn and that are involved in the study, the conservation and the sustainable use of biodiversity. BION, the Bonn Biodiversity Network, aims at increasing mutual knowledge and understanding and fostering synergies among this range of institutions and organizations. This includes academia, private corporations, NGOs, United Nations entities, funding organizations and relevant federal and federal state ministries and agencies, and the recently established Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) as well as the Global Crop Diversity Trust (GDCT).

### ***Declaration***

We, the attendees of the First International BION Conference ‘Biodiversity Today for Tomorrow’,

*EMPHASIZING* that biodiversity – the variety of all forms of life on Earth, both on land and in water – sustains our lives and livelihoods, and that humankind is not only part of it, but essentially depends on it for survival;

*NOTING* with deep concern that

- although some progress has been made since the Convention on Biological Diversity entered into force in 1993, the global biodiversity crisis continues unabated and species of plants, animals and other organisms are being lost at an unprecedented rate,
- as the loss of biodiversity equally affects agrobiodiversity, we also face a dramatic loss of mankind’s heritage,
- the loss of biodiversity is closely, and often causally, linked to the loss of vital ecosystem services and vital resources for the current and future wellbeing of mankind,
- although the loss of biodiversity affects all countries, the poorest people in the world are often the most vulnerable and biological resources are often the direct basis of their livelihoods and the only economic capital at their disposal;

*RECOGNIZING* that

- there have been successes in the conservation of species and ecosystems by the creation of protected areas, enforcement of conventions, capacity building, sustainable use, and other direct action, while overall those actions and policies to halt the loss of biodiversity and the degradation of ecosystems have had only limited and in many cases unsatisfactory effects,

- the reasons for this failure are manifold and complex, including real or perceived conflicts and tradeoffs between the immediate interests and needs of mankind, and insufficient data to document losses and to analyze causes;

*FURTHER RECOGNIZING* with appreciation that

- Bonn provides the unique possibility of a direct interaction between a wide range of stakeholders active at various levels with an equally wide range of diverse types of expertise, experiences and expectations with regard to biodiversity,
- BION, the Bonn Biodiversity Network, is an initiative that can address the challenges at hand and try to leverage opportunities for better cooperation and exchange of experiences and good practices among its partners,
- BION partners accept a common responsibility for joint action in order to contribute to overcoming the global biodiversity crisis and promote the conservation and sustainable use of biological diversity;

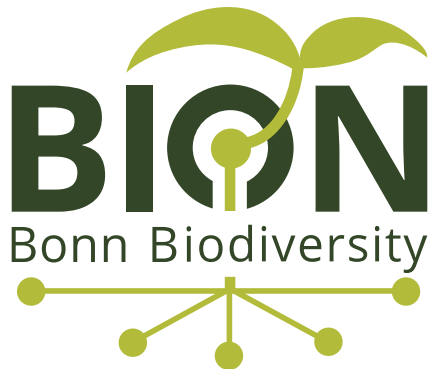
*STRESS* the importance of urgent, concerted, multidisciplinary, cross-cutting action in order to contribute to stalling or reversing the global loss of biodiversity; and therefore

*CALL UPON* BION, the Bonn Biodiversity Network, and its partners to

- pool their knowledge and expertise to support the implementation of national and international strategies such as the German National Strategy on Biological Diversity, the EU Biodiversity Strategy, and the United Nations' Convention on Biological Diversity (CBD), and specifically its Strategic Plan and the Aichi Targets, the Global Strategy for Plant Conservation (GSPC), the Ecosystem Approach as well as the Nagoya Protocol on Access and Benefit Sharing,
- look at biodiversity from a holistic point of view, bringing various academic disciplines together,
- provide an information hub and think tank for a wide range of topics related to biodiversity,
- contribute to cutting edge national and international research in major domains of biodiversity,
- develop specific biodiversity-related projects at local, national and international levels *inter alia* to promote mainstreaming of biodiversity and ecosystem services into development decisions at all levels,
- contribute to raising public awareness on all aspects of biodiversity and associated issues - launch education and capacity building initiatives in the area of biodiversity at local, national and international levels,
- support decision making processes of German governmental authorities in biodiversity matters.

# Biodiversity Today for Tomorrow

1<sup>st</sup> International Conference organized by  
BION – Biodiversity Network Bonn



17 – 19 September 2014  
Bonn / Germany

Funded by the Federal Agency for Nature  
Conservation (BfN) with funds from the Federal  
Ministry for the Environment, Nature Conservation,  
Building and Nuclear Safety (BMUB)



Federal Ministry for the  
Environment, Nature Conservation,  
Building and Nuclear Safety





## **Welcome to the first International Conference of BION - the Biodiversity Network Bonn!**

The City of Bonn is characterized by a unique concentration of local, regional, national, and international stakeholders active in the various aspects of the research on and conservation of biodiversity. More than 50 partners - ranging from university research groups to local and international NGO's, funding agencies and government departments - provide complementary profiles for a whole range of issues related to biodiversity. The recent establishment of both the IPBES-Secretariat and the Global Crop Diversity Trust in the city of Bonn has elevated the international component to a new level.

The local high density of stakeholders was so far not necessarily paralleled by a corresponding degree of stakeholder integration. It was therefore high time to bring these stakeholders together and initiate a common platform for communication and discussion. The constitution of the BION network was initiated by Prof. Walter Erdelen and Prof. Wilhelm Barthlott more than three years ago, it was then formalized as a third-party funded initiative in October 2013. BION aims at increasing mutual knowledge and understanding and fostering synergies among the whole range of institutions and organizations. Through this multidisciplinary network approach BION aims at improving the interactions between society, science and politics at local, regional, national, and global levels. BION wants to foster innovative and pilot approaches and to establish a "think tank" with its partners and stakeholders worldwide.

This congress brings together BION partners and various local and international experts and their expertise and visions. For three days it will provide the forum for an open exchange of ideas between BION partners and their guests and space and time for refining old and developing new concepts. It will hopefully lay the ground for innovative solutions for the grand challenges concerning biodiversity today for tomorrow. We invite all participants to actively partake in the discussions and contribute their expertise. The success of this event depends on your enthusiasm and dedication!

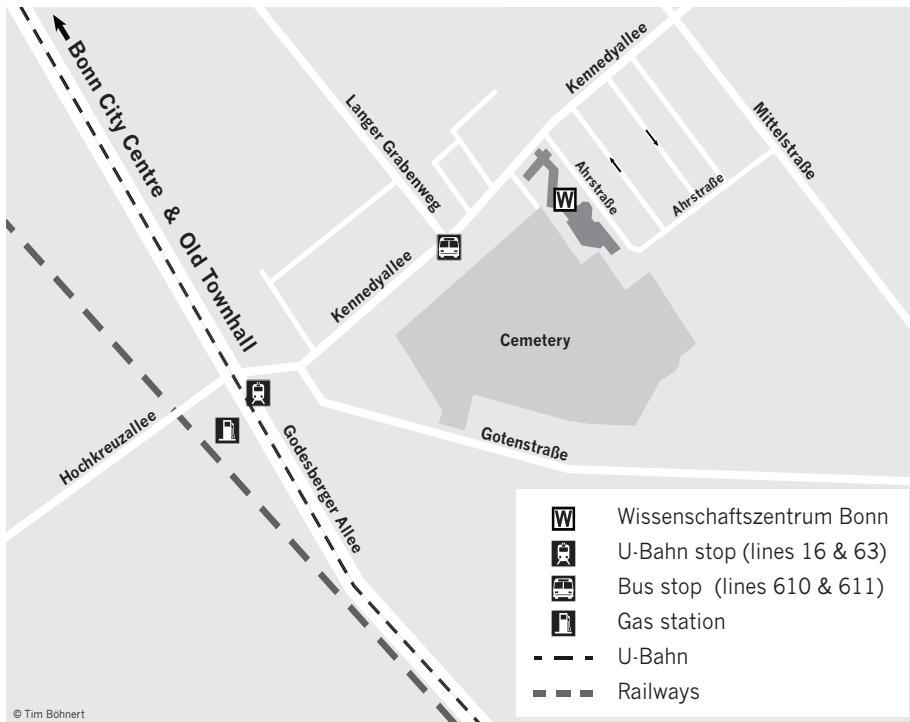
Bonn is the German capital of biodiversity, but especially our guests from abroad are also cordially invited to grasp the opportunity to enjoy the special atmosphere of the city of Bonn with its many attractions, the Rhine river, its museums and scientific collections beyond the congress activities.

Prof. Dr. Maximilian Weigend  
Speaker of BION - Biodiversity Network Bonn

**VENUE & PRACTICAL INFORMATION**

CONFERENCE VENUE: Wissenschaftszentrum Bonn (Bonn Science Centre)  
Ahrstr. 45, 53175 Bonn/Germany.

GETTING THERE: from central railway station take U-Bahn (subway)  
line 16 & 63 (to stop 'Hochkreuz/Deutsches Museum Bonn')  
or bus line 610 & 611 (to stop 'Kennedyallee')



**FACILITIES at Wissenschaftszentrum:**

Car park below the building (fees apply)  
WiFi (network name: Wissenschaftszentrum, user name: WLANWZ,  
password: Ver6druss – only valid during the congress)

**VENUE & PRACTICAL INFORMATION**

RECEPTION: The reception on Wednesday evening will take place at Altes Rathaus  
(Old Townhall), Markt 2, 53111 Bonn/Germany.

GETTING THERE: take U-Bahn (subway) line 16 & 63 (to stop 'Universität/Markt')  
or bus line 610 & 611 (to stop 'Hauptbahnhof')



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@bion\_bonn #bion2014



PROGRAMME OUTLINE

**Wednesday, 17 September 2014**

09:00 Registration

10:00 **Welcome Addresses**

Beate Jessel (President, Federal Agency for Nature Conservation)

Jürgen Nimptsch (Lord Mayor, City of Bonn)

Jürgen Fohrmann (Rector, University of Bonn)

Walter Erdelen (Initiator of BION and former Assistant Director-General for Natural Sciences, UNESCO)

10:30 **Keynote Presentations**

*BION – Biodiversity Network Bonn*  
(Maximilian Weigend, Nees Institute/University of Bonn)

*IPBES – Delivering policy relevant knowledge to inform decision making* (Anne Larigauderie, Executive Secretary, PBES)

*GCDT – The role of plant genetic resources for adapting agriculture to climate change* (Michael Koch, Director of Finance, Global Crop Diversity Trust)

12:00 – 13:30 Lunch

13:30 **Session1: Extinctions and the biodiversity crisis**

CHAIR: Wolfgang Wägele, RAPPORTEUR: Matthias Geiger

KEYNOTE: *The biodiversity of species, their rates of extinction, distribution, and protection* (Stuart Pimm, Duke University/USA)

*The Convention on Migratory Species (CMS) and its related instruments: An international framework for the protection of threatened animals* (Johannes Stahl, UNEP/CMS)

*Challenges for the conservation of biodiversity from a national and European perspective* (Andreas Krüß, German Federal Agency for Nature Conservation)

PROGRAMME OUTLINE

**Wednesday, 17 September 2014 - continued**

14:40 **Session 2: Global biodiversity patterns**

CHAIR: Wolfgang Wägele, RAPPORTEUR: Jonas Astrin

*Global Biodiversity patterns in a changing world*  
(Wilhelm Barthlott, Nees Institute/University of Bonn)

*Global Biodiversity patterns: implications for nature conservation at regional to global scales*  
(Jens Mutke, Nees Institute/University of Bonn)

15:20 – 15:50 Coffee

15:50 **Session 3: Technologies for monitoring**

CHAIR: Wolfgang Wägele, RAPPORTEUR: Stephanie Pietsch

*The German Barcode of Life Project (GBOL): A National Library of Biodiversity* (Matthias Geiger, Zoological Research Museum Alexander Koenig ZFMK)

*Beautiful patterns: algorithmic approaches to bioacoustic monitoring*  
(Rolf Bardeli, Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS)

*Satellite remote sensing for biodiversity monitoring: opportunities and challenges* (Anna Cord, Helmholtz Centre for Environmental Research UFZ)

*From species distribution models to potential resistance surfaces: tracking fine scale habitat suitability and potential gene flow for conservation planning* (Dennis Rödder, ZFMK)

PANEL DISCUSSION „What can science do to safeguard biodiversity?” with speakers of sessions 1-3, facilitated by Stuart L. Pimm

17:30 End of Day

19:00 **Reception at Old Town Hall**

PROGRAMME OUTLINE

**Thursday, 18 September 2014**

**09:00 Session 1: Biodiversity for food and agriculture/Bio-economy**

CHAIR: Stefan Schröder, RAPPORTEUR: Monika Winkler

*Conservation and sustainable use of genetic resources for food and agriculture in Germany* (Thomas Meier, German Federal Ministry of Food and Agriculture)

*Biodiversity – a prerequisite for success in plant breeding*  
(Jens Léon, University of Bonn)

*Bio-economy and biodiversity: Where are the opportunities?*  
(Ulrich Schurr, Forschungszentrum Jülich)

DISCUSSION

10:15 – 10:45 Coffee

**10:45 Session 2: Biodiversity and human development**

CHAIR: Manfred Denich, RAPPORTEURS: Darya Hirsch, Holger Willing

KEYNOTE: *Integrating Natural Capital with Development Decisions: Pathways and Options* (Pushpam Kumar, UNEP)

*Biodiversity and human development: Interplay or Contradiction?*  
(Henning Sommer & Lisa Freudenberger, Center for Development Research)

*Sustainable Biodiversity Utilization – Hunting as a Conservation Tool?*  
(Katharina Trump, Global Nature Fund)

*Biodiversity and Trade: From Pilot Projects to Strategy*  
(Josef Lüneburg-Wolthaus, REWE Group)

DISCUSSION

12:30 – 13:45 Lunch

PROGRAMME OUTLINE

**Thursday, 18 September 2014 - continued**

**13:45 Session 3: Ethical aspects of biodiversity**

CHAIR: Dieter Sturma, RAPPORTEUR: Bert Heinrichs

Keynote: *Ethics and biodiversity* (Dieter Birnbacher, University of Düsseldorf)

*Wilderness and biodiversity* (Hans-Joachim Mader, Wilderness Foundation, Brandenburg)

*Landscape and biodiversity* (Thomas Kirchhoff, Center of Life and Food Sciences Weihenstephan München)

*Animals and biodiversity* (Johanna Risse, University of Bonn)

PANEL DISCUSSION on “Normative Issues”  
with speakers of this session, facilitated by Dieter Sturma

15:45 – 16:15 Coffee

**16:15 Session 4: Societal (social, cultural, political) impact**

CHAIRS/RAPPORTEURS: Bettina Schlüter & Björn Müller-Bohlen

KEYNOTE: *The rights of nature* (Alberto Acosta, Facultad Latinoamericana de Ciencias Sociales, Quito / Ecuador)

PANEL DISCUSSION facilitated by Bettina Schlüter & Björn Müller-Bohlen

Panelists: Alberto Acosta (Quito, Ecuador), Anna-Katharina Hornidge (ZEF, University of Bonn), Irene Quaille-Kersken (Environment/Climate Correspondent, DW), Karoline Noack (Department for the Anthropology of the Americas, University of Bonn), Jean Carlo Rodríguez (Environmental Policy and Natural Resource Management, German Development Institute)

17:45 End of Day

PROGRAMME OUTLINE

**Friday, 19 September 2014**

09:00 **Session 1: Interactive session on capacity building to sustain biodiversity: approaches, needs and reflections on BION's role and contribution**

CHAIRS/RAPORTEURS: Klemens Riha & Marianne Alker

FACILITATOR: Gudrun Henne

10:30 – 11:00 Coffee

11:00 **Session 2: Biodiversity and Quality of Life: Interdisciplinary Challenges**

CHAIR & INTRODUCTION: Dirk Lanzerath, RAPORTEUR: Bert Heinrichs

PANEL DISCUSSION facilitated by Katharina Seuser

Panelists: Michael Blanke (INRES Horticultural Science, University of Bonn), Tade Matthias Spranger (Institute of Science and Ethics IWE, University of Bonn), Wiltrud Terlau (Department of Economics, Bonn-Rhein-Sieg University of Applied Sciences BRSU), Sabine Tröger (Department of Geography, University of Bonn), Wolfgang Wägele (Zoological Research Museum Alexander Koenig), Lucina Zedda (BIO-Diverse, Bonn)

12:30 **Concluding Session**

CHAIRS: Maximilian Weigend, Speaker of BION and Nees Institute / University of Bonn, & Thomas Graner, Head of Central Section and Main Section I, Federal Agency for Nature Conservation (BfN)

13:15 End of Conference

15:00 **Field trip to nature reserve 'Wahner Heide'**

(Registration required; extra fees applicable;

Buses will depart and end at 'Wissenschaftszentrum')

DETAILED PROGRAMME & ABSTRACTS

**WEDNESDAY, 17 SEPT, 10:30-12:00 – KEYNOTE PRESENTATIONS**

**BION – Biodiversity Network Bonn**

Maximilian Weigend

The global biodiversity crisis is characterized by complex reticulations, with no part of the globe free from intentional or accidental human modification, imperiling species and impairing ecosystem services. Local effects may be due to actions or decisions taken in entirely different parts of the planet. The option of non-intervention is no longer available – the anthropocene requires direct and indirect management decisions at a global scale. These need to be based on natural science, but they also have crucial ethical, legal, political, social and economical dimensions. Bonn as Germany's UN-city has a unique complement of international and national, state, municipal and governmental, non-governmental and scientific institutions concerned with the study, administration and/or conservation of biodiversity in all relevant fields and acting at all scales. The BION network brings together this unique set of institutions and establishes a cross-cutting platform to develop novel, exemplary and widely applicable approaches to address the global biodiversity crisis.

Further information on the author:

Contact: Nees Institute for Biodiversity of Plants, University of Bonn  
Meckenheimer Allee 170, 53115 Bonn/Germany  
mweigend@uni-bonn.de; www.nees.uni-bonn.de

Position: Professor at the Nees Institute for Biodiversity of Plants and  
Director of the Bonn University Botanic Gardens, BION Speaker

Research interests: Plant systematics and ecology

Selected publications:

Weigend, M., F. Luebert, F. Selvi, G. Brokamp and H. H. Hilger, 2013. Multiple origins for Hounds tongues (*Cynoglossum* L.) and Navel seeds (*Omphalodes* Mill.) – the phylogeny of the borage family (Boraginaceae s.str.). *Mol. Phyl. Evol.* 68: 604–618.

Farag, M., M. Weigend, F. Luebert, G. Brokamp, L. A. Wessjohann 2013: Phytochemical, phylogenetic, and anti-inflammatory evaluation of 43 *Urtica* accessions (stinging nettle) based on UPLC-Q-TOF-MS metabolomics profiles. *Phytochemistry* 96: 170–183.

Brokamp, B., de la Torre, L. & M. Weigend 2013: IV. Comercio pp. 35–43. in: R. Valencia, R. Montúfar, H. Navarrete & H. Balslev: Palmas Ecuatorianas: biología y uso sostenible. Quito: Publicaciones del Herbario QCA de la Pontificia Universidad Católica del Ecuador, 253 pp.

**WEDNESDAY, 17 SEPT, 10:30-12:00 – KEYNOTE PRESENTATIONS**

**Delivering policy relevant knowledge to inform decision making**

Anne Larigauderie

The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), hosted by Germany and based in Bonn, was established in 2012 as a mechanism to provide policy relevant knowledge to inform decision making on biodiversity and ecosystem services, in response to requests from these decision makers. The talk will present the conceptual framework adopted in December 2013 to guide the work of IPBES, as well as progress in the implementation of the first IPBES work programme, initiated in 2014, for a period of 5 years and designed based on policy requests. It will, in particular, include a presentation of the 2 assessments currently on-going on pollinators, pollination and food production, and on scenarios and modelling of biodiversity and ecosystem services.

Further information on the author:

Contact: Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES)  
Platz der Vereinten Nationen 1, 53113 Bonn/Germany  
anne.larigauderie@ipbes.net; www.ipbes.net

Position: Executive Secretary, IPBES (since Feb 2014)  
Prior to that: Executive Director, DIVERSITAS

Research interests: Biodiversity, Ecosystem Services, Science, Policy

Selected publications:

Mooney Harold A, Duraiappah Anantha and Anne Larigauderie. 2013. The evolution of natural and social science interactions in global change research programs. PNAS, 7 January 2013.

Bradley J. Cardinale, J. Emmett Duffy, Andrew Gonzalez, David U. Hooper, Charles Perrings, Patrick Venail, Anita Narwani, Georgina M. Mace, David Tilman, David A. Wardle, Ann P. Kinzig, Gretchen C. Daily, Michel Loreau, James B. Grace, Anne Larigauderie, Diane Srivastava, and Shahid Naeem. 2012. Biodiversity loss and its impact on humanity. Nature 486: 59-67

Larigauderie, Anne et al. 2012. Biodiversity and ecosystem services science for a sustainable planet: The DIVERSITAS vision for 2012–20. Current Opinion in Environmental Sustainability (COSUST), 4: 101-105

**WEDNESDAY, 17 SEPT, 10:30-12:00 – KEYNOTE PRESENTATIONS**

**The role of plant genetic resources for adapting agriculture to climate change**

Michael Koch

Agriculture is facing one of its greatest challenges ever. A changing climate is projected to reduce crop yields due to rising temperatures. There will be more droughts and flooding and an increase in plant pests and diseases. We will need to generate more food, on the same arable land, using less scarce water and fewer inputs so as to reduce greenhouse gas emissions. At the same time, the world's population is projected to increase to more than 9 billion by 2050, requiring an estimated 70 percent more food than today. The natural diversity found in and between crops represents one of most powerful options for adapting agriculture to climate change. While we have lost up to 90 percent of crop diversity over the past century, we need to preserve and make available the remaining diversity on a global scale, so that farmers, researchers and breeders have the tools necessary to help feed the world of the future.

Further information on the author:

Contact: Global Crop Diversity Trust  
Platz der Vereinten Nationen 7, 53113 Bonn/Germany  
michael.koch@croptrust.org; www.croptrust.org

Position: Director of Finance, Global Crop Diversity Trust (since Oct 2013)  
Prior to that: Director of Global Partnerships at the World Bank

**WEDNESDAY, 17 SEPT, 13:30-14:40**

**SESSION 1: EXTINCTIONS AND THE BIODIVERSITY CRISIS**

CHAIR: Wolfgang Wägele, Zoological Research Museum Alexander Koenig (ZFMK)

RAPPORTEUR: Matthias Geiger (ZFMK)

**KEYNOTE: The biodiversity of species, their rates of extinction, distribution, and protection**

Stuart L. Pimm

Recent studies clarify where the most vulnerable species live, where and how humanity changes the planet, and how this drives extinctions. We assess key statistics about species, their distribution, and their status. Most are undescribed. Those we know best have large geographical ranges and are often common within them. Most known species have small ranges. The numbers of small-ranged species are increasing quickly, even in well-known taxa. They are geographically concentrated and are disproportionately likely to be threatened or already extinct. Current rates of extinction are about 1000 times the likely background rate of extinction. Future rates depend on many factors and are poised to increase. Although there has been rapid progress in developing protected areas, such efforts are not ecologically representative, nor do they optimally protect biodiversity.

Further information on the author:

Contact: Nicholas School of the Environment, Duke University  
Box 90328; Durham, NC 27708/USA  
stuartpimm@me.com; www.savingspecies.org

Position: Doris Duke Chair of Conservation, Duke University

Research interests: Preventing species extinctions

Selected publications:

Jenkins, C. N., S. L. Pimm, and L. N. Joppa (2013). Global patterns of terrestrial vertebrate diversity and conservation. *Proceedings of the National Academy of Sciences (U.S.A.)* 110: E2602-2610

Joppa, L.N., P. Visconti, C. N. Jenkins, and S.L. Pimm (2013). Achieving the Convention on Biological Diversity's goals for plant conservation. *Science* 341, 1100-1103 (2013).

Pimm, S. L., C. N. Jenkins, R. Abell, T. M. Brooks, J. L. Gittleman, L. N. Joppa, P. H. Raven, C. M. Roberts, J. O. Sexton (2014) The biodiversity of species and their rates of extinction, distribution, and protection. *Science* 344, 987. (Review article, full version online DOI: 10.1126/science.1246752)

**WEDNESDAY, 17 SEPT, 13:30-14:40 – SESSION 1, CONTINUED**

**The Convention on Migratory Species (CMS) and its related instruments: An international framework for the protection of threatened animals**

Johannes Stahl

The Convention on the Conservation of Migratory Species (CMS) is an important international instrument for the protection of threatened animals. This presentation reviews the role of the Convention vis-à-vis key factors contributing to the biodiversity crisis, including habitat fragmentation, pollution, unsustainable use, invasive alien species and climate change. The presentation argues that action to conserve biodiversity at a national level is not enough and that there is a clear need for international, transboundary conservation measures. This is particularly true in the case of migratory species and it is why instruments such as the CMS are important in finding agreed regional and global solutions to stop and reverse species' decline.

Further information on the author:

Contact: UNEP/CMS Secretariat, UN Campus,  
Platz der Vereinten Nationen 1, 53113 Bonn/Germany  
stuartpimm@me.com; www.savingspecies.org

Position: Associate Programme Officer, Secretariat of the  
Convention on Migratory Species (CMS)

Research interests: Environmental governance, biodiversity conservation,  
forests, migratory species

Selected publications:

Thomas Sikor and Johannes Stahl (Editors) (2011). *Forests and People – Property, Governance and Human Rights*. Earthscan, London.

Johannes Stahl (2010). *Rent from the Land: A Political Ecology of Postsocialist Rural Transformation*. London: Anthem Press. [Reviewed in: *Environment and Planning*, 2013 Vol. 45, pp. 487f].

Johannes Stahl (2010). *The Rents of Illegal Logging: The Mechanisms behind the Rush on Forest Resources in Southeast Albania*. In: *Conservation and Society*. Vol. 8, No.2. Pp: 140-150.

**WEDNESDAY, 17 SEPT, 13:30-14:40 – SESSION 1, CONTINUED**

**Challenges for the conservation of biodiversity from a national and European perspective**

Andreas Krüß

An overview is presented on the status and trend of biodiversity conservation in Germany and at European level. The focus is on monitoring and reporting data from the reports of habitat and bird directive, and data from national red lists. Success, failure and challenges were addressed on species examples and on general level.

Further information on the author:

Contact: Federal Agency for Nature Conservation  
(Bundesamt für Naturschutz, BfN), Fachbereich II 1  
Konstantinstr. 110, 53179 Bonn/Germany  
andreas.kruess@bfn.de; www.bfn.de

Position: Head of 'Ecology and Conservation of Fauna and Flora'  
(Fachbereich II 1)

Research interests: Species conservation, multitrophic interactions,  
landscape ecology

Selected publications:

Kruess A., Kluth S., Eber S., Tschardt T. (2004) Plant-insect-pathogen interactions on local and regional scales. In: Weisser, W.W. & Siemann, E. (eds.) *Insects and Ecosystem Function*. — *Ecological Studies*, Springer, pp. 155-173

Kleijn D., Baquero R.A., Clough Y., Díaz M., De Esteban J., Fernández F., Gabriel D., Herzog F., Holzschuh A., Jöhl R., Knop E., Kruess A., Marshall E.J.P., Steffan-Dewenter I., Tschardt T., Verhulst J., West T.M., Yela J.L. (2006) Mixed biodiversity benefits of agri-environment schemes in five European countries. — *Ecology Letters* 9: 243-254

Krüß A., Riecken U., Balzer S., Ssymank A. (2010) Ist der Rückgang der biologischen Vielfalt gestoppt? – Eine Bilanz des Arten- und Biotopschutzes. — *Natur und Landschaft*, 85 (7): 282-287

**WEDNESDAY, 17 SEPT, 14:40-15:20**

**SESSION 2: GLOBAL BIODIVERSITY PATTERNS**

CHAIR: Wolfgang Wägele, Zoological Research Museum Alexander Koenig (ZFMK)  
RAPPORTEUR: Jonas Astrin (ZFMK)

**Global Biodiversity patterns in a changing world**

Wilhelm Barthlott

Some 10 million different species are estimated to exist, but less than 20% are described. The knowledge of global distribution patterns is a central prerequisite to understand biodiversity. Plants are the very well known (in contrast to e.g. insects) crucial component of all ecosystems. Based on an analysis of several thousand checklists, floras, herbaria, and other data of vascular plants we generated over the last 20 years world maps of terrestrial global biodiversity patterns. Biodiversity is highly uneven distributed, the global diversity centers and hotspots were identified, correlations between biodiversity and other factors (including e.g. linguistic diversity) and the projected impacts of climate change are discussed.

Further information on the author:

Contact: Nees Institute for Biodiversity of Plants, University of Bonn  
Venusbergweg 22, 53115 Bonn/Germany  
barthlott@uni-bonn.de; www.lotus-salvinia.de

Position: Professor Emeritus, Nees Institute

Research interests: Biodiversity and Biomimicry

Selected publications:

Barthlott, W., Erdelen, W. & D. Rafiqpoor (2014): *Biodiversity and technical innovations: bionics* (Routledge Studies)

Kier et. al. (2009): A global assessment of endemism and species richness across island and mainland regions (PNAS)

(Full list of publications under W. Barthlott Google Scholar Citations and ResearchGate)



**WEDNESDAY, 17 SEPT, 14:40-15:20 – SESSION 2, CONTINUED**

**Global Biodiversity patterns: implications for nature conservation at regional to global scales**

Jens Mutke

The knowledge about the spatial distribution of biodiversity is crucial for its further exploration, use, and conservation. More than 1 billion people live within the top 20 centers of plant diversity (< 7 % of the terrestrial surface). We analyzed regional to global diversity patterns of all major groups of land plants, documented, e.g., gaps in the network of existing protected areas to conserve plant diversity, and assessed the potential impact of future environmental change. Using data especially for Latin American plants, I am going to show parameters that shape plant diversity patterns, consequences for regional priority setting for conservation planning, but also important knowledge gaps.

Further information on the author:

Contact: Nees Institute for Biodiversity of Plants, University of Bonn  
Meckenheimer Allee 170, 53115 Bonn/Germany  
mutke@uni-bonn.de  
<http://www.nees.uni-bonn.de/staff/pages/jens-mutke>

Position: Akademischer Oberrat, Nees Institute

Research interests: Conservation Biogeography, Macroecology, Tropical Ecology

Selected publications:

JJetz, W., Kreft, H., Ceballos, G. & J. Mutke (2009): Global associations between terrestrial producer and vertebrate consumer diversity. *Proceedings of the Royal Society B: Biological Sciences* Vol 276, No 1655: 269-278.

Burgess, N., Küper, K., Mutke, J., Brown, J., Westaway, S., Turpie, S., Meshack, C., Taplin, J., McClean, C. & J. Lovett (2005): Major gaps in the distribution of protected areas for threatened and narrow range Afrotropical plants. *Biodiversity and Conservation* 14: 1877-1894.

Kier, G., Mutke, J., Dinerstein, E., Ricketts, T.H., Küper, W., Kreft, H. & W. Barthlott (2005): Global patterns of plant diversity and floristic knowledge. *Journal of Biogeography* 32: 1107-1116.

**WEDNESDAY, 17 SEPT, 15:50-17:30**

**SESSION 3: TECHNOLOGIES FOR MONITORING**

CHAIR: Wolfgang Wägele, Zoological Research Museum Alexander Koenig (ZFMK)  
RAPPORTEUR: Stephanie Pietsch (ZFMK)

**The German Barcode of Life Project (GBOL):  
A National Library of Biodiversity**

Matthias Geiger

The GBOL (German Barcode of Life) project is a large-scale DNA barcoding campaign designed to capture the biodiversity of Germany. The ultimate aim is to create a reference library for the rapid identification of organisms based on a short DNA fragment, which has the potential to revolutionize various fields of life-sciences. GBOL has been granted a funding of approximately 5 million Euros by the German Federal Ministry of Education and Research (BMBF) for an initial period of 3 years. It is a national consortium of natural history museums and other research institutions, which will provide their professional taxonomic expertise and existing infrastructure to establish the first comprehensive library of Germany's biodiversity.

Further information on the author:

Contact: Zoological Research Museum Alexander Koenig (ZFMK),  
Leibniz Institute for Animal Biodiversity  
Adenauerallee 160, 53113 Bonn/Germany  
m.geiger@zfmk.de; [www.bolgermany.de](http://www.bolgermany.de)

Position: Project coordination GBOL (German Barcode of Life)  
& FREDIE (Freshwater Diversity Identification for Europe) at ZFMK

Research interests: DNA barcoding and biodiversity, Freshwater fish diversity and evolution

Selected publications:

Geiger, M.F., F. Herder, M. Monaghan, V. Almanda, R. Barbieri, M. Bariche, P. Berrebi, J. Bohlen, M. Casal-Lopez, G. Delmastro, and 23 further authors (2014): Spatial Heterogeneity in the Mediterranean Biodiversity Hotspot affects Barcoding accuracy in Freshwater Fishes. *Mol Ecol Res*, (2014; doi: 10.1111/1755-0998.12257).

Geiger, M.F., McCrary, J.K., Schliewen, U.K. (2013): Crater Lake Apoyo Revisited - Population Genetics of an Emerging Species Flock. *PLoS ONE* 8(9): e74901. (doi:10.1371/journal.pone.0074901).

**WEDNESDAY, 17 SEPT, 15:50-17:30 – SESSION 3, CONTINUED**

**Beautiful patterns: algorithmic approaches to bioacoustic monitoring**

Rolf Bardeli

Measuring biodiversity and anthropogenic influences on it is a difficult task. A valuable tool for this measurement is given by bioacoustics. It can provide information about the presence of vocalising species where animals cannot be seen and where human presence is either undesirable or impossible. However, evaluating bioacoustic recordings to measure biodiversity asks for rare and specialised knowledge of animal sounds. If we could train computers to recognise vocalising species by the patterns of their sounds, this would yield a versatile tool for biodiversity assessment. We report about recent advances in this interdisciplinary field and discuss open questions such as generalisation and quantisation.

Further information on the author:

Contact: Fraunhofer Institute for Intelligent Analysis and Information Systems  
Schloss Birlinghoven, 53757 Sankt Augustin/Germany  
rolf.bardeli@iais.fraunhofer.de; mmprec.iais.fraunhofer.de/bardeli

Position: Senior Research Scientist Audio Pattern Recognition, Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS)

Research interests: pattern recognition in time dependent data

Selected publications:

Bardeli R., Wolff D., Kurth F., Koch M., Tauchert K.-H., Frommolt K.-H. (2010): Detecting bird sounds in a complex acoustic environment and application to bioacoustic monitoring, *Pattern Recognition Letters* 31 (12): 1524–1534.

Bardeli R. (2009): Similarity Search in Animal Sound Databases, *IEEE Transactions on Multimedia* 11 (1): 68-76.

Frommolt K.-H., Bardeli R., Clausen M. (Eds.) (2008): Computational bioacoustics for assessing biodiversity, *Proceedings of the International Expert meeting on IT-based detection of bioacoustical patterns*, BfN-Skripten 234.

**WEDNESDAY, 17 SEPT, 15:50-17:30 – SESSION 3, CONTINUED**

**Satellite remote sensing for biodiversity monitoring: opportunities and challenges**

Anna Cord

The increasing influence humans have on all ecosystems poses an ever-growing risk for global biodiversity. Because of the size of the affected areas and the speed of environmental change, many traditional monitoring approaches are becoming less feasible. Over the last few decades, there have been enormous technological advances in remote sensing and the usefulness of this technique for ecological research has been demonstrated. However, the two communities have only recently started to coordinate their research agendas. This presentation gives an overview of the opportunities and challenges as well as current trends in satellite remote sensing for biodiversity monitoring purposes.

Further information on the author:

Contact: Helmholtz-Center for Environmental Research (UFZ),  
Department of Computational Landscape Ecology  
Permoserstr. 15, 04318 Leipzig/Germany  
anna.cord@ufz.de, <http://www.ufz.de/index.php?en=30669>

Position: Postdoctoral researcher, Helmholtz-Center for Environmental Research

Research interests: Potential of remote sensing data for biodiversity research;  
Spatial modeling of species distributions and habitats;  
Trade-offs and synergies between ecosystem services und biodiversity

Selected publications:

Beckmann, M., Václavík, T., Manceur, A.M., Šprtová, L., von Wehrden, H., Welk, E. & Cord, A.F. (2014). glUV: A global UV-B radiation dataset for macroecological studies. *Methods in Ecology and Evolution* 5(4), 372-383.

Cord, A.F., Klein, D., Mora, F. & Dech, S. (2014). Comparing the suitability of classified land cover data and remote sensing variables for modeling distribution patterns of plants, *Ecological Modelling* 272, 129-140.

Cord, A.F., Meentemeyer, R.K., Leitão, P.J. & Václavík, T. (2013). Modelling species distributions with remote sensing data: bridging disciplinary perspectives, *Journal of Biogeography* 40(12), 2226-2227.

**WEDNESDAY, 17 SEPT, 15:50-17:30 – SESSION 3, CONTINUED**

**From species distribution models to potential resistance surfaces: tracking fine scale habitat suitability and potential gene flow for conservation planning**

Dennis Rödder

Climate change and increasing anthropogenic habitat fragmentation are considered as major threats for global biodiversity. The European Unions' goal to stop biodiversity loss within its community borders until 2010 by introducing the Habitat directive (92/43/EEC) failed. One reason may be loss of (genetic) diversity due to habitat fragmentation highlighting landscape configuration as essential component to safeguard biodiversity. Potential habitats acting as inter-population connectivity corridors by promoting genetic exchange among populations are, in turn, mostly ignored in common practice of environmental planning. In this talk I highlight the use of fine-scale predictive connectivity models derived from multispectral satellite data for the quantification of spatially explicit habitat corridors for species of special interest in planning practice.

Further information on the author:

Contact: Zoological Research Museum Alexander Koenig (ZFMK)  
Adenauerallee 160, 53113 Bonn/Germany; d.roedder@zfmk.de  
[http://www.zfmk.de/web/ZFMK\\_Mitarbeiter/RdderDennis/index.en.html](http://www.zfmk.de/web/ZFMK_Mitarbeiter/RdderDennis/index.en.html)

Position: Curator, Head of Herpetology Section, ZFMK

Research interests: Taxonomy, faunistics, aut- / synecology, diversity patterns and conservation of amphibians and reptiles with special focus on tropical amphibian communities; Spatial epidemiology of the amphibian chytrid fungus *Batrachochytridium dendrobatidis*; Macroecology / Species Distribution Modelling with focus on climate change impacts as well as structure and evolution of environmental niches

Selected publications:

Ihlow, F., R. Bonke, T. Hartmann, P. Geissler, N. Behler and D. Rödder (2014). Habitat suitability, coverage by protected areas and population connectivity for the Siamese Crocodile *Crocodylus siamensis* Schneider, 1801. *Aquatic Conservation: Marine and Freshwater Ecosystems*. DOI: 10.1002/aqc.2473.

**WEDNESDAY, 17 SEPT, 15:50-17:30 – SESSION 3, CONTINUED**

Rödder, D., A. M. Lawing, M. Flecks, F. Ahmadzadeh, J. Dambach, J. O. Engler, J. C. Habel, T. Hartmann, D. Hörnes, F. Ihlow, K. Schidelko, D. Stiels, and P. D. Polly (2013). Evaluating the significance of paleophylogeographic species distribution models in reconstructing quaternary range-shifts of Nearctic chelonians. *PLoS ONE* 8: e72855

Wagner, N., D. Rödder, C. Brühl, M. Veith and S. Lötters (2014). Assessing the risk of pesticide exposure for amphibian species listed in Annex II of the Habitats Directive. *Biological Conservation* 176: 64-70.

**PANEL DISCUSSION**

**What can science do to safeguard biodiversity?**

With speakers of Session 1 to 3:

Rolf Bardeli (IAIS),  
Wilhelm Barthlott (University of Bonn),  
Anna Cord (UFZ),  
Matthias Geiger (ZFMK),  
Andreas Krüß (BfN),  
Jens Mutke (University of Bonn),  
Dennis Rödder (ZFMK),  
Johannes Stahl (UNEP/CMS),

Facilitated by: Stuart L. Pimm (Duke University).

**THURSDAY, 18 SEPT, 9:00-10:15**

**SESSION 1: BIODIVERSITY FOR FOOD AND AGRICULTURE/BIO-ECONOMY**

CHAIR: Stefan Schröder, Federal Office for Agriculture and Food (Bundesanstalt für Landwirtschaft und Ernährung, BLE); RAPPOREUR: Monika Winkler (BLE)

**Conservation and sustainable use of genetic resources for food and agriculture in Germany**

Thomas Meier

Biodiversity for food and agriculture is among the earth's most important resources: insects that pollinate plants, diverse livestock breeds used to make a living in different environments or thousands of varieties of crops that sustain food security worldwide. Biodiversity is essential for achieving nutritional diversity in diets which is important for human health and development. And it is crucial to safeguard options for sustainable agriculture in constantly changing environments. However, biodiversity is at risk all over the world today, as well as in Germany. The presentation gives an overview of national and international activities and approaches of the Federal Ministry of Food and Agriculture to encourage and support conservation and sustainable use of biological diversity for food and agriculture.

Further information on the author:

Contact: Federal Ministry of Food and Agriculture (Bundesministerium für Landwirtschaft und Ernährung)  
Rochusstraße 1, 53123 Bonn/Germany  
Thomas.Meier@bmel.bund.de; www.bmel.de

Position: Senior Expert on genetic resources and agrobiodiversity

**THURSDAY, 18 SEPT, 9:00-10:15 – SESSION 1, CONTINUED**

**Biodiversity – a prerequisite for success in plant breeding**

Jens Léon

Plant breeding aims to improve crops in order to serve human needs. The most important method to achieve this goal is to establish genetically different plants by crossing diverse individuals followed by a selection of the most suitable progenies. Having this in mind, plant breeding success highly depend on genetic diversity, the biodiversity within species. Breeders will utilize the diversity within an elite breeding population first, but whenever they have to include new traits into their elite breeding population, crossing with unrelated, exotic or even wild species as parental material is necessary.

Further information on the author:

Contact: Institute of Crop Science and Resource Conservation (INRES),  
University of Bonn  
Katzenburgweg 5, 53115 Bonn/Germany  
j.leon@uni-bonn.de, www.inres.uni-bonn.de

Position: Professor of Plant Breeding

Research interests: Quantitative genetics, abiotic stress, noninvasive techniques

Selected publications:

Sayed, AS., Schumann, H., Pillen, K., Naz, AA, Léon, J., 2012. AB-QTL analysis reveals new alleles associated to proline accumulation and leaf wilting under drought stress conditions in barley (*Hordeum vulgare* L.). BMC Genetics, 13:61.

Naz, AA, Ehl, A., Pillen, K., Léon, J, 2012. Validation for root-related quantitative trait locus effects of wild origin in the cultivated background of barley (*Hordeum vulgare* L.). Plant Breeding 131, 392-398.

Wang, GW , Schmalenbach, I , von Korff, M , Léon, J , Kilian, B , Rode, J , Pillen, K 2010: Association of barley photoperiod and vernalization genes with QTLs for flowering time and agronomic traits in a BC2DH population and a set of wild barley introgression lines. Theor Appl Genet 120 559-1574.

**THURSDAY, 18 SEPT, 9:00-10:15 – SESSION 1, CONTINUED****Bioeconomy and biodiversity: Where are the opportunities?**

Ulrich Schurr

Biodiversity is needed for diversification in a sustainable bioeconomy. Conservation of seed is of utmost importance to sustain genetic diversity of agricultural crops and underutilized crops may provide great potential for novel value generation in a sustainable way in industrialized and/ or in developing countries. Beyond conservation it is important to analyze the diversity of plant species to learn more about their physiology and adaptive responses. Modern plant phenotyping opens new routes to generate important knowledge on such species in the wild as well as in characterizing resources stored in seed banks.

## Further information on the author:

Contact: Forschungszentrum Jülich, IBG-2 Plant Sciences  
Wilhelm-Johnen-Straße, 52328 Jülich/Germany  
u.schurr@fz-juelich.de; www.fz-juelich.de

Position: Managing Director, Institute of Bio- and Geosciences/Plant Sciences

Research interests: Bioeconomy, plant physiology, crop diversity,  
phenotyping technologies and application

## Selected publications:

Fiorani, F.; Schurr, U. (2013) Future Scenarios for Plant Phenotyping. Annual review of plant biology, 64, 267 – 291

McCouch, S.; Baute, G.J.; Bradeen, J.; Bramel, P.; Bretting, P.K.; Buckler, E.; Burke, J.M.; Charest, D.; Cloutier, S.; Cole, G.; Dempewolf, H.; Dingkuhn, M.; Feuillet, C.; Gepts, P.; Grattapaglia, D.; Guarino, L.; Jackson, S.; Knapp, S.; Langridge, P.; Lawton-Rauh, A.; Lijua, Q.; Lusty, C.; Michael, T.; Myles, S.; Naito, K.; Nelson, R.L.; Pontarollo, R.; Richards, C.M.; Rieseberg, L.; Ross-Ibarra, J.; Rounsley, S.; Hamilton, R.S.; Schurr, U.; Stein, N.; Tomooka, N.; van der Knaap, E.; van Tassel, D.; Toll, J.; Valls, J.; Varshney, R.K.; Ward, J.; Wenzl, P.; Zamir, D. (2013) Agriculture: Feeding the future. Nature 499, 23 – 24

Faget, M.; Nagel, K.; Walter, A.; Herrera, J.M.; Jahnke, S.; Schurr, U.; Temperton, V. (2013) Root-root interactions: extending our perspective to be more inclusive of the range of theories in ecology and agriculture using in-vivo analysis. Annals of botany, 112(2): 253-266

**THURSDAY, 18 SEPT, 10:45-12:30****SESSION 2: BIODIVERSITY AND HUMAN DEVELOPMENT**

CHAIR: Manfred Denich, Center for Development Research (ZEF);

RAPPORTEURS: Darya Hirsch & Holger Willing, International Centre for Sustainable Development / Bonn-Rhein-Sieg University of Applied Sciences

**KEYNOTE: Integrating Natural Capital with Development Decisions: Pathways and Options**

Pushpam Kumar

Mainstreaming of natural capital into development policy is designed to help decision makers at all levels (governments, businesses, multilevel development banks, individuals, etc.). Integrating ecosystems and their services into their decision making processes not only enriches the decisions but rectifies the mistakes usually committed by sector specific policies typically practiced by conventional planners and decision makers. The possible approaches and pathways for integration of biodiversity and ecosystem services could not be within the discipline of economics science alone but would transcend to many branches of social and natural sciences. Mainstreaming of natural capital including biodiversity however critically depend upon metrics and measurement widely recognised in economics. They could be wealth measurement and designing of economic tools which has potential to induce efficiency and equity both. The talk builds upon the application of these tools and shares lessons learned from various initiatives including VANTAGE (Valuation and Accounting of Natural Capital for Green Economy) of the UNEP. The focus would be to come out with some insightful recommendations based on the findings from developing parts of the world.

## Further information on the author:

Contact: Division of Environmental Policy Implementation (DEPI),  
United Nations Environment Programme (UNEP)  
P.O.Box 30522, Nairobi 00100/Kenya  
pushpam.kumar@unep.org

Position: Chief, Ecosystem Services Economics Unit (DEPI/UNEP)

## Selected publications:

Co-coordinating Lead Author and Co-coordinator, Responses Working Group for Millennium Ecosystem Assessment and Lead Author for the Fourth Assessment of the IPCC (Mitigation) – recipient of Nobel Peace Prize for 2007. He was also the Scientific Co-coordinator of the Conceptual Framework for the TEEB. Numerous publications in peer reviewed journals and more than ten books. Currently, he also leads GEF supported “Mainstreaming of ecosystem services into development policies (‘Proecoserv’) and coordinates “Inclusive Wealth Report” as well as other projects.

**THURSDAY, 18 SEPT, 10:45-12:30 – SESSION 2, CONTINUED**

**Biodiversity and human development: Interplay or Contradiction?**

Henning Sommer & Lisa Freudenberger

Conservation of biological diversity and human development are often perceived as two contradicting targets that exclude each other. Often, human development can only be achieved by interventions that are not advantageous for nature. On the other hand, biodiversity and ecosystems are of indispensable relevance for human development as they provide ecosystem services. Hence, any kind of sustainable human development requires to take into account the trade-offs with regard to biodiversity and ecosystem service losses and should aim at minimizing negative impacts. The good news is that it is possible to reduce the impact of human development on the environment through comprehensive management plans. But sound knowledge and public awareness are the keys for sustainable development and the cognition that there apparently is a limit to development, if we want to maintain livelihoods today and in future.

Further information on the authors:

Contact: Center for Development Research (ZEF), Dept. Ecology and Natural Resources Management, University of Bonn  
Walter-Flex-Str. 3, 53113 Bonn/Germany  
l.freuden@uni-bonn.de; hsommer@uni-bonn.de; www.zef.de

Position: Senior Researchers, Dept. Ecology & Natural Resources Management

Research interests: Biodiversity Research, Conservation, Ecology,  
Species Distribution Modelling

Selected publications:

Sommer, J. H., Kreft, H., Kier, G., Jetz, W., Mutke, J. & Barthlott, W. (2010) Projected impacts of climate change on regional capacities for global plant species richness. *Proceedings of the Royal Society B*. 277(1692),2271-2280.

Freudenberger L., M. Schluck, P. Hobson, H. Sommer, W. Cramer, W. Barthlott and P.L. Ibsch. 2010. A view on global patterns and interlinkages of biodiversity and human development. In: Ibsch, P.L., A. Vega E. and T.M. Herrmann (eds.): Technical Series No. 54: Interdependence of biodiversity and development under global change. *Convention on Biological Diversity*. 37-56.

Freudenberger, L., P. R., Hobson, M., Schluck, S., Kreft, K., Vohland, H., Sommer, S., Reichle, C., Nowicki, W., Barthlott and P. L. Ibsch . 2013. Nature conservation: priority-setting needs a global change. *Biodiversity and Conservation*, 22: 1255-1281.

**THURSDAY, 18 SEPT, 10:45-12:30 – SESSION 2, CONTINUED**

**Sustainable Biodiversity Utilization – Hunting as a Conservation Tool?**

Katharina Trump

Even among experts, trophy hunting as a conservation tool is still controversially discussed between “emotionally lead” animal protection groups and “pragmatic” conservationists. The presentation evaluates the need of trophy hunting in today’s conservation work in South Africa and illustrates its benefits and current limitations by also considering its possible contribution to rural development. The impact hunting can have on the population management of an endangered species will be exemplified through the development of South Africa’s Southern white rhino (*Ceratotherium simum simum*) over the last 100 years.

Further information on the author:

Contact: Global Nature Fund – International Foundation for Environment and Nature  
Hackescher Markt 4, 10178 Berlin/Germany  
trump@globalnature.org; www.globalnature.org

Position: Programme Manager, Global Nature Fund

Main interests: NGO work linking development cooperation and biodiversity protection

**Biodiversity and Trade: From Pilot Projects to Strategy**

Josef Lüneburg-Wolthaus

Contact: REWE Group, Strategic Quality Management  
Domstraße 20, D-50668 Köln / Germany  
josef.lueneburg-wolthaus@rewe-group.com; www.rewe-group.com

Position: Consultant, Strategic Quality Management, REWE Group (since 2006)  
(Tasks: Coordination of sustainability projects and liaison with contract growers of fruits and vegetables for Germany’s second largest grocery chain, risk analysis and development of strategies for lowering pesticide load, development of sustainability strategies regarding biodiversity in the supply chain)

**THURSDAY, 18 SEPT, 13:45-15:45**

**SESSION 3: ETHICAL ASPECTS OF BIODIVERSITY**

CHAIR: Dieter Sturma, German Reference Centre for Ethics in the Life Sciences (DRZE); RAPPORTEUR: Bert Heinrichs (DRZE)

**Ethics and Biodiversity**

Dieter Birnbacher

Biodiversity presents a number of closely interrelated conceptual and ethical problems. One of these is: How should biodiversity be conceptualized if it is to function not merely as a descriptive but as a valuational property of natural systems? It is argued that an autonomous value of biodiversity on the lines of Leibniz' and Nicholas Rescher's metaphysics leads to paradoxes and that, instead, the value of biodiversity as a structural property is centrally dependent on the independent value of the components it. It is argued, furthermore, that to the extent that the value of biodiversity can be vindicated it should not be interpreted in a purely conservative sense.

Further information on the author:

Contact: Institut für Philosophie, Heinrich-Heine-Universität Düsseldorf  
Universitätsstr. 1, 40255 Düsseldorf/Germany  
dieter.birnbacher@uni-duesseldorf.de  
<http://www.phil-fak.uni-duesseldorf.de/philo/personal/ptphil/birnbacher/>

Position: Professor Emeritus of Philosophy,  
Heinrich-Heine-Universität Düsseldorf

Research interests: Ethics, applied ethics, anthropology, Schopenhauer

Selected publications:

Naturalness. Is the "Natural" Preferable to the "Artificial"? Lanham MD: University Press of America 2014.

Biodiversity and the 'substitution problem'. In: Dirk Lanzerath/Minou Friele (eds.): Concepts and values in biodiversity. London/New York 2014, 39-54.

**THURSDAY, 18 SEPT, 13:45-15:45 – SESSION 3, CONTINUED**

**Wilderness and biodiversity**

Hans-Joachim Mader

Wilderness is nature pure with no or the least possible human influence. Large wilderness areas cannot be found in Central Europe. The German government has decided to protect 2% of the German territory as wilderness area. The "wilderness foundation" (Stiftung Naturlandschaften Brandenburg) is taking part in this process. This task as well as problems and achievements in the daily routine are described and discussed in the context of biodiversity.

Further information on the author:

Contact: Dr.-Wolff-Str. 69a, 14542 Werder/Germany  
hajo.mader@email.de, [www.stiftung-nlb.de](http://www.stiftung-nlb.de)

Position: Director of the board "Stiftung Naturlandschaften Brandenburg"

Research interests: Wilderness, nature conservation, biodiversity

Selected publications:

Mader, H.-J. (1984): Animal habitat isolation by roads and agricultural fields. – Biol. Conservation 29, 81-96

Mader, H.-J. (1980): Die Verinselung der Landschaft aus tierökologischer Sicht. – Natur und Landschaft 55(3): 91-96

Mader, H.-J. (1979): Die Isolationswirkung von Verkehrsstraßen auf Tierpopulationen, untersucht am Beispiel von Arthropoden und Kleinsäugetern der Waldbiozönose. – Schr.R. Landschaftspfl. Naturschutz 19: 1-131

**THURSDAY, 18 SEPT, 13:45-15:45 – SESSION 3, CONTINUED**

**Landscape and Biodiversity**

Thomas Kirchhoff

In my talk I address such biodiversity conservation goals that refer to values of landscapes. I focus on two issues: (1) As to these values, you must not only distinguish between instrumental and eudaimonistic values but you must also take into account that these different values refer to categorically different kinds of objects; otherwise misunderstandings and methodological mistakes are inevitable. (2) Whether or not you expect that the realization of instrumental and eudaimonistic conservation goals coincides, depends on the theory about the organization of ecosystems you assume to be true.

Further information on the author:

Contact: Protestant Institute for Interdisciplinary Research  
Schmeilweg 5, 69118 Heidelberg/Germany  
thomas.kirchhoff@fest-heidelberg.de  
<http://www.fest-heidelberg.de/index.php/tnw-kirchhoff>

Position: Scientific Assistant, Protestant Institute for Interdisciplinary Research, Theology and Science group; Visiting Lecturer, Technical University of Munich, School of Life Sciences

Research interests: Lifeworldly and scientific views of nature, and their relationships; theory of ecology; concepts of biodiversity, landscape, and wilderness; philosophy of nature

Selected publications:

Kirchhoff, Thomas 2014: Community-level biodiversity: an inquiry into the ecological and cultural background and practical consequences of opposing concepts. In: Lanzerath, Dirk & Friele, Minou (eds): Concepts and values in biodiversity. London, Routledge: 99-119.

Kirchhoff, Thomas/ Vicenzotti, Vera 2014: A historical and systematic survey of European perceptions of wilderness. *Environmental Values* 23 (4): 443-464.

Kirchhoff, Thomas 2012: Diversität als Vielfalt oder als Pluralität. Über konkurrierende Diversitätskonzepte in christlicher Kosmologie, Ökologie und Biodiversitätsdiskursen. In: Vogelsang, Frank/ Meisinger, Hubert/ Moos, Thorsten (Hg.): Gibt es eine Ordnung des Universums? Der Kosmos zwischen Messung, Anschauung und religiöser Deutung. Bonn: Evangelische Akademie im Rheinland, 147-168.

**THURSDAY, 18 SEPT, 13:45-15:45 – SESSION 3, CONTINUED**

**Animals and Biodiversity**

Johanna Risse

Wild animals are kept captive and are routinely killed in the name of biological diversity preservation. This raises significant ethical concerns and has led to considerable conflicts between animal welfare groups on the one hand and environmental conservationists on the other. The conflicts can be traced back to the deep gulf dividing the moral foundations of animal rights/welfare approaches and the ecologically orientated ethical stances. Although animal liberationist and environmentalist agree that ethics must be extended beyond the human species, environmental philosophy differs notably from animal liberation philosophy in its valuing of collectives (ecosystems and species) above individuals (sentient and non-sentient beings). Arguably, it has become the paradigmatic statement that animal ethic views cannot ground an adequate environmental ethic because their implications would be systematically opposed to the goals on the environmentalist agenda. I will argue that an animal ethic can not only be an environmental ethic, but it has also the potential to empower a biodiversity preservation movement.

Further information on the author:

Contact: German Reference Center for Ethics in the Life Sciences  
Bonner Talweg 57, 53113 Bonn/Germany  
risse@drze.de, [www.drze.de](http://www.drze.de)

Position: Scientific research assistant, German Reference Center for Ethics in the Life Sciences

Research interests: Animal ethics, environmental ethics, philosophy of nature

Selected publications:

Sturma, D., Lanzerath, D., Heinrichs, B. (Hrsg.): Biodiversität. Ethik in den Biowissenschaften - Sachstandsberichte des DRZE. Verlag Karl Alber (2008).

Risse, J.: Moralische Verpflichtungen gegenüber Tieren? Tierethische Überlegungen im Anschluss an Immanuel Kants Moralphilosophie. Unveröffentlichte Magisterarbeit, Universität Bonn (2010).



**THURSDAY, 18 SEPT, 16:15-17:45**

**SESSION 4: SOCIETAL (SOCIAL, CULTURAL, POLITICAL) IMPACT**

CHAIRS/RAPPORTEURS: Bettina Schlüter & Björn Müller-Bohlen, Forum Internationale Wissenschaft (FIW), University of Bonn

Based on biocentric approaches in social sciences, philosophy and cultural studies, this session focuses on biodiversity as a field, in which ecological, political, cultural, media and economic aspects and challenges are profoundly interlinked. Especially holistic views and approaches will be of interest, as they mark basic shifts of perspectives and introduce practical steps to preserve biodiversity at the same time.

In his keynote speech, Prof. Dr. Alberto Acosta, former president of the constituent assembly of Ecuador, will give an insight view into political processes and the implementation strategies of biodiversity-protection programs on a governmental level. The following talk between the panelists will discuss this far-reaching attempt and examine its preconditions and consequences from different regional and professional perspectives.

**KEYNOTE: The rights of nature – Alberto Acosta**

**PANEL DISCUSSION**

with: Alberto Acosta (Quito, Ecuador),  
Anna-Katharina Hornidge (ZEF, University of Bonn),  
Karoline Noack (Department for the Anthropology of the Americas,  
University of Bonn),  
Irene Quaile-Kersken (Environment/Climate Correspondent, DW),  
Jean Carlo Rodríguez (Environmental Policy and Natural Resource  
Management, German Development Institute)

Facilitated by: Bettina Schlüter & Björn Müller-Bohlen (FIW, University of Bonn)

Further information on panelists:

Alberto Acosta

Contact: Facultad Latinoamericana de Ciencias Sociales Sede Ecuador  
(FLACSO), Departamento Desarrollo, Ambiente y Territorio;  
Calle La Pradera E7-174 y Av. Diego de Almagro, Quito/Ecuador  
aacosta@flacso.edu.ec

Position: Professor of Economics

**THURSDAY, 18 SEPT, 16:15-17:45 – SESSION 4, CONTINUED**

Anna-Katharina Hornidge

Contact: Center for Development Research, Dept. Political and Cultural Change  
University of Bonn, Walter-Flex-Str. 3, 53113 Bonn/Germany  
hornidge@uni-bonn.de; www.zef.de

Position: Director and Professor, Dept. Political and Cultural Change (ZEF)

Research interests: Science policy, water resources, social and cultural change  
and adaption

Karoline Noack

Contact: University of Bonn, Institut für Archäologie und Kulturanthropologie,  
Abteilung für Altamerikanistik, Oxfordstr. 15, 53111 Bonn/Germany  
knoack@uni-bonn.de; <http://www.iae.uni-bonn.de>

Position: Professor, Department of Cultural Anthropology of the Americas

Research interests: Transcultural processes in Latin America in a historical per-  
spective, museum and material culture studies, urban anthropology

Selected publications:

Susan Elizabeth Ramírez und Karoline Noack (Eds.), Contextualizando la ciudad en  
América Latina. Reflexiones desde la academia y el movimiento ciudadano. Quito 2011:  
Abya-Yala.

La construcción de diferencia en la zona de contacto: interrogantes al respecto de la  
etnicidad, In: Etnicidad, ciudadanía y pertenencia: prácticas, teoría y dimensiones  
espaciales. Sarah Albiez, Nelly Castro, Lara Jüssen, Eva Youkhana (Eds.), Madrid &  
Frankfurt am Main 2011: Iberoamericana und Vervuert, S. 35-63.

Irene Quaile-Kersken

Contact: Deutsche Welle Umweltredaktion,  
Kurt-Schumacher-Str. 3, 53113 Bonn/Germany  
Irene.Quaile@dw.de; www.dw.de  
Climate Change Blog: Ice Blog: <http://blogs.dw.de/ice/>

Position: Environment and Climate Change Correspondent, Deutsche Welle

Selected publications:

<http://www.dw.de/stay-at-home-bees-live-longest/a-17826383>

Climate Change affects Arctic Biodiversity: <http://blogs.dw.de/ice/?tag=biodiversity>

<http://www.dw.de/new-hope-for-antarctic-ocean/a-17792474>

<http://www.dw.de/seed-bank-celebrates-ten-years-of-food-security/a-17457351>

<http://www.dw.de/the-other-climate-problem-co2-threatens-marine-life/a-17268533>

**THURSDAY, 18 SEPT, 16:15-17:45 – SESSION 4, CONTINUED**

Jean Carlo Rodríguez

Contact: German Development Institute (Deutsches Institut für  
Entwicklungspolitik, DIE)  
Tulpenfeld 6, 53113 Bonn/Germany  
Jean.Rodriguez@die-gdi.de; <http://www.die-gdi.de>

Position: Researcher, Dept. Environmental Policy and Natural  
Resource Management (DIE)

Research interests: Ecosystem services and society, political ecology,  
socio-economic impacts of conservation.

Selected publications:

Rodríguez-de-Francisco, J.C., Budds, J., Boelens, R., 2013. Payment for environmental  
services and unequal resource control in Pimampiro, Ecuador. *Society and Natural  
Resources* 26, 1217-1233.

Rodríguez-de-Francisco, J.C., Budds, J., in press. Payments for environmental services and  
control over conservation of natural resources: The role of public and private sectors in  
the conservation of the Nima watershed, Colombia. *Ecological Economics*.

Rodríguez-de-Francisco, J.C. 2006. Identificación de incentivos inadecuados y barreras de  
mercado en materia de biodiversidad a nivel nacional y subnacional, CAF. IAvH. Volumen I.  
CAF, Bogotá.

**FRIDAY, 19 SEPT, 9:00-10:30**

**SESSION 1: INTERACTIVE SESSION ON CAPACITY BUILDING TO SUSTAIN  
BIODIVERSITY: APPROACHES, NEEDS AND REFLECTIONS ON BION'S ROLE  
AND CONTRIBUTION**

CHAIRS/RAPORTEURS: Marianne Alker & Klemens Riha, Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ)

Capacity building is a central concern of promoting the conservation and  
sustainable use of biodiversity. This session aims at bringing different BION  
stakeholders from various sector and backgrounds together to reflect on different  
understandings, approaches and requirements for capacity development within  
and through BION. The session will offer an interactive space to share capacity  
building formats and concepts already available within BION, and will discuss  
how these can help to meet concrete needs and reach the relevant target groups.  
The participants are invited to explore local, regional and international examples  
and good practices that help to link research, policy and practice.

Facilitated by: Gudrun Henne, Viveka International (Berlin)

**FRIDAY, 19 SEPT, 11:00-12:30**

**SESSION 2: BIODIVERSITY AND QUALITY OF LIFE:  
INTERDISCIPLINARY CHALLENGES**

CHAIR & INTRODUCTION: Dirk Lanzerath, German Reference Centre for Ethics in the Life Sciences (DRZE), University of Bonn; RAPPORTEUR: Bert Heinrichs (DRZE)

Since its introduction the term “biodiversity” does not only describe scientific facts but it also covers normative requirements in terms of evaluations to inspire environmental and natural policies. It is therefore often referred to as “epistemic moral hybrid”. Nevertheless, descriptive elements, e.g. if a high level of biological diversity contributes to more stability within an ecosystem or whether biodiversity is an indicator of extraordinary ecosystem services, must be distinguished from normative judgments. Questions such as “whether the stability of a certain ecosystem is desirable or not” or “whether there is a moral need to take action in order to preserve native species”, belong to the latter group of judgments. Therefore the impact of biodiversity on our quality of life has to be considered as an enormous interdisciplinary challenge.

Within a constructive interaction of all panelists coming from biology, geography, agriculture, economics, ethics, law and other disciplines the panel will sound out opportunities how these disciplines with their various approaches and languages view on biodiversity and how they could interact to establish more effective ways to protect biodiversity as an element of a modern vision of quality of life.

**PANEL DISCUSSION**

with: Michael Blanke (INRES, University of Bonn),  
Tade Matthias Spranger (IWE, University of Bonn),  
Wiltrud Terlau (Department of Economics, BRSU),  
Sabine Tröger (Department of Geography, University of Bonn),  
Wolfgang Wägele (ZFMK)  
Lucina Zedda (BIO-Diverse, Bonn)

Facilitated by: Katharina Seuser (Department of Electrical Engineering,  
Mechanical Engineering and Technical Journalism, BRSU)

**FRIDAY, 19 SEPT, 11:00-12:30 – SESSION 2, CONTINUED**

Further information on panelists & facilitator:

Michael Blanke

Contact: Horticultural Science, Institute of Crop Science and Resource Conservation (INRES), University of Bonn  
Auf dem Hügel 6; 53121 Bonn/Germany  
mdblank@uni-bonn.de; www.inres.uni-bonn.de

Position: Head of research group ‘Crop Physiology’

Katharina Seuser

Contact: Department of Electrical/Mechanical Engineering and Technical Journalism; Bonn-Rhein-Sieg University of Applied Sciences (BRSU)  
Grantham-Allee 20, 53757 Sankt Augustin/Germany  
Katharina.seuser@h-brs.de; www.fb03.h-bonn-rhein-sieg.de/en/Home.html

Position: Professor of Journalism and Media Production, Dept. of Electrical/  
Mechanical Engineering and Technical Journalism, BRSU

Tade Matthias Spranger

Contact: Institute of Science and Ethics (IWE), University of Bonn  
Bonner Talweg 57, 53113 Bonn/Germany  
spranger@iwe.uni-bonn.de; www.iwe.uni-bonn.de

Position: Head of Junior Research Group ‘Norm-setting in the modern life sciences’, Institute of Science and Ethics (IWE)

Wiltrud Terlau

Contact: Bonn-Rhein-Sieg University of Applied Sciences (BRSU)  
Grantham-Allee 20, 53757 Sankt Augustin/Germany  
wiltrud.terlau@h-brs.de;  
www.wir.hbrs.de/wirtschaftswissenschaften\_rheinbach.html

Position: Professor of Economics and Economic Policy, BRSU

Sabine Tröger

Contact: Department of Geography, University of Bonn  
Meckenheimer Allee 166, 53115 Bonn/Germany  
troeger@giub.uni-bonn.de;

Position: Professor of Development Geography

**FRIDAY, 19 SEPT, 11:00-12:30 – SESSION 2, CONTINUED**

Wolfgang Wägele

Contact: Zoological Research Museum Alexander Koenig (ZFMK) –  
Leibniz Institute for Animal Biodiversity  
Adenauerallee 160, 53113 Bonn/Germany  
w.waegele.zfmk@uni-bonn.de; www.zfmk.de

Position: Director of ZFMK and Professor of Systematic Zoology  
at University of Bonn

Lucina Zedda

Contact: BIO-Diverse  
Ließemer Str. 32a, 53179 Bonn/Germany  
luciana.zedda@bio-diverse.de; www.bio-diverse.de

Position: Project manager, BIO-Diverse

**FRIDAY, 19 SEPT, 12:30-13:15 – CONCLUDING SESSION**

CHAIRS:

Maximilian Weigend, Speaker of BION and Nees Institute / University of Bonn,  
& Thomas Graner, Head of Central Section and Main Section I, Federal Agency  
for Nature Conservation (BfN)

**BION Secretariat**

c/o Botanische Gärten der Universität Bonn  
Meckenheimer Allee 171  
53115 Bonn/Germany

phone +49 228 73 9054 or 9055  
fax +49 228 73 1690

[bion@uni-bonn.de](mailto:bion@uni-bonn.de)  
[www.bion-bonn.org](http://www.bion-bonn.org)

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